THE SHIFT PROJECT

Audencia

EDUCATING THE ACTORS OF TOMORROW'S ECONOMY

REPORT – NOVEMBER 2022

Preamble

This report is intended for the French business school ecosystem, and more specifically for school directors and teachers.

Spurred by the general mobilization of public opinion and students, and by The Shift Project's messages addressed to higher education institutions, Audencia proposed to The Shift Project to join forces in order to initiate specific reflection on business schools, which gave birth to the project **"ClimatSup Business - Educating the actors of tomorrow's economy"**. Audencia, the lead partner, was then joined by many others.

The objective of the ClimatSup Business project is to contribute to the **transformation of management education so that 100% of students are trained in environmental issues.** It aims to inspire all institutions, whatever their nature (public or private) and whatever the program taught[1].

The project concerns only the teaching provided. Research activities, the implementation of environmental practices in campus management, and other areas of ecological transition at an institution are addressed only incidentally. It deals with **environmental issues in the broadest sense** (see "Leading an ecological transition involves rethinking our activities and our models of society," p. 19) and puts a focus on **initial training**[2]. It covers every discipline of management.

ClimatSup Business is structured around four questions:

- **Why integrate environmental issues in management education?**

The first part (p. 18) takes stock of the current ecological crises, their link with our economic and social organization, and the implications for management training.

- **What are the current dynamics?**

The second part (p. 35) presents an overview of business schools from the point of view of the variety of institutions involved in this type of education, the dynamics that drive its various stakeholders and the obstacles to the widespread teaching of environmental issues.

- **What should graduates know?**

The third part of the project (p. 68) presents the base of knowledge and skills necessary to understand and implement ecological transition and describes it for certain professions.

- **How can these contents be integrated in existing training?**

This question calls for several levels of response. Avenues for reflection for program managers and teachers are shared at the end of Part 3 (p. 132). A guide for heads of institutions and recommendations for other stakeholders (teachers, students, institutional staff, alumni, companies, academic associations, accreditation and ranking bodies) are presented in Part 4 (p. 151).

[1] This does not exclude the fact that the content and tools produced in this report may inspire pedagogical leaders and business school teachers working in other types of institutions. The teaching of management plays a significant role in engineering schools, for example. It is also widely taught in high schools, in baccalaureate courses such as STMG or BTS.

[2] However, what emerges from this work can be used for continuing education.

Feedback on the transformation of teaching in several institution is available in the Compendium of Feedback from Institutions, published as a supplement to this report and summarized in Part 5 (p. 219)[3].

This work was guided by principles of scientific rigor and carried out in consultation with the stakeholders. This concertation process goes beyond Audencia, since this project invites other actors to participate in the reflection: the other partners of the project, experts from different disciplinary fields, companies, alumni, students, etc. (see acknowledgements at the end of the report, as well as the guiding principles for the project in the appendix[4]).

The ClimatSup Business report is complemented by a report dedicated to finance, resulting from the ClimatSup Finance project, published on 15 December 2022 in French. ClimatSup Finance deepens the reflection conducted within ClimatSup Business by:

- Taking stock of how environmental issues are taken into account in the finance training courses that are the reference in France,
- Reviewing current developments in finance in relation to environmental issues and exploring possible future developments in a prospective approach,
- Proposing a base of necessary knowledge and skills for the integration of environmental issues in finance and extending this reflection to four families of professions,
- Proposing a model for training in finance.

The ClimatSup Finance report will be available in English in 2023.

[3] The Compendium of Feedback from Institutions was only published in French. It is available on the project's French web page under the title "Recueil de retours d'expérience": https://theshiftproject.org/former-acteurs-economie-de-demain/

[4] The appendices were only published in French. They are available on the project's French web page: https://theshiftproject.org/former-acteurs-economie-de-demain/

Foreword

What does it mean to be a "manager" in the age of planetary limits? Is it simply making a business plan, recruiting employees, seducing consumers, financing, and advising "as usual" with just one more CSR report to produce, or does it mean, in practice, turning upside down the rules for managing an organization?

In the latter case, should we throw away two centuries of intellectual heritage in classical economics and all that derives from it, since the latter was theorized without taking into account the existence of natural resources of any kind, even though without them there can be no economic activity?

If carbon or biodiversity are now criteria that we seek to optimize before pounds and dollars, what is a "2°C compatible" business plan? What does an economy compatible with shrinking physical flows look like? Or for that matter an advertising campaign that does no harm?

Behind all these questions come others: what knowledge and skills should be provided to a management student in the light of the previous questions? Will we need the same teachers who will merely need to be trained in new approaches, or will the angle be so different that the teaching staff able to officiate in this new context will have to come from outside?

Should students be selected according to different bases? Should we invent rankings of institutions that no longer make the salary obtainable at the end of the course the main criterion? How can we stop serving a system that we know is heading for disaster without heading for the same fate ourselves because we are no longer in the game?

The report you hold in your hands does not pretend to provide definitive answers to all of these questions, and to all the others that arise when considering what needs to change in management education. But it does claim to make a start in addressing the formidable task ahead.

The practical questions multiply immediately when getting ready to act. How do you get teachers on board a project that will require them to make an effort, or even, for some, to give up? Should we listen to recruiters, who are by nature the embodiment of the existing system, which we must get rid of, or listen to students who may have aspirations that do not (yet) correspond to existing jobs?

After more than a year of work, a luxury considering we are increasingly in a race against time, The Shift Project provides you fuel for thought on how to train "managers" differently. I hope you will find the results interesting.

Jean-Marc Jancovici, President of The Shift Project

“Changing things so everything remains the same[5]". This famous aphorism perfectly sums up the challenge facing our schools: the transformation towards a decarbonized, sober and resilient economy and society is not a matter of minimal change, a coat of green paint on our ways of doing things, but a profound paradigm shift in the way we think and organize our productive system. Thus, because they train those who must be able to transform companies and propose innovative initiatives today and tomorrow, business schools and other management training institutions have a fundamental role to play in this change.

Gaïa, Audencia has been at the avant-garde of CSR for nearly 20 years, it was the first School of Management to sign the Global Compact in 2004, it has been a partner of the WWF for 22 years, and it launched its School of Ecological and Social Transition in 2021. In partnership with The Shift Project and within the framework of the ClimatSup Business project, Gaïa, Audencia committed itself in 2022 to changing the content of its training courses in such a way as to integrate social and environmental issues to an even greater extent than was previously the case.

This collective project, in which students, graduates, professors, companies, and external actors were consulted and to which other schools, such as EM Normandie, Montpellier Business School, ESCP, ESSEC, ISG, IFCAM, TBS Education and IAE France, wished to join, aims at identifying the knowledge and skills that our students must acquire throughout their training to understand the stakes of ecological and social transition in a managerial context. It also aims, with humility and in a virtuous way, to share the conclusions of the experience gained and the work carried out within the framework of this approach, which took place over several months, with a great number of actors in our sector. This is what this report aims to achieve. I hope you enjoy reading it.

Christophe Germain, General Manager, Audencia

[5] Response taken from the “The Leopard”, a novel by the Italian author Giuseppe Tomasi di Lampedusa.

A word from our partners

"It is essential to better communicate the importance of changing the fundamentals of management sciences, whether in finance, marketing, accounting, logistics, HR... to activate transition. Today, there is a lack of management tools and new performance indicators to design more responsible offers and reorient business models for more sustainable organizations. We hope that this report will help put an end to isolated CSR modules and encourage the training of all management teachers so that they can be vectors of good practices!"

Béatrice Bellini, holder of the **UNESCO Chair "Sustainable consumption and inclusive societies" / Positive Business**, Fondation Université Paris Nanterre

"Education is one of the key levers for complying with the Paris Agreements. Our business schools have a central societal responsibility through their teaching and research activities. We must ensure that managers and decision-makers integrate global limits into their models and that they understand the scope of the transformations underway. We are committed to rethinking management by working with our stakeholders to rethink every discipline (finance, strategy, economics, marketing, human resources, etc.) in the context of global limits.

Frank Bournois, Executive President & Dean, **ESCP Business School**

"TBS Education is ambitiously committed to integrating societal and environmental issues: modules, workshops and conferences to train all students to understand SD-RS issues and to be involved in responsible approaches; programs oriented towards specific knowledge and skills (sustainable development consultant, ESG Financial Analyst, Eco-Marketing Manager for example). Transformation is part of the reflection of the entire faculty. In this perspective, TBS Education was delighted to contribute to the ClimatSup Business project, in order to bring to fruition more widely the efforts of the players in management training, and thus accelerate the movement."

Servane Delanoë-Gueguen, Dean of the Faculty of **TBS Education**

"With its mission to train to transform, MBS reasserts more than ever its vision of managing the economic, environmental and social transformation of companies. We would like to thank the Shift Project and all the stakeholders for their valuable collaboration and this collective dynamic, which is essential for the success of ecological and social transformation. It allows us to take our commitments still further and transform our programs to meet the socio-ecological challenges of our time."

Bruno Ducasse, General Manager of **Montpellier Business School**

"The ESSEC Group is a non-profit association whose mission is to give meaning to the leadership of tomorrow by preparing women and men ready to tackle contemporary economic, environmental and social challenges. Since 2019, transition has been at the heart of the school's strategy, with the ambition to transform training, research and practices. The scale of the

challenges requires exchanges with other business schools as well as with transition experts: ESSEC has therefore chosen to join the ClimatSup Business project led by the Shift Project."

Vincenzo Esposito Vinzi, General Manager of **ESSEC**

"The CDEFM is pleased to support the commitment of its member schools by promoting the integration of CSR issues into the training of those who will be in positions of responsibility tomorrow. In this context, it is working with the CEFDG to develop a common set of CSR skills for business schools recognized by the Ministry of Higher Education and Research. This ongoing transformation complements the actions that the schools have been carrying out for many years in favour of inclusion and diversity, thus contributing to the co-construction of a responsible ecosystem with students, teachers, administrative staff and partner companies."

Françoise Grot, Chief Executive Officer of the **Conference of Directors of French Business schools** (CDEFM)

"Faced with environmental and societal challenges, one of the major missions of EM Normandie is to empower our students so that they are able to initiate change, make informed decisions and collectively build a sustainable future. EM Normandie's participation in the Shift Project's "ClimatSup Business" report is part of this desire to respond to these major transformations. This project has allowed the school to exchange with other institutions and build a solid foundation on regarding the key skills of the economic world of today and tomorrow. The result of this rich collaboration through the various reports will constitute a relevant and mobilizable tool for the School."

Élian Pilvin, General Manager of **EM Normandie**

"The disciplines of economics and management have largely been built outside ecological considerations. For the Transition Campus, ecological and social transition therefore raises the very important issue of disciplinary renewal, which goes well beyond the adaptation of each management sub-discipline. Between the "great resignation" and disdain for "bullshit jobs," the quest for meaning is driving the personal and professional choices of young graduates. It is therefore crucial to train future managers, leaders and experts who will have the difficult task of reversing the trend of a brutal and unequal climate change. For the Campus, the responsibility of business schools is therefore immense to provide the means to meet the challenges of this century.

Cécile Renouard, President of the **Campus de la Transition**

"Faced with our many environmental emergencies, the directors of IAE are convinced of the need to act. That's why they decided to involve the IAE FRANCE network in ecological transition through three lines of action: encourage research projects that integrate environmental issues in management, train teachers to quickly enrich the training programs for all students, and engage a process of continuous improvement in favour of ecological transition at the level of directors and management teams. In this perspective, the "ClimatSup Business" report provides welcome resources to IAEs."

Corinne Van der Yeught, Vice-President of **IAE FRANCE**

EDUCATING THE ACTORS OF TOMORROW'S ECONOMY ON ECOLOGICAL ISSUES: AN ESSENTIAL CONDITION FOR THE TRANSITION

The Shift Project offers an operational method to incorporate ecological issues within management studies, developed in partnership with Audencia business school and multiple other higher education institutions.

Managers have a decisive role to play in the transition to a low-carbon and resilient society. They need to **mitigate the impacts of their organisations on the environment and participate in adapting society to current disruptions.**

Yet, they are very rarely taught about such issues. **In 2019, only 6% of management programs addressed ecological issues as part of their mandatory courses.**[1]

Our economic activity depends on energy and material flows, climatic conditions, and ecosystems. It must respect the planetary boundaries to be sustainable. **Tomorrow's economic actors must fully integrate this reality.**

Management sciences and its professionals are at the heart of this revolution of ideas and practices. **94% of management lecturers believe that their institution should train students on ecological issues.** [2]

The urgency is indisputable. This work needs to start as soon as possible.

THIS REPORT OFFERS :

A knowledge and skills framework
A focus on 4 management disciplines: strategy, marketing, management control, purchasing and logistics
Recommendations for each actor
A curricula transformation guide for the executives and presidents of higher education institutions
Feedbacks from higher education institutions

This report was developed from interviews and workshops with more than **150 representatives** from management higher education professionals.

[1] Mobiliser l'enseignement supérieur pour le climat, The Shift Project, march 2019
[2] The Shift Project survey of higher education management lecturers (489 respondents)

WHAT DO MANAGEMENT GRADUATES NEED TO KNOW ABOUT ECOLOGICAL ISSUES ?

THIS REPORT OFFERS :

A **knowledge and skills framework**

A focus on **4 management disciplines**

The **knowledge and skills framework** is a tool for professors and pedagogical managers.
It describes the knowledge and the skills to include in mandatory classes in management. It is complemented with resources to go further.

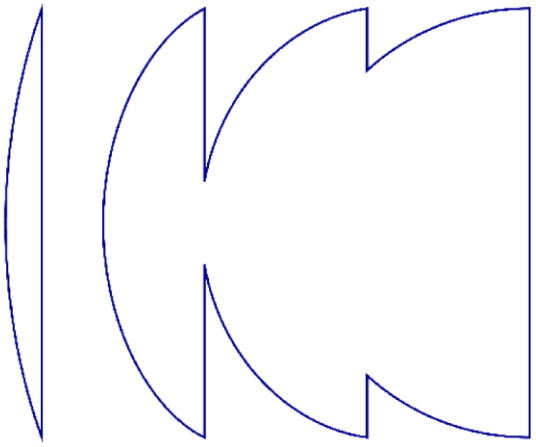
The knowledge framework amounts to about **165 hours of teaching, including 48h (6 ECTS credits) that are dedicated to the physical constraints and their socio-economic implications.** Beyond those courses, the whole educational journey also needs to contribute to teaching those knowledge and skills.

The actors of tomorrow's economy must:

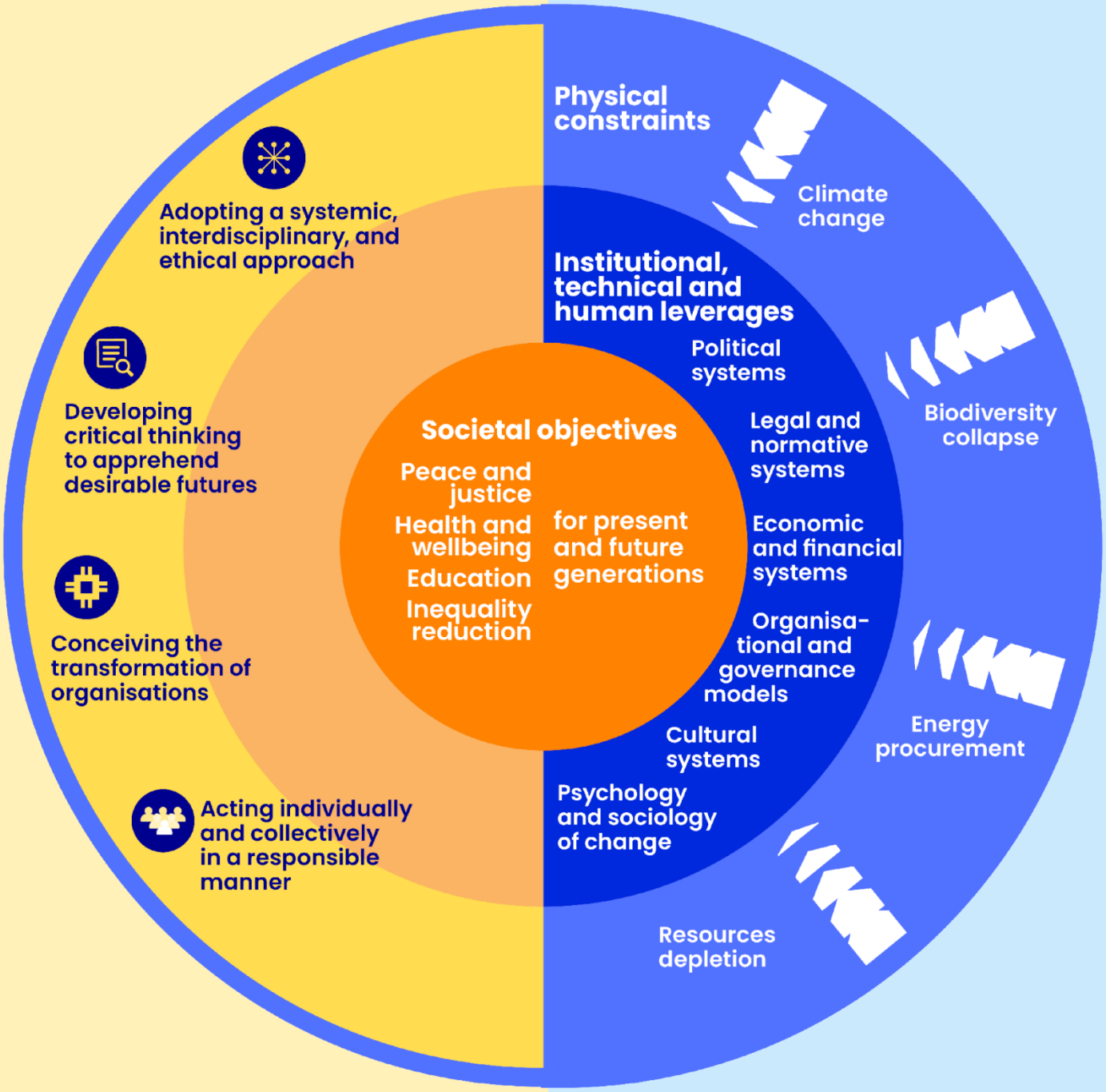
- **Understand the physical constraints and their implications** for society, economic systems, and organisations
- **Mobilise natural sciences, engineering sciences, and human and social sciences**
- **Know the limits of the models** taught in management and economics to take into account the ecological issues
- **Be able to undertake a scenario analysis with physical constraints**
- **Conceive business plans that are compatible with a minimum 6% decrease in greenhouse gas emissions annually**
- **Know how to lead their management and their teams** in a transformation project
- **Dare to be creative** to reinvent current practices

This knowledge and skills framework is completed with:

- **A focus on marketing, strategy** (including consulting), **management control, purchasing and logistics studies,** that highlight the knowledge and skills evolution required by the ecological transition.
- A **focus on digital technologies,** which defines the fundamentals of digital sufficiency. For example, the knowledge of the impacts of digital technologies on greenhouse gas emissions.



TRAINING THE CITIZEN MANAGER OF THE 21ST CENTURY



HOW EACH ACTOR MUST LEAD THE TRANSITION ?

For each recommendation, you will find more details, examples, and resources in the report by looking into the dedicated chapter.

THIS REPORT OFFERS :

A **curriculum transformation guide**

EXECUTIVES AND PRESIDENTS

Driving the institution's transformation

- **Train all staff: at least 10h for management and administrative staff, and 48h for professors,** in order to understand the implications of the planetary boundaries on management teaching
- **Redefine the university's strategy** to include the ecological issues with ambition and coherence in the teaching, research, campus, practices, and governance
- **Mobilise human and financial resources** to lead the transformation: **3% of the operating budget for at least 3 years**
- **Diagnose the starting point** of the institution and identify the assets it can rely on (professors, partners, etc.)

53% of professors declare **needing more time** to integrate ecological issues into the curriculum.
43% declare **needing training.**
42% declare **needing more discussions with their peers.**

- **Organise a consultation** with all stakeholders of the institution **to define a common knowledge and skills framework**
- **Drive the integration of this common framework in all programs** in a coherent manner
- **Work together** with other institutions to move forward faster

PROFESSORS

Training oneself to train others

- **Train oneself** (48h on planetary boundaries and their consequences on society and the economy) and **update course content** according to the knowledge and skills common grounds
- **Publicly share the courses** and teaching materials to accelerate the teachings' evolution
- **Report the expectations** from students and professors **to the institution** administration
- **Switch from a posture of knowledge to a posture of facilitator,** making students actors of their learnings
- **Integrate those issues into their research program**

THIS REPORT OFFERS :

Recommendations
per actor

THE STATE

Set up a suitable framework

- **Inject momentum by defining a national higher education and research strategy for climate** with the objective of training 100% of students on ecological issues
- **Create a framework to incentivise the transition**, for example, by valuing interdisciplinarity work and teaching in the career of professors
- **Offer a financial support to universities** - especially public ones - to aid them in their transition

ACCREDITATIONS AND RANKINGS

Encourage & value

- **Grant ecological issues a higher weight than any other criterion**
- **Precisely define how ecological issues** will be evaluated, by placing planetary boundaries at the centre
- **Value the incorporation** of ecological issues **in all courses**
- **Evaluate, both quantitatively and qualitatively,** the impact of actions undertaken
- **Ensure transparency** in the procedure, methodology, data, and **cross references**

STUDENTS & ALUMNI

Engage & testify

- **Learn about ecological issues**
- **Mobilise and raise awareness** among peers and students and alumni associations, for example, by organising events
- **Alert, and relay expectations** to lecturers and institution administration, for example by talking with them or writing open letters
- **Testify and manifest the need for skills** in the professional world (for alumni)

COMPANIES

Support & testify

- **Become actors in the ecological transition** by integrating those issues into their strategy, operations, and recruitment
- **Organise continuous training of all staff on ecological issues** to be able to lead their transition
- **Recruit competent staff with regard to ecological issues**
- **Finance research** on ecological issues

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PART 1. HIGHER MANAGERIAL EDUCATION IS ESSENTIAL FOR ECOLOGICAL TRANSITION

I. Carrying out ecological transition involves rethinking our activities and societal models

This report addresses environmental issues that go beyond energy and climate topics, i.e. the usual scope of The Shift Project. It reflects the vision of the teaching teams with whom the think tank worked in the framework of this project and upstream. In addition to climate change and energy issues, it addresses other planetary limits, first and foremost the loss of biodiversity[6][7], and other physical constraints linked to the finitude of resources. Above all, it takes into account the social issues linked to physical constraints, in a systemic approach. This larger perimeter gives the teaching team an alternative global vision of our economy.

A. Indisputable scientific consensus: human activities are at the origin of the major imbalances affecting the planet Earth

The situation is worrisome at the beginning of the 21st century.

Human societies are facing what The Shift Project defines as a "double carbon constraint": downstream, it is characterized by climate change, as a result of greenhouse gas (GHG) emissions, and upstream, by the progressive scarcity of fossil energy resources.

Downstream, climate change, which is the result of greenhouse gas emissions of human origin, creates different risks of unprecedented magnitude for both humans and all other living organisms, as the IPCC (Intergovernmental Panel on Climate Change) has been pointing out for three decades. Since 1850, human activities have added about 2,400 billion tons of CO_2 to the atmosphere. The most recent estimates indicate that the remaining carbon budget to meet the Paris Agreement goal of keeping global warming well below 2°C by 2100 is less than 1,000 billion tons of CO_2, or between 20 and 25 years of global emissions at current rates. The challenge is immense: to date, all the commitments of the signatory countries of the Paris Agreement lead to a global warming of more than +3°C.[8]

Upstream, fossil energy resources[9], which account for more than 80% of the primary energy used in the world, are becoming increasingly scarce. In the case of oil in particular, the rate of extraction appears to be increasingly constrained by geological limits. Conventional oil production (which provides 4/5ths of the world's liquid fuel production) reached an all-time high in 2008 and is expected to decline inexorably.[10]. The total oil production of the European Union's main current suppliers is likely to be 10 to 20% lower in the course of the 2030s than in 2019, due

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[6] Biodiversity can be divided into three levels: ecological diversity (diversity of ecosystems), specific diversity (species) and genetic diversity (genes). Biodiversity loss does not only refer to the disappearance of species, but also to the loss of genetic diversity: population decline (decrease in the number of individuals) or disappearance of varieties and races within a species.

[7] Will Steffen et al., "Planetary Boundaries: Guiding Human Development on a Changing Planet", *Science* 347, nº 6223 (13 February 2015): 1259855, https://doi.org/10.1126/science.1259855.

[8] IPCC, "Climate Change 2021: The Physical Science Basis - Summary for Policymakers", August 2021, https://www.ipcc.ch/report/ar6/wg1/.

[9] Oil, coal and natural gas.

[10] In 2010, the International Energy Agency identified a crude oil peak in 2006. It corrected this in 2012, setting the date for the peak of conventional crude oil at 2008. International Energy Agency (IEA), "World Energy Outlook 2010", November 2010, 48; International Energy Agency (IEA), "World Energy Outlook 2012", November 2012, 81; International Energy Agency (IEA), "World Energy Outlook 2018", November 2018, 142.

to the lack of sufficient new reserves to compensate for the decline in existing production [11]. In addition to the obligation to reduce the consumption of fossil resources to limit greenhouse gas emissions, this scarcity obliges us to foresee the reduction of their extraction and use, since it will be done by choice or by force.

The global nature of climate change and the omnipresence of fossil fuels in every aspect of our economies make this double carbon constraint inexorable, both on the global scale and in France.

Recent human activities are also the source of other physical upheavals of a magnitude never before seen in human history, which some researchers have grouped together under the notion of the "Anthropocene". This is the name given to "new era in the history of the Earth where humanity as a whole has become a geological force capable of approaching and, in some cases, reaching the limits of the Earth system. [12,13]

Several origins are proposed to qualify the beginning of this era. In 2004, the International Geosphere-Biosphere Program (IGBP) laid the foundations for thinking about the phenomenon of "great acceleration". **The Great Acceleration refers to the period from the middle of the 20th century onwards during which human development accelerated sharply** (population growth, primary energy consumption, freshwater use, tourism, etc.), **with unprecedented consequences for the Earth's functions**: ocean acidification, loss of atmospheric ozone, biodiversity loss, etc. Indicators of this great acceleration show links between socio-economic development and the evolution of the Earth's systemic organisation (Figure 1).

[11] The Shift Project, "Oil: what risks for Europe's supplies?", May 2021.
[12] The "Earth system" refers to the interacting physical, chemical and biological processes of the Earth. Human life and societies are also an integral part of the Earth system. International Geosphere-Biosphere Programme (IGBP), "Earth system definitions," accessed April 25, 2022, http://www.igbp.net/globalchange/earthsystemdefinitions.4.d8b4c3c12bf3be638a80001040.html.
[13] Jacques Treiner, *Fil conducteur pour une introduction à l'Anthropocène en début d'études supérieures*, 2020, https://enseignerleclimat.org/resource/1.

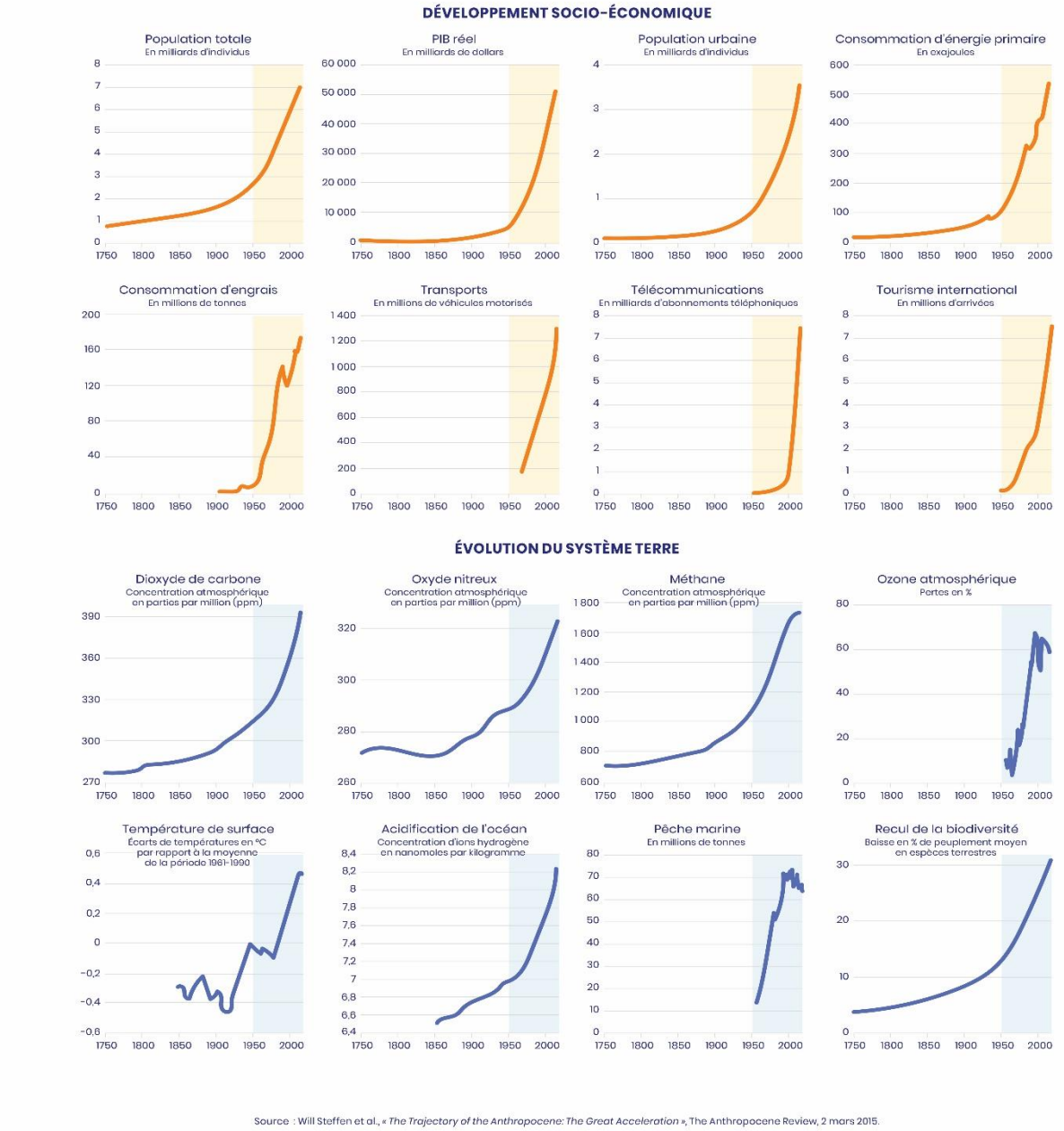

Figure 1 - The trajectory of the Anthropocene: the Great Acceleration (Source: Will Steffen et al., The Anthropocene Review, 2015).

These physical transformations are interdependent. Climate change and biosphere integrity are linked to the other seven planetary boundaries defined as indicators of the Anthropocene. These two planetary boundaries are themselves interdependent, and have been evolving in interaction with each other since the appearance of life on Earth[14]. Thus, climate change is one of the causes of the collapse of biodiversity[15]; and conversely, ecosystems contribute to the

[14] Steffen et al., "Planetary Boundaries".
[15] IPBES, "Summary for Policy Makers of the Global Assessment of Biodiversity and Ecosystem Services", 2019.

mitigation of climate change[16]. If we also include the depletion of finite resources in the ecological challenges, we can also see the link between the consumption of fossil fuels and climate change. Similarly, for materials derived from mining, the production of which destroys ecosystems are, for some, such as copper for example, useful for electrifying functions and thus limiting carbon emissions.

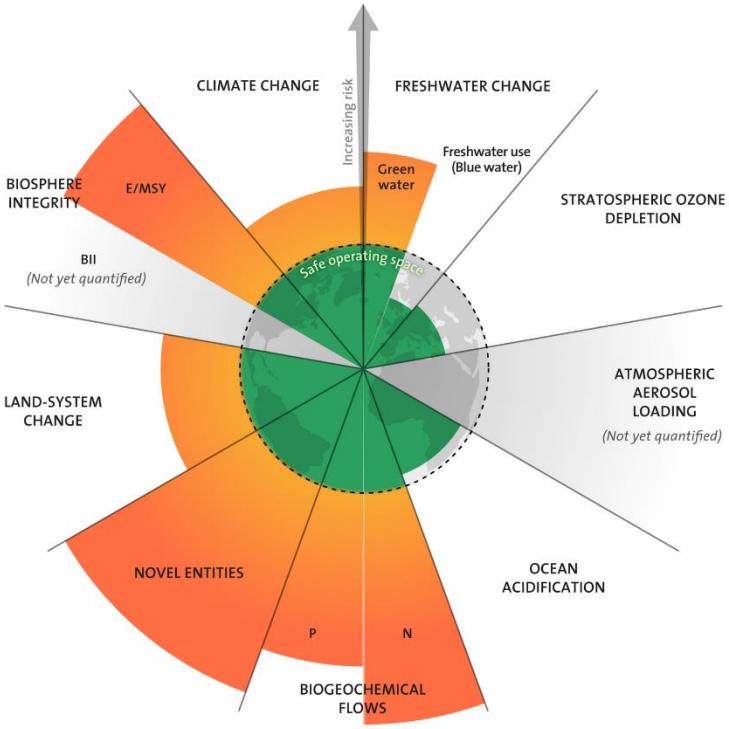

Figure 2 – Planetary boundaries – Nitrogen for the Stockholm Resilience Centre, on the basis of analyses by Wang-Erlandsson et al. 2022[17].

The Shift Project brings together all of these upheavals here under the notion of ecological challenges. This concept includes both issues related to the physical limits of the planet, and the social issues that arise from them.

Why speak about *ecological challenges*?

Given the plurality of terms used to designate "transition" and their polysemy, a single terminology has been chosen for this report. Different concepts exist and are sometimes in competition with each other. They offer different approaches, complement each other and are relevant in different contexts.

Some of them are mainly linked to an approach that implements the solutions.

Sustainable development is probably the best known of them. Among the many definitions found in the Brundtland Report (1987), this was the term most cited: "Sustainable development is a mode of development that meets the needs of present generations without

[16] IPCC, "Climate Change 2022: Impacts, Adaptation and Vulnerability - Summary for Policymakers", February 2022, https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/.
[17] Lan Wang-Erlandsson et al., "A planetary boundary for green water", *Nature Reviews Earth & Environment* 3 (26 April 2022): 380-292, https://doi.org/10.1038/s43017-022-00287-8.

compromising the ability of future generations to meet their own needs. This notion is widely used in higher education: we talk a lot about sustainability in business schools in particular. However, it is often used in the sense of weak sustainability, according to which economic, human and natural capital are substitutable, whereas strong sustainability (non-substitutability between economic capital and natural capital) corresponds to a physical vision of the economy.

Sustainable development is probably the best known of them. Among the many definitions found in the Brundtland report (1987), the most cited was this translation of the term sustainable development: "Sustainable development is a mode of development that meets the needs of present generations without compromising the ability of future generations to meet their own needs[18]. This notion is widely used in higher education: we talk a lot about sustainability in business schools in particular. However, it is often used in the sense of weak sustainability, according to which economic, human and natural capital are substitutable, whereas strong sustainability (non-substitutability between economic capital and natural capital) corresponds to a physical vision of the economy.

The use of the framework provided by the **United Nations Sustainable Development Goals** (SDGs) is common in higher education. The SDGs are defined in the following way, "The Sustainable Development Goals give us a roadmap to a better and more sustainable future for all." [19] The result of negotiations among diplomats (with consultation with experts), they have various limitations: their selection and nomination are partly arbitrary (two SDGs for biodiversity and only one for climate, for example); it is difficult to distinguish between those that fall under the goals and means (both health and industry are included); potential contradictions are present (between the objective of growth and that of clean energy, for example, in the absence of decoupling observed until now) ; and finally, the lack of a hierarchy or method for making trade-offs may reduce their scope in practice (organizations, and especially companies, tend to consider the SDGs as equivalent and substitutable for each other instead of seeing them as all being essential). Nevertheless, this report uses the social objectives of the SDGs as a reminder of what the means (levers of action) mobilized should aim for.

Some notions are formulated more in the direction of the roles to be played by each actor, such as the terms corporate social responsibility (CSR) or organizational social responsibility (OSR), which are limited in relation to the Shift Project's perimeter, and are also polysemous. CSR sometimes focuses only on what happens inside organizations (governance, wage policy, etc.), to the detriment of external impacts. When CSR strategies focus on impacts outside the company, some do so with a philanthropic approach, without modifying the company's core business.[20] The diversity of interpretations of the notion of CSR makes it difficult to use in a systemic vision of the issues.

Other concepts focus on the changes to be made: these are the ones that will be favoured in this report. The notion of ecological transition, or ecological and social transition, is widely used in public debate in France.

[18] United Nations World Commission on Environment and Development, "Our Common Future", 1987.
[19] United Nations, "Sustainable Development Goals", United Nations, accessed 26 April 2022, https://www.un.org/sustainabledevelopment/fr/objectifs-de-developpement-durable/.
[20] Nathalie Lallemand-Stempak and Philippe Eynaud, *Vers une autre gestion*, Petits Manuels de la Grande Transition (Les Liens qui Libèrent, 2022).

Finally, like the Plan for Transforming the French Economy proposed by The Shift Project in February 2022, [21] we sometimes talk about economy transformation or companies transformation, just as we might speak of their ecological transition. The term transformation puts more emphasis on the action of transforming, and does not imply that a transition of the economy and businesses will lead to a new stable state.

Finally, like the Plan for Transforming the French Economy proposed by The Shift Project in February 2022, we sometimes talk about economy transformation or companies transformation, just as we might speak of their ecological transition. The term transformation puts more emphasis on the action of transforming, and does not imply that a transition of the economy and businesses will lead to a new steady state.

While the Shift Project's project for engineering schools opted for the term "social-ecological challenges," the term **"ecological challenges"** will be preferred in this report, as the former is often interpreted by management teachers as "social and ecological challenges" and can lead to frustration that the project is not intended to cover all social issues. However, social issues are not excluded from what is referred to here as "environmental issues," which refer to both physical constraints (climate, energy, resources, etc.) and their impacts on related societal goals.

B. Limiting the social and ecological impacts of human activities in a world subject to constraints supposes radical transformations of our societal models

Dealing with environmental issues requires a systemic vision: human activities are at the root of the transformations of the Earth system, which are themselves interdependent and in turn have impacts on human societies.

The ecological situation is and will continue to be the cause of devastating crises for human societies.

The loss of biodiversity compromises global food security and access to drinking water. It has direct consequences on public health and amplifies "existing inequalities in access to medical care or healthy food"[22] . More broadly, it runs counter to the achievement of the United Nations' sustainable development goals on poverty, hunger, health, water, cities, climate, oceans and land.

By contributing strongly to the loss of biodiversity, Climate change reinforces its consequences: the increase in the frequency and intensity of extreme weather events such as heat waves, heavy rainfall and droughts is already impacting food security and access to water. The effects of climate change are already a direct cause of migration, which is expected to intensify in the coming decades. Economic losses are also present, for example in agriculture, fishing and tourism, with disparities between regions.[23]

As for the depletion of mineral resources (energy and non-energy), the risks of supply that it induces lead to the increasing precarity of the Western model of development, largely based on

[21] The Shift Project, "Le Plan de Transformation de l'Economie Française", accessed on 21 April 2022, https://ilnousfautunplan.fr/.
[22] IPBES, "Summary for Policy Makers of the Global Assessment of Biodiversity and Ecosystem Services".
[23] IPCC, "Climate Change 2022: Impacts, Adaptation and Vulnerability".

extraction-based industrialization. The risks to which oil supplies are subject to could cause the price of essential goods and services, particularly foodstuffs, to increase.

Finally, all these factors contribute to increased tensions, which could lead to conflicts. In 2019, according to the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), there were "more than 2,500 conflicts over fossil fuels, water, food and land".[24]

The disruptions caused by human activities have and will have even more unpredictable consequences for which we must be prepared. Once the planetary limits have been exceeded, and given the uncertainties of current models, it is becoming increasingly difficult to predict the changes in the Earth system that will occur, and therefore to take action (prioritize between different essential parameters, adapt our societies, etc.).

To anticipate and limit the social consequences of these crises, it is urgent to act: these upheavals are already here, and they are partly irreversible on the scale of a human life. Among the nine planetary limits that have been defined as indicators of the Anthropocene, five have already been exceeded: climate change, loss of biodiversity, biogeochemical cycles of nitrogen and phosphorus, changes in land use and new chemical entities [25,26]. For many of these limits, a return to the previous state will not be possible for several dozen or hundreds of human generations.

Limiting and dealing with present and future crises requires transforming the human activities that cause them. On the one hand, because human activities (including economic activities) must adapt to the disturbances that are already underway and that will become more pronounced. On the other hand, because, by being at the origin of these disturbances, human societies have the capacity to mitigate the pressures exerted on the environment. These two directions (mitigation and adaptation) call for profound changes in our economic systems.

All actors in society have a share of responsibility in transforming human activities.

This report proposes that the actors of business schools take their share of responsibility to contribute to this immense challenge of transforming our modes of production and consumption.

[24] IPBES, "Summary for policymakers of the global assessment report on biodiversity and ecosystem services".
[25] Novel chemical entities comprising in particular plastic and chemical pollution.
[26] Linn Persson et al., "Outside the Safe Operating Space of the Planetary Boundary for Novel Entities", *Environmental Science & Technology* 56, nº 3 (1 February 2022): 1510-21, https://doi.org/10.1021/acs.est.1c04158.

II. Managerial education is vital for reintegrating our economic systems within the limits of the physical world

Ecological challenges call for profound upheavals in our economic and financial systems and in the activities of organizations, both to limit the impacts of human activities on ecosystems and to adapt to the resulting disruptions. It is therefore up to the fields of economics and management sciences to take up these challenges. They can and must, on the one hand, provide answers to the questions raised and, on the other hand, transform teaching so that students (in initial and continuing education) are equipped to anticipate and accompany the relevant transformations.

A. Transform our economic and financial systems to meet ecological challenges

1. Current economic systems are dependent on nature and exert growing pressure on ecosystems

Taking into account physical constraints and their effects on societies implies rethinking and reinventing our economic models.

The economic sciences can no longer avoid the question of physical constraints, on which all economic activity rely. Economic activities are at the origin of pressures on ecosystems, on resources and on the climate, which jeopardize the conditions of human life on Earth. Yet the physical constraints that industrialization and economic development now face have long been ignored in economic thinking. As the classical economist Jean-Baptiste Say stated in the 19th century: "Natural wealth is inexhaustible, for without it we would not obtain it for free. Since they can neither be multiplied nor exhausted, they are not the object of economic science"[27]. **Today, the integration of physical constraints in economics is still far from being on the agenda:** in 2019, less than 0.1% of the articles published in the 10 most recognized academic journals in economics dealt with climate[28]. Even when environmental issues are integrated, they are sometimes not consistent with physical realities: for example, the work of William Nordhaus (who was awarded the Nobel Prize in Economics in 2018) indicates that a temperature increase of 6°C compared to the pre-industrial era would be accompanied by a loss of GDP of 8.5% by 2100, even though a large part of the planet would be uninhabitable if such a level of warming were reached.[29] There is thus something unthinkable in economics, **despite the fact that the links between economy and environmental issues are widely documented by the IPCC and the IPBES,** and that economic development since the industrial revolution has been largely dependent on fossil resources.

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[27] Jean-Baptiste Say, "Complete Course in Practical Political Economy", 1829.
[28] Andrew J. Oswald et Nicholas Stern, "Why does the economics of climate change matter so much, and why has the engagement of economists been so weak?", September 2019. Cited by The Other Economy, Marion Cohen and Antoine Gonthier, "Economie, ressources naturelles et pollutions", *The Other Economy*, September 2021, https://theothereconomy.com/fr/modules/economie-ressources-naturelles-et-pollutions/.
[29] Marion Cohen, "Réchauffement climatique : peu d'impact sur la croissance ?", The Other Economy, 20 April 2022, https://theothereconomy.com/fr/fiches/rechauffement-climatique-un-impact-negligeable-sur-la-croissance/.

Reintegrating physical constraints into our economic systems calls for a reversal of the trends at work. Despite gains in energy efficiency, our economic system is increasingly consuming energy and resources and emitting more and more greenhouse gases[30], where, on the contrary, the consumption of energy and material flows and pressures on ecosystems should be reduced. Historically, economic growth, measured by GDP, has driven physical flows upwards - the absolute decoupling between GDP and environmental pressures (understood in terms of consumption of materials, energy, water, resources, greenhouse gas emissions, pollution, destruction of biodiversity) has never been observed on a global scale and over the long term[31]. This economic growth is therefore not physically sustainable. Not taking this into account means that societies run the risk of not being able to guarantee a certain number of essential services in the long term.

Growth and climate: the urgent need to debate trade-offs between the goal of growth and environmental goals

Is economic growth compatible with the reduction of environmental pressures and the consumption of exhaustible resources? This question is often summarized as one of absolute decoupling. In the case of the climate, it is the decoupling of growth and greenhouse gas emissions: can emissions decrease while the economy continues to grow?

Although cases of absolute decoupling between GNP[32] **and greenhouse gas emissions are rare, they have been observed** in certain industrialised countries, including by considering the carbon footprint, i.e. with imports included[33]. This is due in particular to an increase in energy efficiency and to production methods that emit less greenhouse gases.

But this does not take into account the ability of a country or region to meet its climate goals. Globally, limiting global warming to 2°C above pre-industrial levels requires reducing carbon emissions by 6.3% per year from 2020, or 9.4% per year from 2025[34]. However, such a reduction in emissions is not achievable with the observed rates of decoupling and GDP growth. It requires either an increase in decoupling or the implementation of sobriety strategies. Relying solely on increased decoupling is a risky technological gamble whose failure could make attaining the objective of reducing emissions impossible. It is therefore necessary, in addition to decoupling, to develop sobriety strategies[35].

These observations show that the objective of growth must not be pursued at all costs, at the risk of compromising climate action: **growth must be subordinated to the achievement of climate objectives.**

[30] See the great acceleration above (Part 1, I.A.)
[31] Timothée Parrique et al., "Decoupling Debunked: Evidence and arguments against green growth as a sole strategy for sustainability" (European Environmental Bureau, 2019).
[32] While there are alternative economic performance indicators to GDP, GDP is cited here as an indicator of economic growth since it is commonly used in the literature on the links between economic growth and environmental pressures.
[33] Helmut Haberl et al., "A Systematic Review of the Evidence on Decoupling of GDP, Resource Use and GHG Emissions, Part II: Synthesizing the Insights", *Environmental Research Letters* 15, nº 6 (10 juin 2020): 065003, https://doi.org/10.1088/1748-9326/ab842a.
[34] The Shift Project, "Simulation of emission trajectories compatible with the carbon budget +2°C", 2016, https://theshiftproject.org/wp-content/uploads/2017/12/note_danalyse_les_indc_et_le_budget_carbone_the_shift_project_0.pdf.
[35] Haberl et al., "A Systematic Review of the Evidence on Decoupling of GDP, Resource Use and GHG Emissions, Part II".

Furthermore, our growth model relies on the consumption of fossil fuels[36,37]. Thus, in the absence of a paradigm shift, the objective of growth is ultimately constrained by the future unavailability of fossil resources.

The links between economic growth and environmental issues are the subject of research in economics, and it may be useful to draw on this research to integrate them in the teaching of economics and management. The diversity of terms and approaches is vast, ranging from the work of economists such as Tim Jackson on prosperity without growth[38], Herman Daly on the stationary economy[39], Eloi Laurent who proposes a guide to get away from growth[40], the numerous works on secular stagnation brought up to date by former U.S. Treasury Secretary Lawrence "Larry" Summers [41], the analysis of the effects of energy transition on growth and lifestyles by Christian Gollier[42] and the works of Vaclav Smil on the very notion of growth[43].

It is necessary to transform an entire model of economic development. Ecological transition requires the development of new infrastructures - non-fossil fuel energy infrastructures, decarbonized transport infrastructures, etc. - and the adaptation of existing infrastructures - for example by renovating buildings. Production and consumption patterns must also change: sobriety measures, which imply a voluntary reduction in consumption and production, are necessary in every sector[44] (see below, p. 29, for examples by sector). In order to adapt to the transformations of the economy, and to make them possible, it is also necessary to reorganise employment, in turn generating needs for retraining, training, etc.[45] These few examples outline the scope of the socio-economic transformations that need to be implemented to achieve ecological transition.

In order to carry out these structural transformations, it is necessary to rethink the role and actions of economic actors of which companies come first and foremost.

2. Radical transformations to be taken on the scale of companies

In order to break with current trajectories and transform our economic models, companies will necessarily undergo major transformations. While many changes have already taken place – the development of corporate social responsibility (CSR) and the application of environmental, social

[36] While the correlation between energy and GDP is well established, the causal links between them are the subject of debate. We can refer to Ping-Yu Chen, Sheng-Tung Chen, and Chi-Chung Chen, "Energy Consumption and Economic Growth—New Evidence from Meta Analysis", *Energy Policy* 44 (May 2012): 245-55, Panos Kalimeris, Clive Richardson, et Kostas Bithas, "A Meta-Analysis Investigation of the Direction of the Energy-GDP Causal Relationship: Implications for the Growth-Degrowth Dialogue", *Journal of Cleaner Production* 67 (mars 2014): 1-13, Anis Omri, "An International Literature Survey on Energy-Economic Growth Nexus: Evidence from Country-Specific Studies", *Renewable and Sustainable Energy Reviews* 38 (October 2014): 951-59, and Gaël Giraud and Zeynep Kahraman, "How Dependent Is Growth on Primary Energy? The Dependency Ratio of Energy in 33 Countries (1970-2011)", s. d., 28.
[37] On the exhaustion of fossil fuels, see above, p. 12.
[38] Tim Jackson, *Prospérité sans croissance* (De Boeck Supérieur, 2017).
[39] Herman Daly, *Économie stationnaire* (Les petits matins, 2018).
[40] Eloi Laurent, *Sortir de la croissance* (Les Liens qui Libèrent, 2019).
[41] Laurence Henry Summers, "Accepting the Reality of Secular Stagnation - Point of view" (International Monetary Fund, 2020).
[42] Christian Gollier, *Le climat après la fin du mois* (Presses Universitaires de France, 2019).
[43] Vaclav Smil, *Growth: from microorganisms to megacities* (MIT Press, 2019).
[44] Haut Conseil pour le Climat, "Dépasser les constats, mettre en œuvre les solutions", June 2022, 90-91, https://www.hautconseilclimat.fr/wp-content/uploads/2022/06/Rapport-annuel-Haut-conseil-pour-le-climat-29062022.pdf.
[45] The Shift Project, "Employment: the driving force of low carbon transformation. In the framework of the plan to transform the French economy " (The Shift Project, 2021), https://theshiftproject.org/article/emploi-moteur-transformation-bas-carbone-rapport-final-9-decembre/.

and governance (ESG) criteria, the formalization of "reasons for being" that go beyond purely economic objectives, etc. - it is clear that they have not been enough to reduce ecological pressures to the extent that they are imposed on us. It is clear that these developments have not been sufficient to reduce environmental pressures to match what the ecological emergency requires of us.[46] Only profound changes can truly mitigate the impacts of companies on the environment, and enable them to adapt to various physical constraints.

Companies must take up the challenge of transforming their business models to reduce ecological pressures. Technological innovations will be important, but companies will also need to innovate economically, socially and culturally. Below are some examples of the challenges facing companies in their respective sectors.

- **Freight**: reducing greenhouse gas emissions, dependence on fossil fuels and the introduction of invasive species (one of the causes of biodiversity loss) requires reducing freight transport (7% of global CO_2 emissions in 2010[47]) and thus globalized supply chains. This requires the reorganization of a large parts of productive sectors.
- **Food**: the share of meat products in food must decrease to the profit of plant-based products. [48] For many agri-food companies, especially those specializing in meat processing, this requires them to pivot a large part of their activity, to upgrade their production equipment, to adapt their marketing to contribute to changes in consumer behaviour, etc.
- **Manufacturing industry**: Limiting the consumption of materials and energy means extending the life of products, and therefore developing reuse, repair and recycling rather than selling new products. For companies in the manufacturing industry, this means marketing products that are designed differently, that are more repairable for example, reducing the sale of new products, and developing the sale of spare parts and repair, recycling and reuse services.[49]
- **Passenger transport**: To make air transport compatible with a greenhouse gas emissions trajectory that complies with the Paris Agreement, technical innovations will not be enough: it is necessary to reduce the number of kilometres travelled.[50] Airlines, on the other hand, base their strategies and the sustainability of their business model on an increase in air traffic. Integrating the global decline in air traffic, in addition to the necessary technological innovations, represents a major challenge for these companies.

The companies concerned by these issues in their core business must all also review their value chain, their purchasing policies and the transportation of their employees, and thus accompany this transformation.

In addition, companies must now anticipate new risks, largely related to unavoidable physical constraints. To prepare for these risks, companies must develop precise knowledge of the ecological stakes, develop a good understanding of their vulnerabilities, and have a long-term vision.

- For example, "climate risk" is characterized by two main types of risk: physical risks and transition risks. Physical risks are directly related to the effects of climate change, such as

[46] For example in France, since 1990, except for the sectors of energy production and the manufacturing industry, no economic sector has significantly reduced their greenhouse gas emissions. Higher Council for the Climate, "Annual Report", June 2019, 32-34.
[47] International Transport Forum, "The Carbon Footprint of Global Trade: Tackling Emissions from International Freight Transport" (OECD, 2015).
[48] Solagro, "Le scénario Afterres 2050", 2016.
[49] The Shift Project, "Decarbonating industry without sinking it", January 2022.
[50] The Shift Project, "Pouvoir voler en 2050 : Quelle aviation dans un monde contraint?", March 2021.

the increased frequency and intensity of extreme weather events or rising sea levels. Transition risks are related to regulatory measures taken to initiate and implement the ecological transition (such as increased pricing of GHG emissions or penalties for non-compliance with regulations), technological developments (requiring, for example, investments in new technologies), market developments (such as changes in behaviour), or the reputation of companies.[51]

- The depletion of resources, especially fossil fuels, also poses supply risks that will become increasingly pressing. The war in Ukraine, for example, has highlighted the European Union's dependence on Russian gas and oil.

3. A transformation to be planned and coordinated at national and international level

Business transformation and resource allocation must be coordinated to avoid conflicts over the use of resources and prioritize access to essential sectors. For example, in France, biomass resources are useful for food, construction using wood and energy production, but they will not be sufficient to meet the growing demand for biomass in every sector - especially as they will suffer from the effects of climate change on forestry and agricultural yields.[52] Similarly, hydrogen produced by electrolysis can considerably reduce emissions from steel production, as well as from fertilizers; but in France, a decarbonized electricity system will not be able to supply enough electricity to develop these two industrial sectors simultaneously as well as maintain the impetus of exports.[53] In both these cases conflicts over use should be anticipated.

This implies rethinking economic governance. Strategic choices can no longer be made only at the level of a company: to ensure the radical transformation of our economic system, they must also be made at the level of a sector, and moreover planned at the national or even international level. They therefore imply a dialogue between private and public actors, but also between the economic actors (private or public) of the same sector[54]. The latter must set rules to preserve the long-term general interest, which could run counter to the short-term private interests that often govern the strategic choices of listed companies, for example. This limitation of liberal economics as currently practiced and the regulatory role of the public authorities, are increasingly accepted by companies, which consider that rules are necessary so that they can incorporate environmental issues in their business models jeopardising their survival.[55] Otherwise, virtuous companies could be penalized to the benefit of companies that do not reduce their impacts, and which possibly offer the same products or services at more competitive costs.

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[51] The Shift Project, "Climate Risk Analysis" (AFEP, February 2018).
[52] The Shift Project, "L'évaluation énergie-climat du PTEF : Note de transparence dans le cadre du Plan de Transformation de l'Économie Française - under review", February 2022.
[53] The Shift Project, "Decarbonising industry without sinking it".
[54] Thus, regarding climate change mitigation, the IPCC emphasizes the need for coordination at different geographical scales and between different types of actors: "*Achieving the global transition to a low-carbon, climate-resilient and sustainable world requires purposeful and increasingly coordinated planning and decisions at many scales of governance including local, subnational, national and global levels* (high confidence). *(…) Choices that cause climate change as well as the processes for making and implementing relevant decisions involve a range of non-nation state actors such as cities, businesses, and civil society organisations."* IPCC, "Climate Change 2022: Mitigation of Climate Change", April 2022, https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/.
[55] For ,example by the companies of the *Convention des Entreprises pour le Climat en France*. *"Commission du développement durable : audition de représentants de la Convention des Entreprises pour le Climat (CEC)*", 19 January 2022, https://videos.assemblee-nationale.fr/video.11761507_61e7c99fe35c0.commission-du-developpement-durable--representants-de-la-convention-des-entreprises-pour-le-climat--19-janvier-2022.

B. The actors of management have a role to play in this transformation

The management professions structure companies and other types of organization. Furthermore, management sciences, whose theorization can be dated back to the beginning of the 20th century, currently play a central role in the way companies are organized. According to the formalization of Henri Fayol, their objective is the administration of companies, through using the tools of forecasting, organization, supervision, coordination and control.[56] A whole array of tools and practices have been structured to fulfil these roles, in short, to become the cogs of companies and now other types of organizations such as non-profit associations and public institutions. Along with the functions of management (finance, accounting, strategy, marketing, management control, etc.), academic disciplines, and professions (financial analysts, investors, auditors, management controllers, consultants, etc.) and management tools (business plans, organization charts, incentive systems, dashboards, etc.) have developed. These are the tools and practices that enable strategic choices to be made, production processes to be organized, employees to be motivated, the financial performance of business units to be increased, in short, for companies to function properly according to the objectives set.

[56] Henri Fayol, *Administration industrielle et générale* (Bulletin de la Société de l'industrie minérale, 1916). Cited by Ève Chiapello and Patrick Gilbert, *Sociologie des outils de gestion*, Grands Repères (La Découverte, 2013).

Management, companies, what are we talking about?

Many terms coexist when talking about the purpose of business schools. We speak of business and management for business schools, generally international (which deliver bachelor's and master's degrees in management and business administration), and of management in university courses, which are often more francophone.

We use the term "management" here to encompass the subject matter of what are termed management courses, and we use it as a synonym for administration We use the term **"management sciences"** to include all the disciplines taught in these courses: strategy, finance, accounting, marketing, etc. Management is understood here as the set of tools and techniques developed for the management of organizations, but more broadly as a set of practices aimed at organizing and steering collective action.

Although the subject of companies often comes up, as they are the primary object of management training, we are well aware that management aims at wide range of types of organization and even other types of collective action. The aim here is to deal first with what is at the heart of this training historically and remains so today, namely business management. This does not mean that other forms of organization such as non-governmental organizations (NGOs) or public agencies, or other forms of collective action, are excluded.

There has also been some debate about who graduates from a management education program. Is the aim to train managers, leaders, decision-makers, bosses, executives, or maybe auditors, financiers, or marketers? None of these options seemed satisfactory, because management graduates are a bit of all of these at the same time, and do not allow themselves to be locked into a single function that would suit everyone. The term manager is used here, which, while not entirely satisfactory, may be appropriate for inclusive use. However, there is one element that unites all management graduates: they are all citizens, and their education must also contribute to this. We therefore sometimes speak of the citizen manager (see below, Part 3).

Management tools and practices are not neutral: they are not independent of the objectives they serve. One might think that it would be enough to change the objectives pursued by companies for management sciences, practices and tools to fall into line and contribute to the achievement of new objectives that integrate physical constraints. But management tools have been designed and developed in given contexts, for given objectives, and are not neutral: they cannot serve one goal or another indifferently. Several works, listed by Chiapello and Gilbert (2013)[57] and based on a wide variety of examples, show that management sciences are influenced by the dominant ideologies and that management tools have effects on organizations.

We can add that, having rarely been built to integrate physical constraints, they can prove to be inoperative. For example, financial indicators, which are at the heart of decision-making and monitoring tools, are unable to reflect physical realities.

Management tools and practices must therefore be reinvented if we wish to transform companies with regard to environmental issues. For this to happen, management must take an interest in physical constraints and the social issues associated with them, not only to create new indicators but, more ambitiously, to work on the transformation of companies in coordination with the other players in the transition (see above, p. 30). It is therefore necessary to orient

[57] Chiapello and Gilbert, *Sociologie des outils de gestion*.

research in this direction. Integrating environmental issues paves the way for asking structural questions regarding managerial disciplines that can be investigated by research.

Management sciences, which theorize collective action, can make a significant contribution to transition. They can help us to conceive and implement ecological transition: as underlined in the manual “Towards another management”[58], we need a collective organization to carry out these transformations, and this is precisely what management contributes to [59]. For Hatchuel, "the essence of management sciences lies in the understanding, invention and criticism of models of collective action”[60]. In this perspective, management sciences cannot avoid the challenges of transforming organizations that result from ecological emergency. Due to the difficulties faced by existing "collective action models" in conducting transition, it is highly desirable that management sciences carry out constructive critical analysis of current models and contribute towards inventing new ones.

This important role of management in ecological transition requires us to consider its responsibility. According to the authors of “Towards another management”, the neutrality in which the management sciences pride themselves would allow them to avoid questioning their responsibility with regard to the objectives pursued by the organizations they serve. Recognizing their non-neutrality forces them to reinvest the field of their responsibility[61]. Likewise, it is up to management professionals to take their share of responsibility in ecological transition and have their practices evolve in this direction. Business schools, for their part, have the responsibility of training people to take their responsibilities.

C. Business schools, a key moment: training for transforming

All actors in management have a role to play in placing the economic system in the context of planetary limits, and business schools are a key element for preparing for this transition.

The curricula of the primary and secondary cycles are defined by the Ministry of Education. It is therefore the Government that determines the best way to educate the youngest students about environmental issues. On the other hand, **in higher education, training depends largely on the education establishments, although the Government has a role in supervising the academic system.**

In 2019, 38% of the population of full working age (25 to 64 years) had a higher education degree[62]. For the students involved in initial training, this is a key moment when the role they will play in society as citizens and professionals is being built. It is also the moment when they are most able to grasp complex problems. It is therefore a fundamental stage in their intellectual development, where teaching about environmental issues cannot be overlooked. For professionals in continuing education, a passage through higher education is an opportunity to

[58] This book is part of a collection of "Small Manuals of the Great Transition" that follows the publication of the Manual of the Great Transition. These books are written by the FORTES collective of teachers and professors, affiliated with the Transition Campus. The collection of "small manuals" extends the reflections of the Great Transition Handbook, with a more thematic and disciplinary approach. *Towards another management* deals more specifically with management sciences. Collective FORTES, Manuel de la grande transition (Les Liens qui Libèrent, 2020).
[59] Lallemand-Stempak and Eynaud, *Towards another management*.
[60] Armand Hatchuel, "The Two Pillars of New Management Research", *British Journal of Management* 12, nº s1 (December 2001): S33-39, https://doi.org/10.1111/1467-8551.12.s1.4.
[61] Lallemand-Stempak and Eynaud, *Towards another management*.
[62] "État de l’Enseignement supérieur, de la Recherche et de l’Innovation en France n°14" (Ministère de l’Enseignement supérieur de la Recherche et de l’Innovation, 2021), https://publication.enseignementsup-recherche.gouv.fr/eesr/FR/EESR14_ES_23/le_niveau_d_etudes_de_la_population_et_des_jeunes/.

update their skills and knowledge by integrating environmental issues and thus have a rapid impact within the organizations that employ them.

Management education is an important and growing part of higher education. The training dedicated to management concerned more than 19.6% of students in higher education in 2019-2020[63]. This shows how important it is for ecological transition that business schools integrate knowledge and skills related to environmental issues.

Management professionals, especially business executives, whether or not they have a management background, have the onerous task of reinventing practices, tools and economic models, and some are already doing so. **Business schools have a fundamental role to play in preparing their students for their future professional life (and current professional life for those in continuing education), and in educating enlightened citizens**. In the current context, fulfilling this dual mission implies fully integrating environmental issues in students' studies.

[63] Pierre-Louis Dubois, "Observatoire des formations en Sciences de Gestion et Management" (FNEGE, 2022).

PART 2. HIGHER EDUCATION IN FRANCE: AWARENESS BY ACTORS BUT A LARGE NUMBER OF BARRIERS

I. Higher education in management is ensured by a diverse range of public and private actors

The notion of "higher education institution in management" refers to a reality that is complex to define because it is heterogeneous. Higher education in management is provided by both public institutions (universities and high schools) and private institutions (private business schools). A certain diversity is found within each of these categories.

The Observatory of Management Science and Management Education published in 2022 by the FNEGE [64] mentions that 20% of students in France study management as a main course of study outside of economics, not counting management courses given in other courses of study (e.g., engineering schools, IEP, etc.).

Enrolment in public and private institutions is currently at the same level, but is rising sharply in the private sector. At the start of the academic year of 2021, more than 239,000 students were enrolled in management disciplines (economics, management, economic and social administration, etc.), which represents a decrease of nearly 1% in one year. There were also more than 239,000 students enrolled in management, business and commercial schools (not including higher technician sections), which represents an increase of 9% in one year[65].

A. Public establishments: universities, high schools and elite establishments

In the public sector, higher education degrees in management are awarded mainly by universities but also by high schools. Within universities, management education is provided through the Institutes of Business Administration (IAE), training and research units (UFR) and the University Institutes of Technology (IUT). High schools also play a role in preparing students for the certificate of advanced technician (BTS), many of which are specialized in management (e.g., BTS Insurance, BTS Banking, BTS International Trade, etc.). They also host preparatory classes for the elite schools.

1. Universities

a. Business administration institutes

The IAE are components of French universities whose mission is to develop research and higher education in management. **There are 37 in France with about 53,000 students and 3,000 employees including 1,600 teachers.**

Their autonomy is very variable. The IAE of Paris is the only establishment to benefit from the status of public establishment having an administrative objective, which gives it an administrative and financial autonomy.

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[64] Dubois.

[65] DEPP et SIES, "Repères et références statistiques 2022", 2022, https://www.education.gouv.fr/reperes-et-references-statistiques-2022-326939#:~:text=Rep%C3%A8res%20et%20r%C3%A9f%C3%A9rences%20statistiques%20(RERS,sup%C3%A9rieur%20et%20de%20la%20Recherche.

34 IAE are governed by article 713.9 of the Education Code [66] which gives them a status of internal school. These IAE have their own board of directors made up of 30 to 50% of external personalities (mostly from the socio-economic world), who define the teaching and research program (within the framework of the university policy) [67].. They have their own budget integrated in the university budget but in fact, their financial autonomy is variable, depending on the position taken by the university management. Most IAE self-finance their daily operating budget through continuing education and work-studies. They also sometimes generate surpluses that are transferred back to the university. They have no autonomy from the point of view of recruitment and the management of their permanent human resources which are supervised by the university, although they can influence the recruitment affecting them, for example by a right of veto.

The other IAE fall within the framework of a classic UFR supervised by the university management.

The IAE control the content on the education dispensed. However, the slant in favour of environmental issues is greatly facilitated when this subject is driven at the level of the university management and by the companies that sit on the board of directors of the IAE. Some IAE have implemented interesting initiatives. Professors take on topics related to environmental issues at the level of their IAE and their university. **However, the structural lack of permanent professors places a severe limit on their ability to change.**

The IAEs are grouped within the IAE France network, whose missions are to represent the IAE in the Ministry of Higher Education and Research (MESR) and promote management sciences and the IAE. The network of IAE carries out common projects and coordinates the network. The membership of the network relies on the establishment of a common quality reference framework.

b. Education and research units

Formerly called a "faculty", a UFR is a component of a university that groups together training departments and research laboratories. The exact number of students in the management sciences in the UFRs is not known, in particular because of the difficulty of categorizing degrees. For example, how can we classify an MBA in law and management taught in a law department?[68]

c. The elite schools

The elite schools are national higher education and research institutions with a legal personality and pedagogical, scientific, administrative and financial autonomy. The term "elite school" corresponds to the legal status of these institutions. Two of these establishments offer management degrees: the Université Paris-Dauphine and the Institut Mines-Télécom Business School. The Université Paris-Dauphine is under the supervision of the Ministry of Higher Education and Research (MESR), while the Institut Mines-Télécom is under the supervision of the Ministry of the Economy and Finance.

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[66] "Article L713-9", Pub. L. No. L713-9, § Section 3: Les instituts et les écoles., Code de l'éducation, accessed on 29 September 2022, https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000006525374/#:~:text=Le%20directeur%20de%20l'institut,%C3%A9met%20un%20avis%20d%C3%A9favorable%20motiv%C3%A9.

[67] Laurence Macaluso and Rayann Mouslim, "Synthèse juridique. Les grandes écoles universitaires de management. Les instituts d'administration des entreprises soumis à l'article L713-9 du code de l'éducation", April 2021.

[68] Dubois, "Observatoire des formations en Sciences de Gestion et Management".

d. Technical university institutes (IUT)

IUTs are components of universities that provide higher education designed to prepare students for technical and professional positions in certain production, applied research and service sectors. There were 108 IUTs with 120,900 students in 2020. Unlike the UFRs and IAEs, the IUTs do not award bachelor's, master's and doctoral degrees, but rather the technical university bachelor's degree (BUT). The BUTs for management professions are: administrative and commercial management of organizations, the management of companies and administrations, logistics and transport management, statistics and decisional computing, marketing techniques.

2. High schools

High schools are involved in higher technical education through the advanced technician sections that prepare students for the BTS in two years. In 2021, the BTS training for management professions was followed by nearly 89,000 students, 68% of whom would be trained in public institutions[69].

The high schools also host classes that prepare students for elite for the entrance exam to certain elite schools (grandes écoles) over one or two years. In 2021, there were more than 18,000 students in the economics and business section and more than 12,000 students in the literary section. The business schools recruit students from the economics and business sections in their competitive entrance programs (Programmes Grande Ecole, PGE), but some competitive entrance exams are also open to students from the literature section. 75% of economics and business students and 89% of literature students are educated in public high schools.

B. Business schools

1. A wide range of legal statuses

Business schools are very diverse in nature. **The first criterion that distinguishes them is their legal status.**

Private schools are independent from the State in their management and almost totally independent in the financing of their activities. They have either the status of an association under the 1901 law, or a company status (SA or SAS) and are therefore for-profit. The establishments governed by the 1901 law are non profit-making and are not supposed to make any profit.

The consular establishments are dependent on the chambers of commerce and industry (CCI), public administrative establishments under the authority of the Ministry of Industry whose mission is to represent the interests of commercial, industrial and service companies in a geographical area and provide them with certain services. They are largely financed by the territories in which they operate, the CCI's own revenues and the apprenticeship tax.

Faced with the reduction in resources allocated to the CCIs, many consular establishments have changed their status to that of not-for profit associations and then to that of a consular higher education establishment (EESC). The CCI remains the majority shareholder but the school can

[69] DEPP and SIES, "Repères et références statistiques 2022".

open up to other shareholders. This status allows consular establishments to have an independent financial structure, thus increasing the possibilities of indebtedness, as well as flexibility in the daily management of their activities.

2. Diversity in recognition by the State

Business schools can only award national degrees, approved by the MESR, if they are recognized by the State and after assessment by a national body: the Commission on the assessment of management training and degrees (CEFDG), created for this purpose. **A second way of distinguishing them is therefore based on their recognition by the State.**

State recognition takes two different forms: recognition of the institution, and the authorization to issue a degree. Recognition of an institution is granted by the MESR on the basis of criteria relating to the faculty, the pedagogical content, and the time spent.

Recognition by the State is a prerequisite for the awarding of approved diplomas. The visa is a quality label guaranteeing the school's effective participation in the public service of higher education, which may not exceed five years following the judgement of the Commission on the Assessment of Management Training and Degrees (CEFDG). In particular, the CEFDG's quality standards take into account the organization of admission and schooling conditions (studies and internships), collaborations with universities and research laboratories, openness to international markets, and the professional integration of graduates. The visa is a condition for obtaining a Bachelor's or Master's degree.

Business schools can also issue school diplomas and titles registered in the National Directory of Professional Certifications (RNCP). An RNCP-certified title allows its holder to certify the competencies, skills and knowledge necessary for the exercise of a profession or an activity corresponding to a professional field. The delivery of a professional certification is generally done by an authority or an official body such as a consular chamber or a ministry. Whereas a national degree or degree that has been approved allows you to acquire a level recognized academically while being registered in the RNCP, certified titles allow you to obtain a level recognized in the professional field.

In addition to their legal status, business schools are distinguished from one another by their recognition by the State. **Until recently, the MESR divided the schools into three groups:**

- Group I: schools recognised by the State and which offer at least a degree validated by the Ministry of Higher Education;
- Group II: schools recognised by the State but which do not award any degree validated by the Ministry;
- Group III: schools not recognised by the State and which do not award any degree validated by the Ministry.

Group	Number of establishments	Number of students educated	% of students educated
Group I	105	141,800	76%
Group II	53	14,300	8%
Group III	175	31,300	17%
Total	**333**	**187,400**	**100%**

Table 1 – Distribution of business schools and students between the groups of schools (start of the academic year 2018).[70]

At the start of the 2018 academic year, more than three-quarters of business school students were enrolled in an institution of Group I[71]. Alongside these institutions, there is a multiplicity of small schools that are not recognized by the State. Today, there are only two categories of schools corresponding to groups I and III.

In 2020, the legal status of 60 validated establishments was as follows:

Legal status	Total	%
Not for profit association	34	57%
Consular	10	17%
EESC	10	17%
Private: SA, SAS, etc.	4	7%
Public	2	3%
Total	**60**	**100%**

Table 2 – Legal status of 60 schools of Group I (2020 – Source CEFDG).[72]

[70] Adeline Dembo, "Memo of the SIES", Memo (MESRI, July 2020).
[71] At the beginning of the academic year 2021, 197 business schools were not recognised by the State, 44 were recognised by the State but did not dispense any validated education, 65 were recognised by the State and awarded at least one validated course. Source: CEFDG.
[72] Bernard Fourcade, "Observatory of management training courses" (FNEGE, 2015).

3. Elite schools (grandes écoles)

Among private and public institutions, a distinction is also made between the elite schools and the others. The most reputable schools are members of the Conference of Elite Schools (CGE), which includes engineering and business schools. The latter, of which there are 38, all offer at least one Master's degree and are financially autonomous. Only two public institutions are members (Institut Mines-Télécom Business School and EM Strasbourg).

The Conference of Directors of French Business schools (CDEFM) was founded In 2021. The major business schools joined this conference, which carries on the activities of the CGE's chapter of business schools and acts on their behalf on issues that are specific to them or that have a strong impact on their stakeholders (learning, international relations, CSR, etc.), both in France and internationally[73].

The term "elite school" does not, however, take into account the major transformations that have affected business schools. The "elite schools" have had to adapt to the behaviour of baccalaureate holders, who are less and less committed to following preparatory classes. **On the one hand, we are witnessing a broadening of the range of courses offered by business schools**. They now offer bachelor's degrees, three- or four-year programs accessible after high school and leading to a bachelor's degree, as well as a number of two-year master's degrees. **On the other hand, the number of gateways to the Programme Grande Ecole has increased**. More and more students are entering the second or even third year of the PGE, through parallel admission or on the basis of their qualifications, from other courses such as the Bachelor's degree, the BUT or a BTS.

To complete this overview of business schools, it should be noted that management education is also integrated in many courses offered by institutions not dedicated to management: engineering schools, health schools, political studies institutes, law faculties, science faculties, etc. It is also delivered by numerous private training institutes, some of which, integrated in companies, are genuine internal training bodies (e.g., the Crédit Agricole Group's training institute) that also play a role in initial training through apprenticeships.

This is therefore only a brief overview of the diversity of business schools in France, which invites us to qualify the general findings of this report. It is also a call to each actor to take up our recommendations, debate them and adapt them within their institution.

[73] Fourcade.

II. Higher education: a sector undergoing a crisis of awareness

A. The Shift Project has worked on higher education since 2017

The Shift Project began questioning the education of young workers in 2017, following remarks from several of its experts who were also teachers, alarmed by the level of their students' knowledge of climate-energy issues upon graduation.

In March 2019, The Shift Project published the report "Mobilising higher education for the climate"[74]. Based on a sample of 34 higher education institutions in different fields (engineering schools, business schools, schools for senior civil servants, etc.), **it found that there was a lack of teaching on issues related to planetary limits in French higher education.**

Only **11% of the core courses analysed addressed these issues. For business schools, this figure dropped to 6%.** Elective courses were available to address these issues, but in a very mixed way: some addressed planetary boundaries, others were limited to other social responsibility issues such as how to fight against discrimination or well-being at work. This report also proposed avenues of action and reflection to ensure that the teaching of these issues becomes more widespread.

In September 2019, 170 institutional leaders and 9,000 citizens signed an appeal initiated by The Shift Project "To educate all the students of higher education in climatic and environmental issues"[75], acknowledging the imperative need to dispense general and uniform training on these issues.

Following this assessment, the INSA Group, a group of engineering schools, joined the Shift Project in 2020 to experiment with the integration of environmental issues in all of its initial training courses and draw useful lessons for other higher education institutions. The ClimatSup INSA project was born and led to the publication of its final report in March 2022 "Training the engineer of the 21st century"[76].

The numerous exchanges that the Shift Project team had with teachers during this project showed that **many of them want to get involved and change the way they teach, but they face several obstacles**: lack of time, financial resources and recognition of their teaching activity. In addition, they do not feel sufficiently competent on environmental issues, would like to be trained, and often feel isolated and lack support for their efforts.

To address these challenges, in 3021 The Shift Project and the Shifters, the network of Shift volunteers, launched a collaborative pedagogic platform (enseignerleclimat.org) aimed at sharing experience and resources between teachers. The Belgian Shifters have created a tool to identify training, courses and teachers dealing with energy and climate transition in Belgian universities: Education4Climate.

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[74] The Shift Project, "Mobilising higher education for the climate", March 2019, https://theshiftproject.org/wp-content/uploads/2019/04/Rapport_ClimatSup_TheShiftProject-2019.pdf.
[75] "To educate all the students of higher education in climatic and environmental issues", The Shift Project, 16 September 2019, https://theshiftproject.org/article/100-appellent-former-etudiants-climat/.
[76] The Shift Project, "Training the engineer of the 21sdt century - Synthesis » (The Shift Project, March 2022), https://theshiftproject.org/wp-content/uploads/2022/03/ResDec-Climatsup-INSA-version-Web.pdf.

The Shift Project's initiatives are part of a context of growing mobilization of all the stakeholders in the higher education ecosystem, driven by the impetus of students who have strongly contributed to triggering the movement.

B. Students are mobilised for ecology

The psychological impact of climate change is having a profound and lasting effect on young people around the world. According to a survey [77] conducted among 10,000 young people, 75% of them considered their future to be "frightening" in relation to climate change, 60% were "very" or even "extremely" worried, 45% of them declared that their "eco-anxiety" manifested itself in their daily life.

The same study notes that while individual involvement in environmental collectives helps protect youth from mental health problems related to eco-anxiety, **government recognition of eco-anxiety and decisive action to address its causes are critical.**

While government action around the world is currently far from meeting the environmental challenge, **the strong mobilization of students for climate**[78] **has triggered an evolution in higher education in France.**

Young people have begun to express their increasing refusal to work in organizations that contribute to the ecological crisis, and their desire to be educated to understand environmental issues and provide answers. The Student manifesto for ecological awakening [79], signed by more than 30,000 students in 2019, is the most iconic symbol. The National student consultation, driven by the Students' network for an ecological and social society (RESES, formerly REFEDD), reasserted this message as 69% of respondents in 2020 said they wanted to be better educated about environmental issues [80].

However, these figures must be qualified for business schools, where our exchanges with teachers and students and various articles [81, 82, 83] **have led us to think that the students committed to environmental issues remain in the minority.**

More recently, the documentary "Rupture(s)"[84] and the book "The Revolt – Survey on young elite students faced with the challenge of ecology"[85] provided testimony from young graduates of elite schools who have chosen alternative routes instead of following the career path available to them.

This student commitment continues for an increasingly large (albeit minority) share of graduates and is expressed in various ways, for example: involvement with alumni networks committed to

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[77] Caroline Hickman et al.,"Young People's Voices on Climate Anxiety, Government Betrayal and Moral Injury: A Global Phenomenon", *Preprints with The Lancet*, 7 September 2021.
[78] Maïté Darnault, Eva Fonteneau, and Philippine Renon, "Youth marches for the climate: "Il faut se bouger le cul !"", 20 September 2019, https://www.liberation.fr/france/2019/09/20/marches-des-jeunes-pour-le-climat-il-faut-se-bouger-le-cul_1752660/.
[79] For an ecological awakening , "Manifeste étudiant pour un réveil écologique", July 2019, https://manifeste.pour-un-reveil-ecologique.org/fr.
[80] REFEDD, "Consultation Nationale Etudiante 2020", November 2020, https://le-reses.org/consultation-nationale-etudiante/.
[81] Raybaud, Alice, "In business schools, a still artificial green revolution", *Le Monde*, 21 November 2021, https://www.lemonde.fr/campus/article/2021/11/21/dans-les-ecoles-de-commerce-une-revolution-verte-encore-artificielle_6103019_4401467.html.
[82] Otter, Margaux, "Ecology hardly makes an impact business schools", *Reporterre*, 5 July 2021, https://reporterre.net/Dans-les-ecoles-de-commerce-l-ecologie-perce-a-peine.
[83] Marianne Blanchard et al., "Tous et toutes concerné·es ? Anxiété et engagements des étudiant·es face aux enjeux climatiques et environnementaux", *Observatoire de la Vie Etudiant*, (forthcoming).
[84] Arthur Gosset, *Rupture(s) Changement de cap chez les jeunes diplômés*, 2021, https://www.ruptures-le-film.fr/.
[85] Marine Miller, *La Révolte – Enquête sur les jeunes élites face au défi écologique*, 2021.

environmental issues (see Part 4, p. 204), the creation of an inter-school forum for committed professions, " Transition Ambitions"[86], refusing a position in a company with a high environmental impact or changing careers for more meaningful ones. These include: (see Part 4, p. 204), the creation of an inter-school forum on committed professions, "detraining", which advocates working only the minimum necessary, according to a rationale of degrowth and environmental concerns, associative involvement and activism.

C. Teachers are taking up the subject

1. A large number of initiatives taken by teachers in higher education have emerged to bring the challenges of ecological transition to the fore

The appeal to train all higher education students on climate and environmental issues, launched in 2019 by The Shift Project, has been signed by more than 9,000 citizens, including 1,200 teachers.

Associations and groups of teachers are increasingly organizing themselves to promote the exchange of best practices and to convey their messages: Profs in transition[87], Teachers for the planet[88]. Recently, the association Teachers of transition[89] has been founded which mainly addresses teachers in higher education.

The FNEGE (Fondation nationale pour l'enseignement de la gestion des entreprises), whose main mission is to "develop and promote higher management education in France and bring it to a level of excellence", launched **the Observatory of the environmental transition of business schools** [90] in 2020 and facilitates exchanges between institutions on these themes. It also plans to ask academic associations to rewrite the basic textbooks of each management discipline, taking into account the ecological transition.

The Transition Campus[91] has also brought together and mobilized many teachers from all disciplines to work on the evolution of the content of teaching in different fields. Its Handbook of the Great Transition[92], the result of the work of the FORTES group of teachers and researchers, constitutes a valuable basis for these reflections. The collection of "Petits Manuels de la Grande Transition" (Little Manuals of the Great Transition), progressively published since then, allows deepening reflections on the teaching of ecological and social transition in higher education through a thematic and disciplinary approach.

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[86] "Ambitions Transitions : Forum inter-écoles des métiers engagés", accessed on 13 April 2022, https://events.makesense.org/fr/e/ambitions-transitions-forum-inter-ecoles-des-metiers-engages-622e1cf3632bbf07a18f0256.
[87] "Profs in transition", accessed on 13 April 2022, https://profsentransition.com/.
[88] "Teachers for the planet", accessed on 13 April 2022, https://enseignantspourlaplanete.com/.
[89] "Teachers of transition", accessed on 13 April 2022, https://www.enseignantsdelatransition.org/.
[90] Jacques Igalens, "L'observatoire de la transition environnementale des écoles de management" (FNEGE, 2021), https://fr.calameo.com/read/0019301715dab09f5d6c2.
[91] The Transition Campus is a teaching, experimentation and research space created in 2018 by a collective of professors, entrepreneurs and students who wish to assist the directors of higher education establishments and teachers to changes teaching with respect to the social-environmental issues of our century. The Transition Campus proposes an innovative approach in the contents of its lessons and in the pedagogical practices it develops.
[92] This manual is the result of collective work "FORTES" (Former à la Transition Écologique et Sociale de l'Enseignement Supérieur), created following a demand by the Ministry of Higher Education, Research and Innovation, in summer 2019. FORTES Collective, *Manuel de la grande transition*.

Teachers are also involved alongside students and graduates in some of the transition clubs that have been created within different schools (e.g., Audencia Club Transitions, ESCP Transition Network, etc.).

The resources of the Transition Campus

The Great Transition Handbook presents six ways to enter the "Great Transition", i.e., to link scientific diagnosis and the search for fairer societies, to reflect on the changes in the rules of the economic game and on the narratives of a desirable life today and tomorrow, to set oneself in motion and to reconnect with nature.

It can be read in conjunction with the collection of the ***Petits Manuels de la Grande Transition***, which seeks to deepen reflections on certain major themes and disciplines. *Towards another management* proposes a reflection on the ways of teaching management sciences at a time of ecological and social transition; while Pedagogy of Transition proposes a "head-body-heart" pedagogical approach aimed at integrating knowledge, know-how and skills into the academic curriculum.

2. Business management teachers are strongly convinced of the importance of ecological challenges, but the transformation of the teaching given remains to be carried out[93]

A survey carried out as part of this project allows us to assess the position of management teachers with respect to environmental issues.

A questionnaire was first distributed to permanent and part-time professors at Audencia, and then more widely to professors from other business schools. The survey received 489 responses from teachers from nearly 30 institutions, including business schools, business administration institutes and universities. The majority of respondents were professors-researchers (Figure 3).

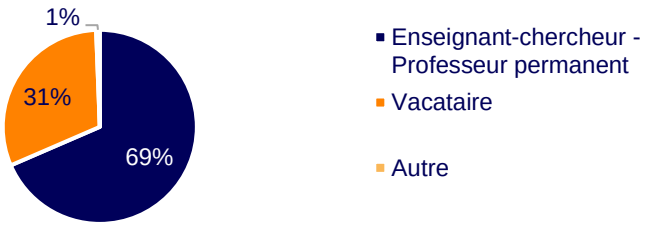

Figure 3 – Distribution of respondents according to their status.

a. The teaching of environmental issues in higher management education meets with the approval of all the teachers

There is a strong belief in the role of business schools in training on environmental issues. The vast majority of respondents say they value environmental issues (93%, Figure 4), and

[93] The questionnaire distributed and the complete analysis of this survey are available in the appendix. The appendices of this report will be published in November 2022, on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/

believe that business schools should train their students in environmental issues (94%, Figure 5)[94].

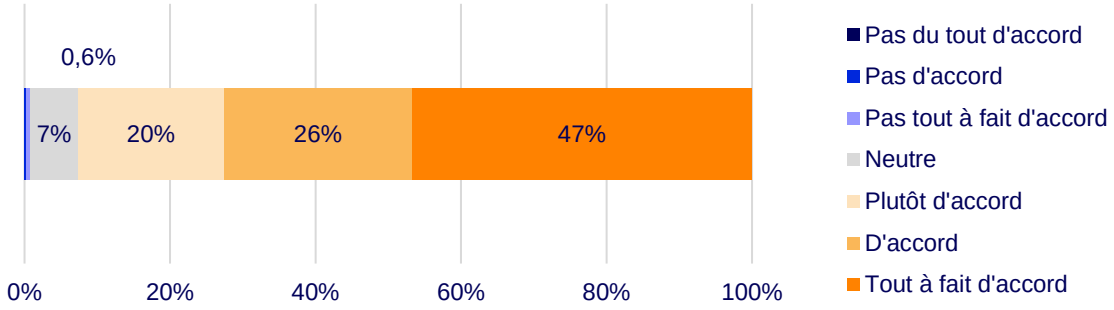

Figure 4 - Distribution of respondents by level of agreement with the statement: "In general, I value environmental issues."

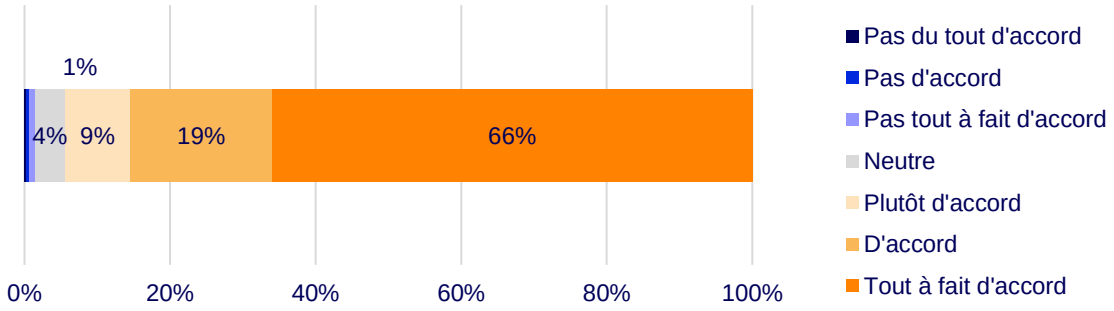

Figure 5 – "Business schools should educate their students in environmental issues."

b. Many teachers are integrating environmental issues in their courses, but there is still a long way to go before lessons are totally overhauled and all physical constraints are integrated

Course integration, while real, remains limited. A small majority see the link between their teaching discipline and environmental issues (63%, Figure 6), and claim to integrate environmental issues in their courses (60%, Figure 7). However, this clearly fails to match the strong awareness of the need for training on these issues. In-depth consideration of environmental issues remains limited to just over one-third (36%) of teachers (Figure 8).

[94] Here, all the responses are counted, from positive, quite agree to completely agree.

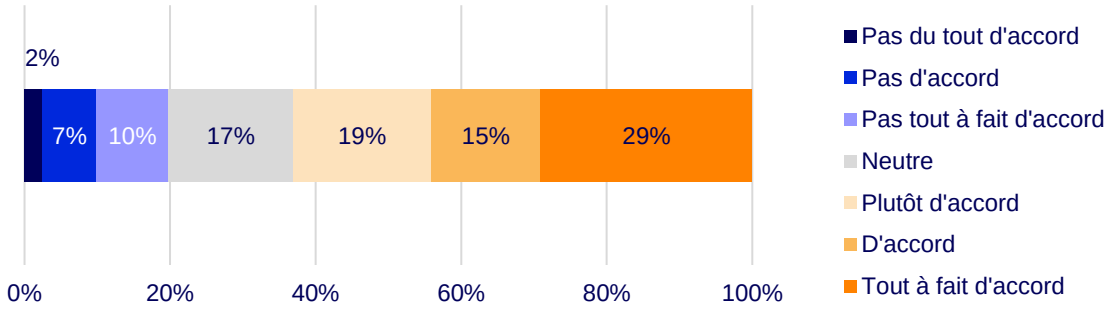

Figure 6 – "Ecological challenges have a link with my main teaching discipline."

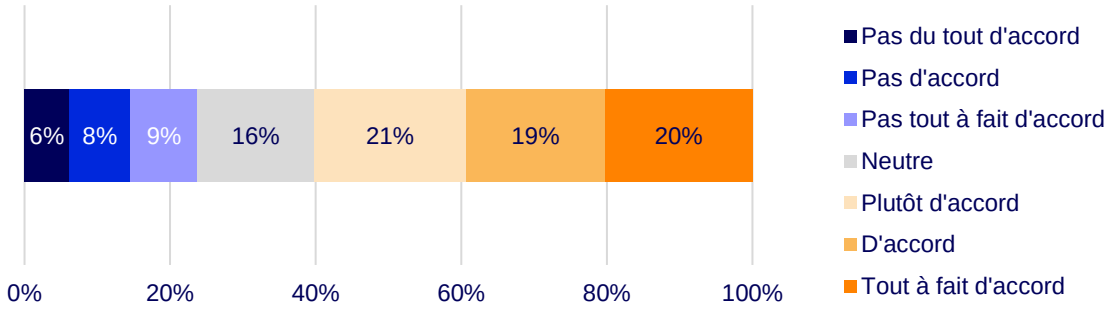

Figure 7 – "I integrate environmental issues in my courses."

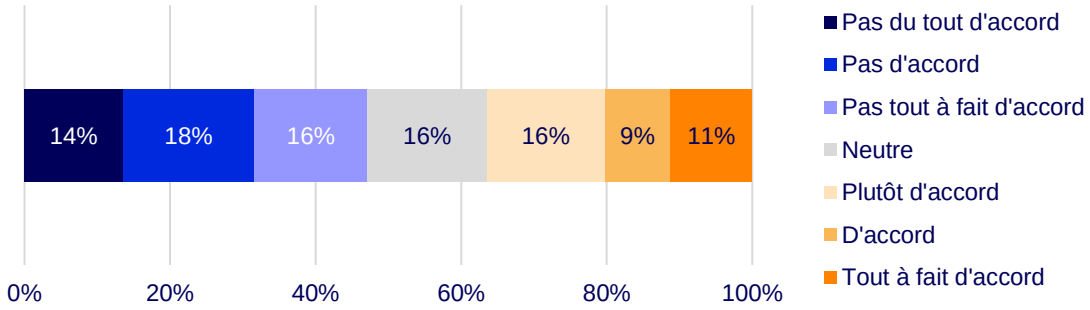

Figure 8 – "I think my courses in-depth as a function of environmental issues."

The teachers' responses are at odds with the analysis of course syllabi conducted as part of the Audencia case study (see Part 5, p. 222). Just over half of the Audencia teachers (54%) said that they integrated environmental issues in their courses, and about a quarter (26%) felt that they had thought through their courses in terms of these issues. However, 90% of the school's syllabi do not mention any elements related to environmental issues. There are several possible explanations for this significant gap, which are not mutually exclusive.

- It is likely that course syllabi are incomplete, not all of them are up to date, and generally do not reflect the integration of environmental issues in a comprehensive manner. This may be the case, for example, when environmental issues are addressed only in an example that is not in the syllabus.
- It is also possible that teachers have a broader interpretation of "environmental issues" than that used in the analysis of the syllabi, and more broadly in this report. Discussions with teachers suggest that the notions of "CSR" or "sustainable development" or "sustainability" blur the line between social issues in the strict sense and issues related to planetary limits or the finitude of resources. However, this hypothesis can only partially explain the gap observed, as it remains with more specific issues. For example, 39% of Audencia teachers said that they integrate climate change issues in their courses, and 14% said they "strongly agree" with the statement (climate change is the physical constraint most present in the courses, according to the questionnaire responses).
- Desirability bias may also lead to claims that they are integrating environmental issues in their courses more than is actually the case.

To reinforce this analysis and better understand this discrepancy, it would be interesting to ask the teachers themselves their interpretation of the results. It would also be relevant to complete these analyses with the perception of the students, through a survey, questions in the course grading, or through a focus group.

The collapse of biodiversity and the depletion of non-energy resources are the physical constraints that are most in the background. They are those for which the teachers' self-assessed knowledge level is the lowest, for which they make the least connection with their discipline, and those they integrate the least in their courses. This reveals increased training needs on these two topics.

c. Establishments have role to play to make resources available to teachers

About half of the teachers say they need more time to integrate green issues in their courses. This is followed by the need for training and the need to share with peers (Figure 9). The managements of establishments can make a significant contribution by freeing up time for teachers to do this work, offering training, and organizing workgroups on these topics (see Part 4, I. "Training Transformation Guide for Principals and Presidents," p. 153). It should be noted that only 22% of teachers said that they had received training on these issues at the time of the survey, and that the training cited was often awareness-raising rather than training: more than a third of the responses that specified the training taken cited only the Climate Fresco or other Frescos.

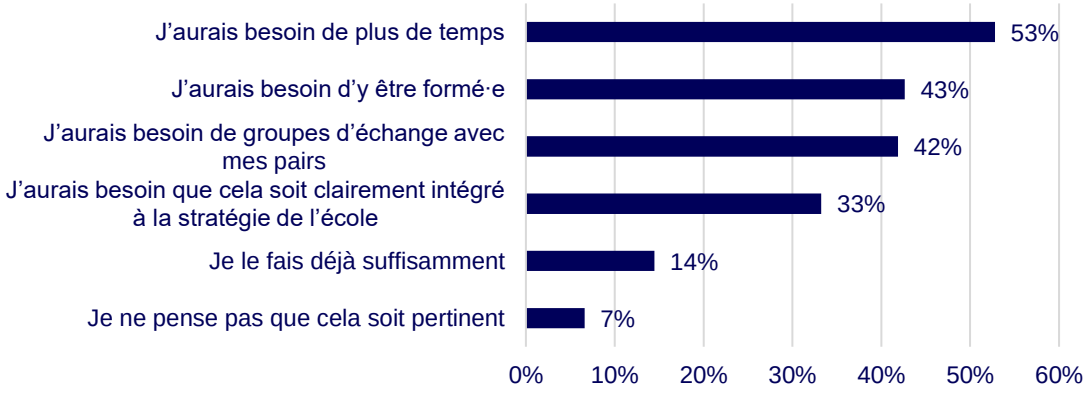

Figure 9 – "What do you need to better integrate environmental issues in your courses?"

In the open-ended responses, several teachers also said they needed case studies and business games, and examples of courses that incorporate these issues. They are also asked for elements to adapt their teaching methods. This leads to recommendations to create case studies, to freely distribute course materials, or to encourage the sharing of good practices between teachers from different institutions (see below, p. 135).

Some also emphasized the need for institutional change, in this case changes in international rankings and accreditations.

Finally, several teachers pointed out the risk of greenwashing and called for a debate on current teaching methods.

D. Higher business education establishments are progressively positioning themselves regarding environmental issues

Higher education institutions can engage in ecological transition in 6 areas [95]:

- the definition of their reason for being,
- the teaching they provide, which is of particular interest to us in this report
- their research activities,
- implementing environmental practices in their campus management, research and teaching
- support for student engagement, [96]
- support for the creation of businesses related to the ecological transition.

The implementation of environmental practices in the management of their campuses was the first step taken by business schools, notably by carrying out their carbon footprint.

It is only more recently that the question of training content has arisen. In 2021, **only 16% of business schools stated that they were willing to train 100% of their students in ecological transition issues** [97]. In March 2022, France Universités [98], the Conference des

[95] Igalens, "L'observatoire de la transition environnementale des écoles de management".
[96] For example, many schools have built themselves up by promoting internationalism, in particular by offering students the opportunity to study abroad, a practice that should be questioned in order to mitigate its impact.
[97] Pour un Réveil Ecologique, "L'écologie aux rattrapages. L'enseignement supérieur français à l'heure de la transition écologique : état des lieux et revue des pratiques", February 2021, https://pour-un-reveil-ecologique.org/documents/6/RESUME_Rapport_Ecologie_aux_rattrapages-Pour_un_reveil_ecologique-fev_2021.pdf.
[98] Formerly the Conférence des présidents d'université (CPU)

grandes écoles (CGE) and the Conference of the Directors of French Engineering Schools (Cdefi) launched **a joint appeal for ecological, energy and societal transition to become a national priority** for higher education institutions, **insisting on the need to train 100% of students at the second year BSc degree level**[99]. These two organizations have also created the SD&RS (Sustainable Development and Social Responsibility) label, which has helped to integrate these issues in the thinking and actions of institutions.

A number of institutions have already taken steps in this area: business schools, engineering schools, universities and others. Several institutions have reported on their experiences with these transformations in the "Collection of feedback from experience of establishments", published as a supplement to this report[100].

Despite these advances, the teaching of ecological transition issues in French management training remains limited[101]. The resources allocated to the development of training courses are still largely inadequate compared to those used to renovate campuses, for example[102]. **The evolution of teaching is still very far from integrating all the consequences of the planet's physical constraints.** The necessary questioning of business models based on the hypothesis of a planet with infinite resources[103] and capacity to absorb externalities is not yet widespread.

E. Employers who are committed but struggle to express their needs for skills

Employers (companies and other organisations) are increasingly - though still to a small extent - looking to recruit professionals with skills to lead the green transition. This need arises from the increasing regulatory constraints they face, because they see a business opportunity or because they anticipate that environmental issues (climate change, constraints on the resources they need, etc.) will require them to introduce real innovations.

The statement by Christoph Schweizer, Chairman and CEO of The Boston Consulting Group (BCG), one of the world's top three strategy consulting firms, **calling on climate activists to join the board**[104], is symptomatic of this development. BCG currently earns nearly 10% of its revenues (over £10 billion in 2021) from climate change-related consulting. It expects this to account for between a quarter and a third of its revenue over the next four to five years.

Although not all employers are moving at the same pace towards a green transition, **various surveys demonstrate the growing importance of this topic for existing employees and recent graduates**:

- **91% of employees consider ecological transition to be an important issue in French companies in general,** and 43% consider it a priority. Employees are only slightly less

[99] "France Universités, CGE et Cdefi lancent un appel commun pour que la transition écologique soit “une priorité nationale”, 29 March 2022, https://www.aefinfo.fr/depeche/670039-france-universites-cge-et-cdefi-lancent-un-appel-commun-pour-que-la-transition-ecologique-soit-une-priorite-nationale#:~:text=Dans%20le%20contexte%20de%20l,en%20ligne%2C%20en%20pr%C3%A9sence%20du.
[100] The collection of feedback from institutions is available on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/
[101] Igalens, "L’observatoire de la transition environnementale des écoles de management".
[102] Pour un Réveil Ecologique, "L’écologie aux rattrapages".
[103] Igalens, "L’observatoire de la transition environnementale des écoles de management".
[104] Michael O’Dwyer,"BCG’s Christoph Schweizer calls for ‘climate activists’ to join consultancy", *Financial Times*, 14 February 2022.

enthusiastic when it comes to their own organisation, with 88% believing that it is an important concern for their organisation [105].

- 78% of employees would choose, for an equivalent offer, to join a company committed to ecological transition [106]. Business school students and alumni **consider the environment to be the most attractive sector (65%)**[107], ahead of consulting (62%). **A majority (55%) say they are prepared to give priority to meaningful work, even if it is more precarious**. Climate change is the subject that worries them most (61%). Students and alumni of elite schools consider that large companies are not very committed to corporate social responsibility (CSR), and that this commitment is not very sincere. 56% of elite school students say they are ready to refuse a job in a company that lacks social or environmental commitment and 39% of alumni say they are ready to resign from their company if it lacks social or environmental commitment.

Although the business world has not yet made the transition, **it seems that a movement is underway in France**: a Convention of companies for the climate[108] was created, a "Major Challenge" of companies for the planet[109] was launched, and the Shift Project's exchanges with various companies corroborate the observation that management training must evolve to include skills related to ecological transition.

Many issues are still poorly taken into account by companies and require new skills and knowledge. For example, the impacts of business activities on biodiversity are still poorly assessed, despite their crucial importance. However, **companies, which rarely engage in prospective thinking relating to environmental issues, have difficulty anticipating the evolution of their sectors and professions, and therefore identify too little and often their future needs for skills inadequately** (in the short, medium and long term).

However, management courses, whose priority is the employability of students, need employers to express this need in order to place it on the curriculum, without which they are taking a gamble on the future. This is a gamble that The Shift Project supports, and which it is convinced will be successful; however not all institutions are ready to place their stakes. Thus, forward-looking reflection in companies, involving strategy and human resources departments, and the institutions from which they recruit, would make it possible to get training for management and other disciplines to undergo major changes.

[105] "Employees and the ecological transition in companies" (CSA), accessed on 8 April 2022, https://csa.eu/news/les-salaries-et-la-transition-ecologique-dans-les-entreprises/. Survey of people working in the civil service, public or private companies or NGOs.
[106] According to the same report: "Employees and ecological transition in companies".
[107] " BCG-CGE-Ipsos barometer “Talents : what they expect from their job” (Ipsos, mars 2021), shorturl.at/drHU8.
[108] The Companies for the Climate Convention, s. d., https://cec-impact.org/.
[109] "Le Grand Défi", Le Grand Défi des Entreprises pour la Planète, accessed on 12 April 2022, https://www.legranddefi.org/.

III. The barriers to generalising the inclusion of environmental issues in education are many

The relevance of the obstacles identified varies according to the nature of the higher education institution in management considered, which we have can be very diverse. The elements presented below are based on our discussions with actors working mainly in IAEs and business schools. The recommendations that follow from this overview are presented in Part 4 "All higher education actors must do their part" (see p. 151).

A. The institutional and academic framework provides little incentive for institutions to take environmental issues into account

1. The institutional framework has little effect on educational contents

The principle of autonomy of higher education and research governs this sector in France. This means that, unlike in national education, the content of the teaching provided is the responsibility of the institutions themselves. **The institutional actors only define the content of training courses to a very limited extent.**

Rules, mainly of form, are defined at national level by the Ministry of Higher Education and Research (MESR), which does not greatly interest itself in educational content. The National Training Framework (CNF), defined by the MESR following the Fioraso Law (2013), sets out the principles and procedures for the implementation of national degrees, that take the form of Bachelor, Master and PhD degrees, which are binding on institutions[110]. The CNF has also given rise to the creation of reference frameworks for skills[111], that set out, for each course, the skills that the students must learn.

In order to award national degrees, institutions must be recognised and their courses accredited by the State. **The High Council for the Assessment of Research and Higher Education (Hcéres) is responsible for assessing courses.** Its role is not to assess the content of courses as such, but to ensure that the missions entrusted to institutions under their contract with the State are being carried out. **The Hcéres focuses more on "detailed points of teaching organisation"**[112].

The Commission on Management Training Courses and Degrees (CEFDG) assesses the quality of training programmes offered by private and public business schools. In order for a management course to be approved by the State and, where applicable, to obtain a grade

[110] "Ruling of 22 January 2014 establishing the national framework for courses leading to the award of national bachelor's, professional bachelor's and master's degrees, Légifrance, accessed on 10 September 2018, https://www.legifrance.gouv.fr/loda/id/JORFTEXT000028543525.
[111] MESRI, "Référentiels de compétences en Licence", 16 July 2012, https://cache.media.enseignementsup-recherche.gouv.fr/file/Plan_licence/61/4/referentiel_227614.pdf.
[112] Laure Endrizzi, "L'avenir de l'université est-il interdisciplinaire ?", *Institut français de l'éducation*, n° 120 (novembre 2017), http://veille-et-analyses.ens-lyon.fr/DA-Veille/120-novembre-2017.pdf.

equivalent to that of a university course, it must be assessed by the CEFDG. The CEFDG awards a visa, a quality label that guarantees that a given course of study contributes to the missions of higher education. Its standards, however, which will be revised in 2021, do not currently include any consideration of environmental issues. **On the other hand, ecological, social and societal transition was recently introduced into the assessment file in a non-prescriptive manner at the level of the school's strategy and the programme being assessed, inviting the schools to explain in their file how they deal with these subjects**.

In view of the ecological emergency, and the service to the general interest that it seems legitimate to expect from a sector supported - even partially - by public subsidies, **the fact that business schools have no obligation to justify the way in which they contribute to improving society appears questionable**. Without prejudice to academic freedom, it seems legitimate that the roadmap given by the Government should include guidelines related to the contribution of these institutions to the national effort to ensure ecological transition. These guidelines could be defended by the representatives of the Government - generally the ministries responsible for these institutions, i.e., the MESR or the Ministry of the Economy - who sit on their board of directors. And they could of make their accreditation and access to public funding possible in return for fulfilling certain conditions.

The Utopies consultancy has initiated interesting reflection on this subject, inviting institutions to reflect on and define their reason for being [113]. However, this aspect should be a prerequisite for obtaining public support. It should be justified by precise indicators and objectives, defined collectively and monitored, in particular in order to encourage institutions which, once training for ecological transition has been included in their object (mission, vocation, etc.), are slow to include it in their programmes.

2. Several initiatives are in progress but whose concrete effects are yet to be seen

Following numerous mobilisations, a bill "on the generalisation of teaching issues related to the preservation of the environment and biological diversity and climate change within the framework of planetary boundaries "[114] was tabled in September 2019 after receiving the support of 80 MPs.

It appears that the message reached the then Minister of Higher Education, Research and Innovation. Indeed, in 2020**, Frédérique Vidal entrusted climate scientist Jean Jouzel**[115] **with the responsibility of setting up a working group to reflect on how to teach the challenges of ecological transition in higher education, a group in which The Shift Project participated. This working group brought together many representatives of higher education** (CPU, CGE, CDEFI, RESES, FAGE, UNEF, Pour un Réveil écologique, Campus de la Transition, etc.).

[113] Utopies, "From reason for being to reason for doing", February 2021, https://utopies.com/wp-content/uploads/2021/03/Executive-loipacte_Fe%CC%81vrier2021_franc%CC%A7ais_web-.pdf.
[114] "Proposal of law relating to the generalisation of education on issues linked to preserving the environment and biological diversity and climate change in the framework of planetary boundaries", Pub. L. No. 2263 (2019), https://www.assemblee-nationale.fr/dyn/15/textes/l15b2263_proposition-loi.
[115] Mission letter from the Ministry of Higher Education to Jean Jouzel, 03/02/2020. Sur https://theshiftproject.org/wp-content/uploads/2020/04/20-02-03_lettre_de_mission-Vidal-MESRI-%C3%A0-Jouzel002.pdf (consulté le 15/01/2021).

The conclusions of the meeting, which were presented to the Minister in a report on 16 February 2022,[116] invited the Government and the institutions and establishments concerned to:

- **Adopt the objective of training 100% of students at BSc second year level within 5 years.**
- **Give impetus and support to higher education and research establishments (ESR) in order to develop all training courses to prepare all citizens for ecological transition.** A consistent set of common skills can be developed for this purpose in each field of study.
- **Support the training of trainers** and encourage the mobilisation of RSE staff (time, resources, human resources (HR) development).
- Coordinate and assist these transformations, and provide the necessary resources.
- Encourage the integration of ecological transition at the highest level of institutional governance.
- Support the initiatives of association-based projects.

Meanwhile, **the law on research programming (LPR)**[117] was promulgated in December 2020. Without making any major changes along the lines of the proposals in the workgroup's intermediate memo published in February 2021, **it nonetheless introduces in the Education Code the mission of higher education to contribute to "awareness and education about the challenges of ecological transition and sustainable development"** (Education Code, Article 123-2).

Based on the recommendations of the working group led by Jean Jouzel, in October 2022, Sylvie Retailleau, Minister of Higher Education and Research, reiterated the objective of educating 100% of students in ecological transition. [118] The resources that will be made available to carry out this strategy have not yet been announced, which makes it difficult, at the time of writing, to draw any conclusions on the scope of the stated objectives.

B. The demand for integrating environmental issues in training courses is still driven by the most committed actors

1. Businesses have a lot of influence, but are slow to take these issues on board on a massive scale

Businesses are present on the boards of higher education management institutions and their voice is taken into account in the institution's policies. However, companies are slow to take environmental issues into account and do not yet make them an important recruitment criterion. Their needs in terms of skills linked to transition are therefore not communicated to the institutions from which they recruit. Indeed, the representatives of the local economic fabric sometimes expect higher education institutions to meet their immediate needs in terms of skills, and give less importance to environmental issues. But these dynamics can change quickly, as

[116] "Making aware and educating about ecological transition and sustainable development in higher education - Mobilisation of students", February 2022, https://www.enseignementsup-recherche.gouv.fr/fr/sensibiliser-et-former-aux-enjeux-de-la-transition-ecologique-dans-l-enseignement-superieur-83888.
[117] "Law no. 2020-1674 of 24 December 2020 on research programming for the years 2021 to 2030 and on various provisions relating to research and higher education (1)', Légifrance, accessed on 15 January 2021, https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000042738027.
[118] Ministère de l'Enseignement supérieur et de la recherche, "Former à la transition écologique dans l'enseignement supérieur : défis et solutions (Dossier de presse)", October 2022, https://www.enseignementsup-recherche.gouv.fr/fr/la-ministre-de-l-enseignement-superieur-et-de-la-recherche-annonce-la-generalisation-de-l-87608.

testified by an IAE director who has been confronted for two years with requests from companies that need graduates with skills related to environmental issues.

Companies play an important role in financing business schools. The evolution of the legal status of consular schools towards that of EESC has enabled them to diversify their sources of financing by bringing in private players in the capital (this is the case, for example, of the Burgundy Business School)[119]. The motivation of these investors is varied: capital gain on resale in the event of the school's growth, the rationale of territorial development, pooling their corporate university with the school, etc. Furthermore, some private institutions are financed by investment funds (for example, the OMNES group, which was bought by the British fund Cinven in 2019, or EM Lyon, in which Galileo has invested).

Companies also contribute to financing business schools through continuing education, the apprenticeship tax and **financing of research, which is partly based on the companies' activities.**

Many companies have made a public commitment to ecology without this necessarily being reflected in their recruitment. Some companies, although still imperfect from an ecological point of view, are nevertheless committed to a more virtuous path by financing research on ecological and social transition. However, other companies have financed organisations that refute global warming[120], **which raises questions about the possible conflicts of interest that some companies may have in funding research on this subject or in supporting the integration of environmental issues in training.**

2. Mobilising students plays a decisive role, but it remains the action of a minority

The mobilisation of students plays a central and necessary role in the consideration of environmental issues by higher education (see Part 2, "Students are mobilised for ecology", p. 43). It reflects their deep concern for the subject. **However, in the field of management, students involved in environmental issues are still in the minority**[121]. And business school students are among those who say they are least concerned about the climate issue [122].

This trend is reinforced by the high proportion of international students in business schools, which has now reached 17%.[123]. Some of the professors interviewed said that **the sensitivity of business students to environmental issues varies significantly depending on their geographical origin.** For example, it seems that students outside Europe are comparatively less aware of environmental issues.

Furthermore, students' concern for the environment is not yet perceptibly reflected in their

[119] The editor, "Burgundy School of Business, premier EESC to open its capital to businesses", Business Cool, 24 March 2018, https://business-cool.com/actualites/actu-ecoles/burgundy-school-of-business-premier-eesc-a-ouvrir-capital-aux-entreprises/.
[120] Christophe Bonneuil, Pierre-Louis Choquet, and Benjamin Franta, "Early warnings and emerging accountability: Total's responses to global warming, 1971–2021 », *Global Environmental Change* 71 (November 2021), https://www.sciencedirect.com/science/article/pii/S0959378021001655.
[121] Otter, Margaux, "Ecology hardly makes a mark in business schools".
[122] Blanchard et al., "Is everyone concerned? Anxiety and commitments of students faced with climatic and environmental issues".
[123] Sylvie Lecherbonnier, "Still more costly, still more attractive: the paradox of business schools", *Le Monde*, 18 November 2020, https://www.lemonde.fr/campus/article/2020/11/18/toujours-plus-cheres-toujours-plus-attractives-le-paradoxe-des-ecoles-de-management_6060152_4401467.html.

choice of institution. Apart from their commitment to environmental issues, **other criteria are also taken into account when choosing an institution**. For example, students who are admitted to more than one institution will tend to choose that best ranked, regardless of their environmental commitment.

There are several possible explanations. It may be due to a **lack of clarity as to which institutions and programmes really integrate environmental issues into their curricula**, with a proliferation of programmes bearing the title of 'sustainable' and initiatives by institutions. As the content and even the titles of the courses taught are rarely available, it is difficult to judge whether these issues are really taken into account.

This can also be explained by the fact that business school studies are often financed by parents, or even grandparents, who therefore have a say in the choice of school. However, this population remains less committed to the subject of ecology. Some students go into debt to pay for their studies. According to a survey by the Observatoire de la Vie Étudiante, students in business schools account for 11% of the loans granted to students. A student in a business school now has a debt of €25,000, whereas a university student borrows around €7,000[124]. This debt creates a strong incentive to choose the highest ranked institution regardless of its environmental commitment in order to increase one's chances of finding a well-paid job.

Finally, **some heads of public institutions point to the financial difficulties affecting some of their students,** which is confirmed by the Observatoire de la vie étudiante[125], and the fact that a number of them work in parallel with their studies, leaving them little time to concern themselves with environmental issues.

C. The integration of environmental issues: a challenge for teachers

1. The integration of environmental issues in training requires a major renewal and extension of disciplines

Ecological and social transition calls for a major overhaul of disciplines[126, 127]**.** The integration of environmental issues within each discipline **requires thorough rethinking of teaching** because, as mentioned above (see Part 1, p. 26), the disciplines taught were developed in a historical context where physical constraints were not an issue and not taken into account. It is therefore necessary to **question their basic assumptions** in order to understand the links between physical constraints and the institutional, social, economic and technical fundamentals in which our economic activities take place.

This intra-disciplinary work is insufficient: **the integration of physical constraints also calls for work to open up disciplines.** Each discipline must open up to new fields of knowledge to ensure adequate understanding of environmental issues and the development of specific skills such as environmental impact assessment (life cycle analysis, scenario analysis, etc.). This

[124] Noélie Brun, "Student indebtedness: from France to the United States", Le virus de l'info, 31 mai 2020, https://levirusdelinfo.fr/2020/05/31/lendettement-etudiant-de-la-france-aux-etats-unis/.
[125] Observatoire national de la vie étudiante, "Student living conditions 2020", 2020, http://www.ove-national.education.fr/.
[126] Aurélien Acquier and Pierre Peyretou, "Business education meets planetary boundaries: how to teach energy and climate in business schools?", *ESCP Business School*, ESCP Impact Paper, 2021, https://academ.escpeurope.eu/pub/IP%202021-51-EN%20V2.pdf.
[127] Nathalie Lallemand-Stempak and Philippe Eynaud, *Petit Manuel - Repenser les sciences de la gestion*, s. d.

interdisciplinary approach calls in particular on the natural sciences, which management teachers are generally not trained to deal with.

However, the disciplinary division according to professions (marketing, strategy, finance, etc.) is an obstacle to understanding an eminently systemic phenomenon such as ecological transition. Of course, it is not a question of breaking completely with a disciplinary approach, but of introducing within each discipline the elements of other disciplines (from the natural sciences, engineering sciences, other human and social sciences) necessary for understanding physical limits and their link with the discipline.

Another obstacle is that there are still too few examples of companies that have truly taken into account the implications of global physical constraints and that can serve as case studies from which teachers and students can learn. The teachers we surveyed also said they need case studies and business cases, examples of courses that integrate these issues. They are also in need of elements to adapt their teaching methods.

2. Disciplinary renewal must be addressed at the institutional level, and may come up against resistance by certain teachers

Today, the majority of committed teachers have been trained and are training themselves. In the teacher survey (see presentation of results on p. 45), **only 22% of teachers said they had received training on these issues, and the training mentioned was often awareness raising rather than training**. More than a third of the responses that specified training cited only the Climate Fresco or other Frescoes. In order to scale up, **the topic needs to be addressed at the institutional level and not at the level of individual teachers** (see Part 4 "All actors in higher education must do their part", p. 153). Moreover, it must be about training, not just awareness-raising[128] (see p. 166).

Institutions that are committed to ecological transition must involve their teachers in the process. **The same heterogeneity of students' approach to environmental issues is found among teachers.** Some of the latter are very committed to these issues and play a leading role in higher education institutions. However, **integrating environmental issues in courses requires major personal rethinking, which may be all the more difficult to accept if the teacher was trained a long time ago and if his or her status is based on management teaching that does not integrate these issues.**

Moreover, the content devoted to ecological transition is perceived by some teachers as competing with the basic content they have to teach in their discipline, in a framework that is sometimes already very constrained in terms of teaching hours. Finally, it is not only a question of teachers acquiring knowledge, but also of adapting their teaching methods to the subjects covered (see Part 3, p. 133).

This reluctance may be reinforced by the fact that many teachers devote more time to research than to teaching, since the former is generally more highly valued by institutions in terms of their career development and gives entitlement to bonuses. However, since interdisciplinarity is not highly valued - or even discouraged - by academic journals, it also has a knock-on effect on the career paths of professors. The latter may therefore be reluctant to devote time to opening up to other disciplines.

[128] The Shift Project ideally recommends 20 hours and a minimum of 10 hours of training for principals and non-teaching staff and 48 hours of training for teachers.

Investing in ecological transition has a significant cost. This cost is directly visible from the point of view of the environmental impact of campuses, for example by investing in the insulation of buildings or the environmental renovation of campuses. It is perhaps less directly apparent, but just as real, when we consider the integration of environmental issues in training. The guide for school managers in this report (p. 153) gives an idea of the extent of this integration. **This is a real transformation, not just an evolution.** In particular, teachers need to be made aware of and trained in these subjects, and they should be given the time to reflect on and identify the links between environmental issues and their course, etc. All these actions require a strong commitment from school managements. All these actions require resources and time obtained from the faculty and other staff. The guide for school management provides concrete and operational details of the transformation project to be undertaken.

By way of indication, the teaching transformation project described in this guide requires resources estimated at **3% of the institution's operating budget for at least 3 years, on training alone**[129]**.**

D. The competitive nature of management education hinders the integration of environmental issues in education

Higher education business schools are competing for students, faculty, investment, and high rankings.

They deploy a differentiation strategy aimed at improving their overall image and developing their offer. They influence the representation of students and their families regarding the quality of the institution by using accreditations and by trying to obtain favourable assessments from ranking bodies (national and international). They seek to quickly adapt their programmes to the expectations of students and the companies that recruit them, participate in the schools' governance and financing. They position themselves as a pathway to valued careers in business and society.

The competitive nature of the higher education market in management results in a high degree of responsiveness to the expectations of companies and students. In the case of environmental issues, under pressure from students, business schools and Institutes of Business Administration (IAE) have made significant progress in taking these issues into account. Today, many elite schools and IAEs integrate ecological transition in their mission, launch actions in this direction (e.g., Climate Week, etc.) and develop certain courses to integrate CSR[130].

However, in a context where: 1/ the consideration of environmental issues by institutions does not result in an increase in the number of students enrolled, 2/ companies do not show a strong interest in the subject, and 3/ the integration of these subjects has a significant cost for institutions, **the competitive nature of business schools also has a negative effect on the way this subject is considered**. Some institutions, driven by this competitive logic, by poor appreciation of the work to be done, and by the agitation surrounding ecological transition, tend to integrate environmental issues in a superficial manner. Their 'transformation' ultimately affects only a limited number of their staff, so as not to be penalised in the eyes of students, but without any in-depth and systematic questioning of their teaching.

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[129] The Shift Project estimates that a minimum of 3% of an institution's operating budget is needed for three years to trigger changes in education and training. To this budget must be added the expenses related to the transformation of research and the campus.

[130] Igalens, "L'observatoire de la transition environnementale des écoles de management".

It should nevertheless be stressed that this fierce competition coexists with collaboration between institutions, especially on CSR issues, through several bodies, including for example the CDEFM, the CEFDG and the FNEGE. The IAE network rejects this competitive logic and promotes cooperation between member institutions.

A point of preoccupation concerns the progress noted earlier in the integration of CSR in teaching. This is important but not sufficient to account for the integration of environmental issues in teaching. This approach comes up against the same difficulties as those based on CSR, ESG and the SDGs. **The crucial importance of addressing physical constraints is diluted by other considerations which, while important, are nonetheless secondary, as they are dependent on physical constraints.** In this type of approach, an institution can be exemplary from a CSR, CSR or ESG perspective, while still teaching content that ignores planetary limits. For example, one cannot work on the eradication of hunger in the world without taking into account the climate and biodiversity which will have a negative impact on agricultural yields. However, the teaching of this objective sometimes ignores the physical issues on which to a large extent it depends.

E. Accreditation helps to dilute the importance of environmental issues

1. Context and issues

There is a multiplicity of public and private labels and accreditations designed to assess the level of excellence of business schools.

The Commission on Management Training Courses and Degrees (CEFDG) and the High Council for the Assessment of Research and Higher Education (Hcéres) are public assessment bodies. They allow institutions or courses to award a state-recognised degree giving access to the grade of BSc or master. Their assessment methods are therefore central to the development of course content.

Accreditations or labels issued by private bodies are supposed to guarantee a form of excellence for institutions and courses based on their own criteria. The most prestigious private accreditations are: the Association to Advance Collegiate Schools of Business (AASCB), the Association of Masters of Business Administration (AMBA), and the European Quality Improvement System (EQUIS). Less than 1% of the world's higher education business institutions hold these three accreditations. The following analysis focuses on these three accreditations.

These private accreditations are of great importance to institutions because of the prestigious nature they confer. They are a guarantee of excellence and help to position institutions at international level, which strengthens their legitimacy at national level and enables them to attract international students.

The rankings also take account of these accreditations in their assessment criteria. Indeed, accrediting bodies, whether national or international, guarantee more exhaustive control than some rankings.

Whether or not environmental issues are taken into account in the accreditation evaluation criteria therefore has a definite impact on the choices and strategies of institutions.

In addition, some organisations offer accreditations or labels specialising in environmental issues (such as the DDRS Label [131] or EDuC label [132]). While they certainly have a positive impact, **the proposals in this report are aimed at developing the most widespread, non-specialised accreditations.** Indeed, it is through their evolution that it will be possible to influence the strategies of institutions in a massive way.

Today, although most accreditations have introduced references to CSR, sustainable development or environmental impacts in their assessments, these are still too limited in scope.

2. Criteria that remain insufficiently attractive in the most recognised accreditations

a. A few examples of criteria that take into account environmental issues

Changes are occurring in the consideration of environmental issues by accreditations and some of them are now integrating the notions of sustainability and impact in their criteria. For example, EQUIS includes a chapter on "Ethics, Responsibility and Sustainability" in its criteria, AASCB includes a whole chapter dedicated to impact, proposing (but not imposing) the 17 SDGs as a reference framework.

The following is a non-exhaustive list of indicators that exist in the most common accreditations and that support the consideration of environmental issues in institutions:

Indicator	Source
Teaching	
The institution ensures that its training offer integrates the challenges of sustainable development.	Hcéres
Describe how ethics, responsibility and sustainability are integrated in the design, delivery and assessment of the School's degree programmes.	EQUIS
Provide a short summary describing the School's integration of ethics, responsibility and sustainability into its educational offerings.	EQUIS
Evidence should be provided that the MBA programme enables its participants to build new skills and values in the face of environmental issues.	AMBA
What training programme for all the staff, and in particular permanent teachers, on the subjects of social, environmental and societal responsibility?	CEFDG

[131] The labelling system, called Label DD&RS - Sustainable Development and Social Responsibility - for higher education was created in 2015. It is the result of the collective work of a dozen universities and elite schools, the Conférence des Grandes Écoles (CGE), the Conférence des Présidents d'Université (CPU), the Ministry in charge of sustainable development, the Ministry in charge of higher education and the Réseau des Etudiants pour une société écologique et solidaire (RESES). On https://www.label-ddrs.org/index.php/le-dispositif/item/3-le-dispositif (accessed on 23/09/2022)

[132] Developed under the supervision of AFNOR, the Label EDuC supports higher education programme managers worldwide and in all disciplines on the way to the relevant and adapted integration of the challenges of socio-ecological transition in teaching and other activities offered to students. On https://www.labelleeduc.org/fr/ (accessed on 23/09/2022)

Research	
The school's portfolio of intellectual contributions contains exemples of basic, applied, and/or pedagogical research that have had a positive societal impact, consistent with the school's mission.	AASCB
Provide a short summary describing the School's integration of ethics, responsibility and sustainability in its research and development activities.	EQUIS
Governance & strategy	
Is the school committed to obtaining the SD&RS label developed by the Ministry of Higher Education?	CEFDG
The school assesses the socio-economic impact of its activities and, where appropriate, uses tools to measure it.	Hcéres
The institution assesses its environmental impact and ensures that it is under control by using indicators, labels and certifications.	Hcéres
Summarize the evidence that ethics, responsibility and sustainability are reflected in the School's mission, governance, strategy and current operations.	EQUIS
Assess the key changes in the School's activities regarding ethics, responsibility and sustainability that have occurred in the past five years.	EQUIS

b. The limits of including environmental issues in accreditations

The importance of integrating environmental issues in teaching is mentioned only explicitly. In the case of EQUIS accreditation, the terms "ethics, responsibility and sustainability" are used, whereas AASCB accreditation refers to "positive social impact". The CEFDG prefers to speak of "social, environmental and societal responsibility", and the Hcéres sometimes of "societal responsibility", "sustainable development", or "environmental impact".

These formulations, as well as the notions of CSR and OSR to which institutions often refer, are not sufficiently precise to encourage the integration of environmental issues in teaching. The crucial importance of taking into account physical constraints is diluted by other considerations which, although important, are nonetheless of secondary importance, since they depend on these physical constraints. In this type of approach, an institution can be exemplary from a CSR perspective, while continuing to teach content that ignores planetary limits. For example, one cannot work on the eradication of hunger in the world without taking into account climate and biodiversity, which will have a negative impact on agricultural yields, yet the teaching of this MDG sometimes overlooks the physical issues that condition it to a large extent.

The existing indicators are mainly qualitative (not quantified), **but the headache is often in the means deployed** to provide a response commensurate with the challenge, and the real impact of the initiatives put in place.

The indicators do not always make it possible to identify the existence of a global approach, of harmonised thinking across all the lessons. Yet it is important that environmental

issues be taught in a coherent manner across all the courses, in order to avoid contradictions and schizophrenia between courses.

Similarly, as part of the evaluation criteria for obtaining and maintaining some of these accreditations (not all of which are equally important), institutions must have faculty members who publish in highly ranked peer-reviewed journals. In doing so, accreditation aims to encourage quality management education based on quality research. **However, this has two negative consequences for the consideration of environmental issues in education.**

On the one hand, **this reinforces the tendency of educational institutions to give more importance to research than to teaching.** However, taking environmental issues into account in courses requires in-depth work that requires time that is often dedicated to research. Quality research is certainly essential for integrating environmental issues in teaching content, but it must not be done at the expense of modifying teaching content to integrate environmental issues. A balanced approach is needed.

On the other hand, international organisations impose a certain level of quality on journals, leaving it up to each institution to demonstrate this quality, generally via journal rankings (in France, the lists proposed by the FNEGE and the Hcéres, or the Academic Journal Guide, often serve as a reference). **This approach, which is totally justified, nevertheless raises the question of a possible bias against the publication of research integrating environmental issues in the best journals listed in these rankings.** For example, **for the disciplines of economics and finance, the inclusion of environmental issues may be accompanied by the questioning of certain currents of thought that these journals hold,** which reduces the possibility of publishing articles that attempt to reflect them[133]. Nevertheless, it seems that in the field of finance, the number of articles integrating climate issues is increasing. Another example of bias lies in the fact that **taking these issues into account requires an interdisciplinary approach, whereas these journals publish articles that are specialised from a disciplinary point of view.**

Although it is not the strict object of these recommendations (which concern the content of training courses), it seems important to note the absence of **global reflection on the ecological impact of all the indicators established by the accreditations**. However, all the indicators used by the accreditations have an ecological impact. For example, with regard to international mobility, accreditations generally value international mobility by plane in the same way as European mobility by train, without regarding the mode of travel used, although the carbon footprint of these two options is not the same.

F. Traditional rankings do not contribute to the integration of environmental issues in training

1. Context and issues

In addition to accreditations, there are many rankings of higher education business schools and their programmes, mostly produced by the media. Some rankings have a national dimension (e.g., Le Figaro, L'Étudiant, etc.), others compare institutions on a global or European level (e.g., Financial Times, The Economist, etc.).

[133] I. Diaz-Rainey, B. Robertson, et C. Wilson, "Stranded research? Leading finance journals are silent on climate change. Climatic Change", *Climatic Change* 143, n° 1-2 (s. d.): 243-60. Cited by Lallemand-Stempak and Eynaud, *Vers une autre gestion*.

Rankings have a significant impact on the perception of students and their families. Their purpose is to help them find their way through the multiplicity of business schools and programmes. **Companies also take this into account to a large extent** by aiming to recruit graduates from the best ranked schools and by paying them more. Institutions are therefore extremely vigilant about their place in the ranking.

The approaches differ from one ranking to another in terms of what is measured (e.g. programme or institution) and the criteria and methods for assessing these criteria. "Rankings are the result of multiple choices, which are justified in terms of pre-established representations of quality and explicit or implicit objectives"[134]. If we take the example of the Financial Times' ranking[135], the average salary three years after graduation and the average salary increase between graduation and the date of ranking account for 40% of the assessment of the excellence of a programme.

One may wonder about the consistency of the criteria used today - or at least their weighting - with the national objectives of ecological transition, and the expectations of students who today express their desire to give more meaning to their career.

While not all rankings place equal weight on the financial success of students upon graduation, to our knowledge, none of the main rankings seriously take into account the integration of environmental issues in education.

This is precisely what has led a number of actors to propose rankings that attempt to do so (e.g., Positive Impact Rating[136], Corporate Knights[137]). **Les Echos Start and ChangeNOW have launched the first ranking of schools and universities committed to ecological transition in 2021** [138] and a coalition of stakeholders from the higher education community made recommendations to guide the evolution of rankings [139].

At the international level, two dedicated tools have helped to set a movement in motion. The Positive Impact Rating [140] launched in 2019 attempts to measure business school students' perceptions of the positive impact of their school. The Times Higher Education Impact Ranking, launched in 2020, assesses institutions' contribution to the UN Sustainable Development Goals[141]. The participation of more than 1,500 higher education institutions in the latest ranking shows growing interest in this topic.

In addition, the major ranking organisations - Financial Times (FT), Quacquarelli Symonds (QS), Times Higher Education (THE), etc. - **have been involved in the Higher Education Sustainability Initiative (HESI)** for the past three years to reflect on this subject. Three guides

[134] Nadine Dalsheimer and Denis Despréaux, "Analyse des classements internationaux des établissements d'enseignement supérieur", *Education & Formation*, November 2008.
[135] Leo Cremonezi, Sam Stephens, et Chan Wai Kwen, "FT Masters in Management ranking 2021: methodology and key", Financial Times, 12 September 2021, https://www.ft.com/mim-method.
[136] "Positive Impact Rating", accessed on 25 September 2022, https://www.positiveimpactrating.org/.
[137] "Corporate Knights", accessed on 25 September 2022, https://www.corporateknights.com/.
[138] Julia Lemarchand, "Premier classement des grandes écoles les plus engagées dans la transition écologique et sociétale", Les Echos Start, 24 October 2021, https://start.lesechos.fr/apprendre/universites-ecoles/exclusivite-classement-2021-des-ecoles-et-universites-pour-changer-le-monde-quels-sont-les-30-etablissements-les-mieux-classes-1357899.
[139] Utopies et al., "Recommandations aux classements de l'enseignement supérieur", 14 February 2022, https://le-reses.org/wp-content/uploads/2022/02/Recommandations_Classements_TransitionsEcoSoc.pdf.
[140] "Positive Impact Rating".
[141] "Impact Rankings 2022", Times Higher Education, accessed on 5 September 2022, https://www.timeshighereducation.com/impactrankings.

were published in 2020 to shed light on these issues and propose recommendations to the various stakeholders[142].

However, changes in the positioning of the main rankings are still pending. Nonetheless, they must evolve in order to have a significant influence on the strategies of institutions.

2. Taking account of environmental issues is hindered by numerous barriers

a. Recent progress in taking account of environmental issues remain modest

The situation is changing, but the inclusion of environmental education in the main rankings remains marginal. For example, following the publication of the "*Business Schools Rankings for the 21st Century*[143]**"**, the Financial Times has changed its criteria to include the proportion of teaching hours in core courses dedicated to environmental, social and governance (ESG) issues. However, this criterion is vague and only accounts for 3% of the final score of the programme, which, compared to the weight of the criteria linked to salary (43%), is negligible in relation to the importance of environmental issues.

L'Étudiant[144] and Le Figaro[145] have recently added criteria on environmental issues. The following is a non-exhaustive list of criteria for taking environmental issues into account in establishments.

Criteria	Source
Teaching	
Does the school organise a climate mural for the students of the programme, or a workshop to understand climate issues?	L'Etudiant 2022 of elite business schools
Integration of the "sustainable development" and "social responsibility" theme in the elite school programme: consideration of the number of specialities, compulsory courses, optional courses and teachers integrating it into their courses.	Le Figaro 2020 of the most ecological business schools
Research	
Number of "CSR" publications in research journals categorized by the CNRS or FNEGE.	Le Figaro 2020 of the most ecological business schools
Governance & strategy	

[142] "Assessments of Higher Education's progress towards the UN Sustainable Development Goals, Volume 1" (United Nations, October 2022), https://sdgs.un.org/HESI/rankings-ratings-and-assessment.
[143] David Pitt-Watson et Ellen Quigley, "Business School Rankings for the 21st Century" (United Nation Global Compact, January 2019), https://www.unglobalcompact.org/library/5654.
[144] "Classement 2022 des grandes écoles de commerce", L'Etudiant, accessed on 4 November 2022, https://www.letudiant.fr/classements/classement-des-grandes-ecoles-de-commerce.html.
[145] "Découvrez notre classement 2020 des écoles de commerce les plus écologiques", Le Figaro, accessed on 4 November 2022, https://etudiant.lefigaro.fr/article/exclusif-decouvrez-notre-classement-des-ecoles-de-commerce-les-plus-ecologiques_5e351a92-cfe0-11ea-b4e1-89894d83f6ce/.

Existence (or not) of a specific department dedicated to sustainable development and social responsibility.	L'Etudiant 2022 of elite business schools
Environmental labels that the school has from the following list: DD&RS label, Lucie 26000, Agir Ensemble campus durable.	L'Etudiant 2022 of elite business schools
Associative life	
Number of associations related to sustainable development and social responsibility in the institution.	L'Etudiant 2022 of elite business schools

b. Taking account of environmental issues by ranking is hindered by numerous limits

In most rankings, the societal impact of institutions is taken into account as a 'non-ranking' criterion, i.e. it is given a zero weighting that is purely symbolic. As a result, these criteria are not taken into account in the general ranking of business schools and appear in an ancillary manner, with the exception, for example, of the Financial Times, mentioned above, which gives a low weighting to ESG issues.

The integration of environmental issues in teaching is rarely mentioned explicitly. It is too vaguely defined and subject to interpretation by the institutions. The terms "sustainable development", "CSR" and "SDO" are often used. **These notions do not allow measuring the integration of environmental issues in teaching**. For example, a course that regularly addresses issues related to discrimination, inequality or well-being at work cannot be considered to integrate environmental issues. **The wording of the criteria must evolve in order to truly integrate issues related to the preservation of the environment and biological diversity, and to climate change within the framework of planetary boundaries**.

The data for the rankings is often collected by journalists from the institutions, which usually respond in a purely declarative manner. The information is not necessarily verifiable, and the ranking therefore depends on the sincerity and level of understanding of the respondents.

Furthermore, the data collected by the rankings come solely from the institution's management, whereas it would be useful **to cross-check these statements with those of other stakeholders**.

Most of the time, the criteria measure the means used but not the results. **It is essential to encourage institutions to measure the results of their educational actions**: knowledge, skills and attitudes[146].

The criteria do not make it possible to identify the existence of a global approach, of coherent reflection regarding all the lessons. It is important that environmental issues be taught in a coherent way across the courses, in order to avoid contradictions and schizophrenic messages between courses.

The criteria for the rankings are almost exclusively quantitative and succinct, and need to be supported by qualitative details or additional quantitative criteria to be meaningful.

Similarly, among the assessment criteria for the rankings, institutions are required to report on the ability of their faculty to publish in peer-reviewed journals. However, this also contributes to

[146] This is the intention of initiatives such as the Sulitest (www.sulitest.org), which offers quizzes to check knowledge on sustainable development, a tool that some institutions have adopted and adapted to their own standards.

slowing down the consideration of environmental issues**, due to the low profile of these subjects in these journals** (see p. 57 and p. 62).

Although it is not the strict object of this report (which deals with the content of training courses), it seems important to note the absence of **global reflection on the ecological impact of all the criteria established by the rankings.** Indeed, a large part of the criteria assessed by the rankings have an ecological impact. For example, in terms of international openness, the rankings generally value international mobility by plane in the same way as European mobility by train for their students, without regard to the mode of travel used, although the carbon footprint of these two options is not the same.

3. The notion of ranking is in itself a barrier to taking account of environmental issues

The negative effects of rankings are well-documented[147, 148]. The underlying choices, the limitations of which have been mentioned above, have an impact on institutional choices in terms of recruitment, curriculum development, candidate selection, etc. Thus, when they were introduced for law schools in the United States, the deans of these faculties tried to oppose them without success and found that they led them to decisions that were contrary to what they considered their mission and the interests of the students[149]. Moreover, rankings convey implicit representations of higher education that contribute to reinforcing the importance of graduate starting salaries in the minds of students and, conversely, to minimising the importance of environmental issues[150].

Consequently, one can question the interest of putting higher education institutions in competition with each other, when the work of integrating environmental issues to be carried out and the stakes are such that they should cooperate to achieve this objective. For example, the IAE France network refuses to enter into the rationale of rankings because it is built around the idea of pooling and collaboration between its members. **Along these lines, higher education institutions could, in a concerted manner, refuse to participate in such rankings.**

These accreditation and ranking dynamics have mixed effects on the consideration of sustainability issues. **They are part of a context of increasing fragmentation of rankings and accreditations, which leads to an increase in the bureaucratic workload of educational institutions. They expose institutions and their students to a loss of legibility regarding the issues of ecological and social transition and, in the worst case, to the institutionalisation of bad criteria**.

All the questions raised in this chapter raise the question of the capacity of higher education management institutions, as things stand, to develop their content in such a way as to train 100% of students in environmental issues. While the typology of obstacles probably applies to all institutions, the hierarchy established between these obstacles varies greatly from one type of institution to another due to different resources, funding methods and audiences. This analysis shows that, **unless all the players in higher education make an effort, the mass integration**

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[147] Wendy Nelson Espeland and Michael Sauder, "Rankings and Reactivity: How Public Measures Recreate Social Worlds", *American Journal of Sociology* 113, n°. 1 (July 2007): 1-40.
[148] Dennis A. Gioia and Kevin G. Corley, "Being Good Versus Looking Good: Business School Rankings and the Circean Transformation From Substance to Image", *Academy of Management Learning & Education* 1, n° 1 (September 2002): 107-20.
[149] Espeland et Sauder, "Rankings and Reactivity: How Public Measures Recreate Social Worlds".
[150] Pitt-Watson et Quigley, "Business School Rankings for the 21st Century".

of environmental issues in training courses in the short term seems compromised. Fortunately, the responses that may be provided by each of these actors are well identified (see Part 4, p. 151).

PART 3. WHAT SHOULD GRADUATES KNOW ABOUT ENVIRONMENTAL ISSUES AT THE END OF THEIR MANAGEMENT COURSE?

This section presents frameworks for thinking and tools [151] for integrating environmental issues in management training, focusing on the content of the education: what should students be taught and how to teach it?

What should all business graduates know and be able to do to integrate environmental issues in their future work?

- **What resources? The knowledge and skills base** (p. 70) proposes:
  - **Knowledge and skills** to be taught to all students in the core curriculum, to understand environmental issues and make the link with management;
  - **Examples of knowledge and skills** to make the proposed framework operational;
  - **Resources** (courses, books, academic articles, etc.) to deepen and appropriate the elements of the base.
  - A **digital zoom** on the integration of environmental issues in digital technology, a topic that crosses several disciplines (p. 95);
- **For who?** It is aimed primarily at teachers and programme managers, but more broadly at all the stakeholders in management education: school management, students, employers, institutional actors, etc.

What students who have taken a course or specialisation in strategy, marketing, controlling or purchasing and logistics should know and do?

- **What resources? Job descriptions** describe the competencies of the base in four job areas or disciplines, with knowledge and skills to go further than the common core (Strategy p. 102, Marketing p. 109, Management control p. 117, Purchasing and logistics p. 125)[152].
- **For who?** This part mainly addresses the teachers of these disciplines.

How can the knowledge and skills of the base be integrated in a course?

- **What resources?** Elements on the **stance taken by the teacher and the pedagogical methods** adapted to the teaching of environmental issues (p. 130).
- **For who?** This part mainly addresses the teachers.

How can the knowledge and skills of the base be integrated in a programme?

- **What resources?**
  - Paths of reflection on **integrating new subject areas in the curriculum and ensuring consistency within a programme** (p. 134);
  - A proposal for **adapting the knowledge and skills base in a common core curriculum** (p. 136).
- **For who?** This part mainly addresses programme managers, pedagogical managers and school directors.

[151] The method of creating these different elements will be published as an annex in November 2022. An Excel spreadsheet lists references and resources on the knowledge and skills of the base. All the annexes and tools will be accessible on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/.
[152] Finance professions are not covered here: they will be the subject of a dedicated report, to be published on 15 December 2022.

I. The knowledge and skills base: a base for integrating environmental issues in a common core

The knowledge and skills base formalises the knowledge and skills that must be taught to all students in business schools, starting with the basic courses taught in the core curriculum, so that they are able to take environmental issues into account in their future jobs and as citizens.

A good understanding of environmental issues is necessary to take effective and relevant decisions and actions as a professional and as a citizen. This involves acquiring knowledge related to environmental issues, defined as physical constraints and their implications for human societies. It is also necessary to develop the skills to put this knowledge into practice, to take it into account in one's decisions and actions[153].

Thus, in order to contribute to climate change mitigation as a company executive, it is necessary to be aware of the objectives to be achieved and the levers for reducing greenhouse gas (GHG) emissions in one's sector, their potential and their limits. This is not enough: it is also necessary to know how to place these elements in a global and long-term vision that takes into account the decarbonisation of other sectors, be capable of reinventing the economic model of one's organisation, change the incentives of all one's teams, etc. **This is why this base comprises skills and knowledge, since they act in synergy and are inseparable.**

The knowledge related to environmental issues is divided into three parts (see Figure 10[154]):

- Knowledge about **physical constraints** (on the periphery of the figure): the planetary limits that must not be exceeded else our ability to live sustainably in a safe ecosystem will be jeopardized, as well as the finitude of resources.
- Knowledge about **societal goals** (in the centre of the figure): these goals are collectively defined (notably within the framework of the United Nations), widely shared and recognised as what our societies should be moving towards. Their achievement depends on physical constraints.
- Knowledge of the **institutional, technical and human levers** that are available to human societies to achieve societal goals collectively designated as desirable, within physical constraints. Future graduates need to know these in order to drive ecological transition.

These different fields of knowledge do not all require the same level of teaching. It is not a question of becoming an expert in each of these subjects, and some can be taught in less depth than others.

The skills to be developed are those that will enable future graduates to mobilise their knowledge of the issues in order to meet the challenge of ecological and social transition, both as

[153] Aware of simplifying the concepts of knowledge and competence, our objective is more to make people understand the linking of the different components of the base and the importance of pedagogical approaches in their teaching, than to present the different debates on these notions.

[154] This representation is reminiscent of Kate Raworth's donut theory (Kate Raworth, La théorie du donut : l'économie de demain en 7 principes (Plon, 2018).) according to which the objective is to circumscribe humanity and therefore our economic systems between an environmental ceiling made up of planetary limits and a social floor that takes up the UN's sustainable development goals: i.e. to ensure everyone's essential needs while making sure that we do not exceed the planetary limits that make it possible to maintain life on Earth.

professionals and as citizens. The skills presented in this section are mainly cross-disciplinary skills, not specific to a discipline or a profession[155].

This base, which links constraints, objectives and means, should be discussed in any institution wishing to be inspired by it, so that teachers and other stakeholders can make use of it (to organise workgroups for this purpose within the faculty, see below the section of the Guide to the Transformation of Training devoted to it, p. 178).

Resources

FORTES Collective, *Manual of the Great Transition*[156]

Ivar Ekeland, Aicha Ben Dhia, Jacques Treiner, *The environmental challenges of the 21st century* [157,158,159]

Jean-Michel Lourtioz, Jane Lecomte and Sophie Szopa (dir.) *Challenges of ecological transition: teaching ecological transition to university undergraduates* [160]

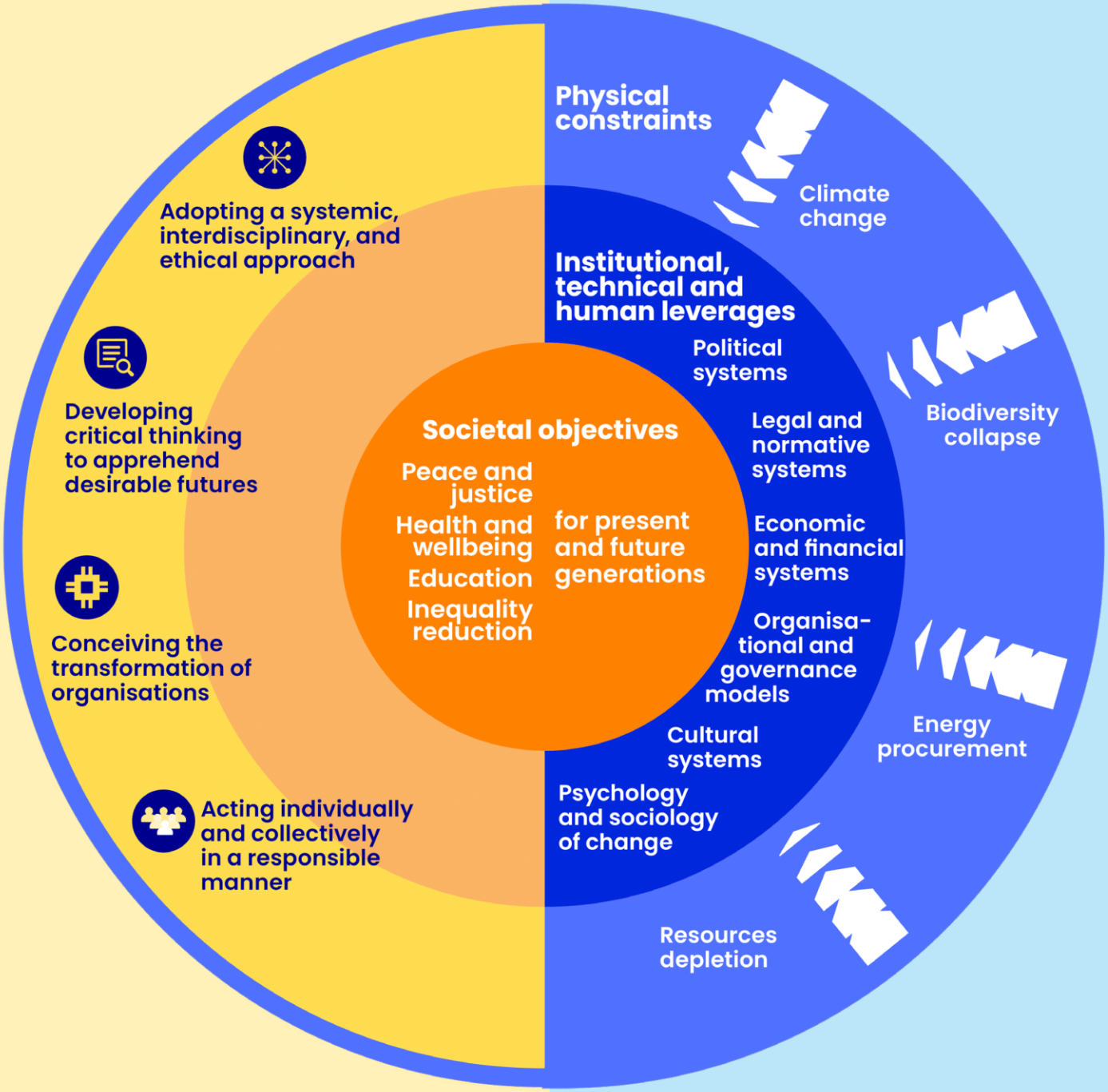
Jacques Treiner, *Guideline for introducing the Anthropocene era at the beginning of advanced studies* [161]

François Gemenne and Aleksandar Rankovic, *Atlas of the Anthropocene era*[162]

Gaël Giraud, audition for The Shift Project[163]

[155] For the adaptation of the base for different professional sectors, see below p. 93.
[156] FORTES Collective, *Manual of the Great Transition*.
[157] Introductory course on environmental issues for undergraduate students at the University of Paris-Dauphine, with the support of the University of Paris-Dauphine, the Madeleine Foundation and the 2050 Society. Ivar Ekeland, Aïcha Ben Dhia, and Jacques Treiner, The Environmental Challenges of the 21st Century, 2022, https://alignment-playbook.com/resource/467.
[158] English version of the course given at Paris-Dauphine University: Ivar Ekeland, Aïcha Ben Dhia, and Jacques Treiner, *The environmental challenges of the 21st century*, 2022, https://www.ceremade.dauphine.fr/~ekeland/lectures/Climate%20course%20_compressed.pdf.
[159] Course presentation and feedback from Ivar Ekeland and Aïcha Ben Dhia for The Shift Project: *The environmental challenges of the 21st century*, 28/012022, https://www.youtube.com/watch?v=QT5U-dwYj6A&list=PLX8LCkV3D8Upybb3Cr8h7eV_cgfRRicjD.
[160] Jean-Michel Lourtioz, Jane Lecomte, and Sophie Szopa, The challenges of ecological transition. Teaching the ecological transition to undergraduate students attending university, 2021, https://laboutique.edpsciences.fr/produit/1240/9782987526629/enjeux-de-la-transition-ecologique.
[161] Guideline for introducing the Anthropocene era at the beginning of advanced studies.
[162] François Gemenne, Aleksandar Rankovic, and Map workshop of Sciences Po, *Atlas of the Anthropocene* era (Presses de Sciences Po, 2021).
[163] *What shifts in the economic paradigm shift are caused by ecological crises?* 2022, https://www.youtube.com/watch?v=-4IsYSWqEhU&list=PLX8LCkV3D8Upybb3Cr8h7eV_cgfRRicjD&index=6.

TRAINING THE CITIZEN MANAGER OF THE 21ST CENTURY



A. Knowledge: physical limits

The four physical limits selected here are those that encompass all planetary limits, namely climate change and biodiversity collapse, as well as the depletion of energy and non-energy resources. Climate change and the integrity of the biosphere are indeed the two fundamental planetary limits, which encompass all others[164]. The depletion of mineral resources is not included in the planetary limits, as it does not in itself bring about changes in the Earth system, but it is a very real constraint for human societies as they are currently developing. The issues related to the depletion of energy resources are presented separately from other resources because of their central place in recent economic development.

These fields of knowledge are far removed from what is usually taught in management training, but a minimal understanding of these subjects is essential. Knowing the major trends at work and the orders of magnitude is a prerequisite for understanding what the upheavals occurring in the Earth system imply for our societies. This understanding is essential for analysing the relevance of the solutions to be found and for projecting ourselves into the world as it will evolve in the course of this century. On this point, the various stakeholders approached during the project (teachers, students, professionals, etc.) were unanimous.

[164] Within the planetary boundaries as defined by the Stockholm Resilience Centre, climate change and biosphere integrity are considered central because they interact with all other planetary boundaries, and significant changes in climate or biosphere integrity could single-handedly tip the Earth system into a new geological era. Steffen et al, "Planetary Boundaries".

1. Climate change

Economic activities, and more broadly human organisations, have major impacts on the climate. Understanding the physical mechanisms of climate change as well as its economic and social causes and consequences is essential so managers can be actors in the transition.

Here are some paths regarding content.

Resources

IPCC, Sixth assessment report summary for policymakers[165]

Haut Conseil pour le Climat (HCC), Annual reports[166]

Contextualisation

- Definition of climate (notably the difference between meteorology and climatology,
- Historical evolution of climate since the ice-age,
- Main institutions that work and are legitimate on climate (IPCC, HCC, etc.),
- International climate negotiations: functioning, history and limitations.

Mechanisms

- Physical functioning of the climate: physical causes of climate change, causal chains, feedback loops, thresholds, physical consequences;
- Social and economic causes of climate change;
- Orders of magnitude of the main factors of GHG emissions;
- Know the notion of greenhouse gas emission balance (carbon accounting) and the different scopes;
- Social and economic consequences of climate change;
- Notions of mitigation and adaptation to climate change;
- Carbon neutrality: physical mechanism and limits of the concept on a non-global scale.

Relations, interactions

- Interactions between climate change and other physical constraints: loss of biodiversity, depletion of energy and non-energy resources,
- Interactions between climate change and societal objectives,
- Link between climate, energy and the economy (e.g., Kaya equation).

Perspectives and limits

- IPCC scenarios: methods and lessons learned
- Local climate change mitigation and adaptation strategies (examples for France: the National Low Carbon Strategy (SNBC) and the National Climate Change Adaptation Plan (PNACC); the Shift Project's proposals for decarbonisation, ADEME and NegaWatt scenarios);
- Main company responses and their critical analysis:
- Regulation and taxation
- Technical innovations and their limits (energy efficiency, carbon capture and storage, geoengineering, new energy sources and carriers, etc.)
- Social innovations, including sobriety
- Organisational responses: offsetting, greenwashing, new economic models, etc.

[165] IPCC, "Climate Change 2021: The Physical Science Basis3; IPCC, 3Climate Change 2022: Impacts, Adaptation and Vulnerability"; IPCC, "Climate Change 2022: Mitigation of Climate Change - Summary for Policymakers", April 2022, https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/.

[166] For example: Haut Conseil pour le Climat, "Annual report 2022".

2. The collapse of biodiversity

The biosphere is being severely disrupted by human activity: the diversity of life is disappearing at a rate unprecedented in human history. This collapse is having major impacts on ecosystems and the functions they provide, with potentially dramatic consequences for humans. The collapse of biodiversity is linked to climate change and other planetary boundaries. Understanding the issues related to living organisms is an essential step in the training of managers so that they understand their importance and their multiple interactions with human organisations and activities.

Resources

IPBES, Report 2019[167]

Here are some paths regarding content.

Contextualisation

- Definition of the biosphere, living organisms, biodiversity and the concept of ecosystems;
- Historical evolution of biodiversity and 6th mass extinction;
- Main institutions that work and are legitimate on biodiversity (IPBES, COP biodiversity, IUCN, etc.);
- International negotiations on biodiversity: functioning, history and limits.

Mechanisms

- Basic mechanisms of life and evolution;
- 5 direct drivers of biodiversity loss;
- Changes in land and sea use (agricultural expansion, urbanisation, infrastructure development, aquaculture development, etc.);
- Direct exploitation of organisms (e.g., fishing);
- Climate change;
- Pollution;
- Invasive exotic species;
- Social and economic consequences of biodiversity loss;
- Main indicators of the state of biodiversity;
- Major representations of and relations with "nature" in our societies.

Relations, interactions

- Concept of "one health" and understanding the interdependence of human and environmental health;
- Links between biodiversity loss and global warming, between resource exploitation and biodiversity.

Perspectives and limits

- Main societal responses and their critical analysis: tools for protecting, restoring, rehabilitating and enhancing biodiversity, and their limitations;
- Local strategies to preserve and restore biodiversity: e.g. National Biodiversity Strategy (SNB).[168]

[167] IPBES, "Summary for Policymakers of the Global Assessment of Biodiversity and Ecosystem Services".
[168] "National biodiversity strategy 2030", Ministère de la Transition Ecologique, accessed on 24 April 2022, https://www.ecologie.gouv.fr/strategie-nationale-biodiversite.

3. Energy supplies

Energy is the mainstay of most societies, powering the machines that enable us to live, heat, feed, provide care, move and communicate, etc. The ecological emergency is intimately linked to energy. It is essential to understand this link in depth, particularly in the light of climate change and the omnipresence of fossil fuels. Reducing the dependence of our activities on energy flows is becoming a strategic, financial, ecological and social necessity.

Here are a few paths relating to content.

Resources

IEA, "*Net Zero by 2050*"[169]

The Shift Project, Approvisionnement pétrolier futur de l'union européenne[170]

Contextualisation

- Definition of energy, law of energy conservation;
- Different types of fossil fuels (conventional and non-conventional) and alternatives (renewable, nuclear);
- Historical evolution of the consumption of these energies, phenomenon of energy addition;
- Main institutions working and having legitimacy on energy (International Energy Agency, etc.);
- Main points of discord and actors.

Mechanisms

- Distribution of energy production (geographically and by type of energy), consumption (by country and sector) and energy rates of return;
- Geopolitics of energy: origin of oil and gas products and associated risks, evolution of consumer countries, etc.
- Production peaks.

Relations, interactions

- Link between climate, energy and economy (example: Kaya equation);
- Systemic nature of energy in our societies: links with food, transport, building, industry, etc.
- Outline of French and European energy policies.

Perspectives and limits

- Limitations of the different means of energy production linked to the finiteness of resources (use of materials, land use, conflicts of use, etc.) or to environmental and social issues (social acceptance, pollution, destruction of biodiversity, risks of accidents, etc.);
- Main energy scenarios (IEA, RTE, Ademe, etc.);
- Concepts of energy sobriety and efficiency.

[169] International Energy Agency (IEA), "Net Zero by 2050 - A Roadmap for the Global Energy Sector", October 2021, 224.

[170] "The future of the European Union's oil supplies" (The Shift Project, May 2021), https://theshiftproject.org/wp-content/uploads/2021/05/Approvisionnement-petrolier-futur-de-lUE_Shift-Project_Mai-2021_SYNTHESE.pdf.

4. The exhaustion of mineral resources *(excluding energy resources)*

The development of societies is closely linked to the availability, extraction, processing, use and end-of-life management of mineral resources. They are indispensable in our food systems, our industrial system, our health systems, our travel, etc. They also have an important role to play in the transition of our economies towards less carbon-intensive energy. They are the mainstay of most sectors of activity, just like energy resources, but they create dependencies and risks for these sectors: depletion of resources, possible fluctuations in their price and quality, etc.

Here are a few paths regarding content.

Resources

Zenon Research, "Fluxes, not stocks"[171]

ADEME, "L'épuisement des métaux et minéraux: faut-il s'inquiéter ?"[172]

Contextualisation

- Definition of mineral resources (metallic and non-metallic), use and role;
- Consumption trends, notion of strategic raw materials.
-

Mechanisms

- Notions of deposit, reserve and burn rate and the different factors that affect them;
- Geopolitics of mineral resources: origin of resources and associated risks, evolution of consumer countries, notion of criticality, etc.
- Notion of circular economy and recyclability and limits of recycling.

Relations, interactions

- Interactions between energy production and mineral resources (material intensity of energy production, need to use more and more energy to extract increasingly diluted materials);
- Link between electrification of uses and mineral resources;
- Link between agriculture and materials;
- Links between resource extraction and climate change (e.g., increased demand for metals related to electrification of uses), biodiversity (e.g., impacts of mining on ecosystems) and societal objectives (e.g., working conditions in mining).

Perspectives and limits

- Organising sobriety: ways of reducing the use of materials (economy of functionality rather than ownership and obsolescence, eco-design, etc.).

[171] François de Rochette and Greg De Temmerman, "Fluxes, not stocks: the real challenges of metallic resources for the energy transition" (Zenon Research, 2022), https://www.zenon.ngo/insights/fluxes-not-stocks-the-real-challenges-of-metallic-resources-for-the-energy-transition.
[172] Alain Geldron, "L'épuisement des métaux et minéraux : faut-il s'inquiéter ?" (ADEME, June 2017), https://librairie.ademe.fr/dechets-economie-circulaire/1889-epuisement-des-metaux-et-mineraux-faut-il-s-inquieter-.html.

B. Knowledge: institutional, technical and human levers

Institutional, technical and human levers are those that human societies can use to achieve societal goals collectively designated as desirable, while responding to the imperatives posed by the physical world. We propose here some important categories of knowledge for future managers to understand how the organisations of which they will be a part fit into larger human systems, which are constrained by physics and have impacts on their environment and thus on society. This description does not claim to be exhaustive.

For each of the proposed categories, students must acquire knowledge of:

- Contextualisation: definition, history, temporal and geographical perimeters;
- Mechanisms, modes of operation
- Relations and interactions with physical constraints and societal objectives, and with other institutional, technical and human levers
- Risks, limits
- Perspectives: solutions, prospective studies.

1. Political systems

Private organisations interact with politics: many of them, such as companies, professional or public interest associations, influence politics. Conversely, political decisions embodied in national or international regulations define the framework for action by organisations. Political decisions are central to the implementation of ecological transition. Management students must acquire knowledge that enables them to understand how politics can play a role in preserving the general interest within a framework constrained by these power relationships.

Examples

- Know the decision-making institutions at different territorial levels and in different countries in relation to environmental issues;
- Know the links between energy resource exploitation and political power;
- Know the interactions between organisations and politics: lobbying, advocacy, consultations, regulations;
- Know the systems of representation (political, scientific, community, etc.) and their limits.

2. Legal and standards systems

In connection with political systems, laws and standards are crucial for the preservation of the environment and ecological transition. Having basic knowledge of the functioning of legal systems allows one to understand how to utilise these laws and standards in favour of ecological transition.

Examples

- Know the origin of the main laws and standards related to the environment (e.g., pollution and health impacts) and the changes they have brought about in society and the economy;
- Be familiar with environmental protection laws and standards at various levels: national laws, international standards, European directives;
- Be familiar with the main legal approaches to environmental protection: hard law, soft law, self-regulation, authorisation schemes, etc.;
- Know the hierarchy of standards, including those not specifically dedicated to environmental protection, and the binding force of public and private law, in order to understand how to ensure that the general interest prevails;
- Know the mechanisms of decision-making, e.g., the organisation of lobbying in the European Union;
- Know the effectiveness of laws and standards, as well as their limits;
- Know the benefit of laws and standards, especially at the international level, to promote change without being burdened by unfavourable competitive conditions;
- Be familiar with examples of climate-related lawsuits (around 2,000 worldwide to date) brought on different legal grounds against states, companies and financial actors.

3. The economic and financial system

Companies are part of an economic and financial system whose functioning and social and environmental consequences must be understood. The study of its history, its limits and the evolutions necessary to take into account environmental issues, could contribute to a shift towards an economic model that is sustainable for all, in present and future generations. To, achieve this, it is important that students are exposed to several currents of economic thought.

This category of knowledge encompasses concepts from economic and financial theories, economic policies as well as the physical reality to which they refer. Examples of content include.

Resources

Alain Grandjean and Marion Cohen, *The Other Economy*[173]

The Shift Project, *Climate, crises: the plan to transform the French economy*[174]

Economic theories and tools

- Know the main economic theories, the historical context of their emergence, their links with the human and social sciences and the way they integrate physical constraints or not;
- Be familiar with economic theories that aim to integrate environmental issues and envisage possible trajectories other than perpetual growth, such as degrowth or post-growth;
- Know the indicators of value creation and human development, their history and their limits, particularly in relation to environmental issues, and the associated controversies. For example, to know the limits of the GDP indicator in responding to environmental issues, particularly the state of knowledge on the decoupling of GDP and environmental pressures, and know alternative indicators;
- Be familiar with the concept of sustainable development and its limits, as well as the concepts of weak and strong sustainability.

Economic policies

- Know the diversity of economic policies implemented in the world, the political and theoretical context of their emergence and evolution; know their strengths and limitations in taking into account environmental issues;
- Know the fundamentals of carbon markets, their scope and limitations.

Physical economy

- Know the relationship between the economy and the physical world: e.g., materials and infrastructure needed for products and services; the link between GDP, energy and greenhouse gas emissions;
- Know the dynamics of economic globalisation, its externalities (especially negative ones) and the interdependencies between countries;
- Know the environmental and social issues of certain emblematic sectors: energy production, electronics and digital technology, food industry, construction, transport, plastics, tourism, distribution, etc.:
  - Impacts on climate, natural resources, biodiversity, health, inequalities, etc., and ways to mitigate these impacts;
  - Dependence of these sectors on climate, life, resources, etc., and resilience factors
  - Possible transformation plans.
- Know the concepts of physical risks, transition and responsibility.

[173] "The Other Economy", s. d., https://theothereconomy.com.

[174] The Shift Project, *Climate, crises: the plan to transform the French economy* (Odile Jacob, 2022).

Financial system

- Understand the role of finance (money, debt, economic cycles) and their evolution based on anthropology, history, philosophy and ethics; [175]
- Understand how the financial system is integrated in the economy, which is itself part of the biosphere and therefore of the Earth system - know these terms and concepts, understand the place of finance in this context;[176]
- Be familiar with ecological accounting and the principle of double materiality, i.e., the company's dependencies on the environment (financial materiality) and its impacts on the environment (impact materiality, or environmental and social materiality);[177]
- Be familiar with the concepts of green and sustainable finance, extra-financial reporting, ESG indicators, etc., as well as their limits and their limited place in traditional finance;
- Be aware of works giving orders of magnitude of financing needs for ecological transformation (adaptation, mitigation, biodiversity, etc.);[178]
- Know the theory and practice of discounting, its effects on the consideration of environmental issues (e.g., discounting leads to an underestimation of long-term environmental degradation).[179]

[175] Christophe Revelli and Thomas Lagoarde-Segot, "Finance and Economics Education in the Anthropocene Era: Embedding through Sustainable Ontology - Working Paper", *Post-Crisis Finance Network*, January 2022, https://pocfin.kedge.edu/documents-de-travail.
[176] Revelli and Lagoarde-Segot.
[177] BL Evolution, "Double matérialité : comment appréhender ce nouveau principe et quelles implications pour le reporting extra-financier ?", 2022, https://bl-evolution.com/Docs/202202_Insight_Double-Materialite_BLevolution.pdf.
[178] The IPCC proposes for example, an estimation of financing needs to mitigate climate change (IPCC, "Climate Change 2022: Mitigation of Climate Change", April 2022, 124.); UN Environment Programme for nature-based solutions to mitigate climate change, the depletion of biodiversity and the degradation of soils (UNEP, "State of Finance for Nature - Tripling investments in nature-based solutions by 2030", 2021.)
[179] Antonin Pottier, *Comment les économistes réchauffent la planète*, Seuil, Anthropocène, 2016.

4. Organisational and governance models

Most of the students in business schools will be managers or future managers and will make and influence many decisions. The governance of organisations plays a decisive role in their orientation. Knowledge of a variety of governance models and their respective capacity to respond to the challenges of ecological transition is fundamental.

Resources

Nathalie Lallemand-Stempak and Philippe Eynaud (dir.), *Vers une autre gestion*, collection Petits Manuels de la Grande Transition[180]

Examples

- Know the diversity of legal forms of organisation and their associated modes of governance, their advantages and disadvantages in taking into account ecological and social issues;
- Know the recent paradigm shift between managerial governance and shareholder governance;
- Know the limits of the current modes of governance in companies from the point of view of taking environmental issues into account, and the proposals for change (for example, the quality of a company carrying out missions);
- Know the main obstacles to the democratisation of decision-making in organisations (for example, the iron law of oligarchy)
- Know the main principles and limits of multi-stakeholder governance, inclusive governance, and governance of the commons; and examples of companies governed according to these principles
- Be familiar with the debate on the tragedy of the commons (Hardin)[181] and the governance of the commons (Ostrom)[182], and the effect of the privatisation of the commons.

5. Cultural systems

Culture shapes our relations with nature and with the physical world. It is also closely linked to the relationship we have with ecological transition: consumption, comfort, constraint, the general interest, etc. Understanding one's own culture and knowing about other cultural paradigms makes it possible to take a step back from what is conveyed by one's own culture and imagine other relationships with the world (see below, competence "Developing a critical mind to envisage desirable futures", p. 88).

Examples

- Be familiar with the main findings of anthropological work on the relationship between human societies and (the rest of) nature [183]
- Be familiar with work on the cultural component of the Western model of development[184]

[180] Lallemand-Stempak and Eynaud, *Vers une autre gestion*.
[181] Garrett Hardin, *The Tragedy of the Commons*, 1968.
[182] Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press (Cambridge, UK, 1990).
[183] Philippe Descola, *Par-delà nature et culture* (Gallimard, 2005).
[184] Arturo Escobar, *Encountering Development: The Making and Unmaking of the Third World* (Princeton University Press, 1995).

- Be familiar with historical and philosophical works on the place of technology in Western societies.

6. The psychology and sociology of change

The relationship of human beings with themselves, with others and with the world passes through their reason, their emotions and their social dimension. Understanding these psychological and social dimensions is important for anyone who aspires to be an actor in transition. The transformations to be achieved individually and collectively, in our organisations and societies, are significant. They require a good understanding of the psychological and social mechanisms that they set in motion, the resistance they can provoke, the cognitive and emotional biases, and the social determinisms in play.

Resources

William F. Lamb et al., "Discourses of Climate Delay"[185]

Psychological and sociological approaches are rich in information on the difficulties individuals and societies have in taking environmental issues into account in their decisions.

Examples

- Know the main cognitive biases, errors of perception and attribution: anchoring[186], framing[187], basic error of attribution, halo effect, etc.;
- Know the psychological mechanisms and rationalisation of inaction;[188,189]
- Know and identify the individual and collective sources of resistance to change;
- Understand the individual, collective and structural aspects underlying the inertia of ecological transition;
- Know the notions of social determinism and power relations between social groups
- Distinguish between the notions of instrumental and value-based rationality, and the different forms of authority;[190]
- Be familiar with models of decision-making in an organisational context and the limits of the rationality of actors (rational decision model and bounded rationality model) [191], political model[192], garbage can model[193]);
- Know the different levers of motivation (intrinsic, extrinsic, notion of psychological contract).[194]

[185] William F. Lamb et al., "Discourses of Climate Delay", *Global Sustainability* 3 (2020): e17, https://doi.org/10.1017/sus.2020.13.
[186] Amos Tversky et Daniel Kahneman, "Judgment under Uncertainty: Heuristics and Biases", *Science* 185, nº 4157 (1974): 1124-31, https://doi.org/10.1126/science.185.4157.1124.
[187] Amos Tversky and Daniel Kahneman, "The Framing of Decisions and the Psychology of Choice", *Science* 211, nº 4481 (1974): 453-58, https://doi.org/10.1126/science.7455683.
[188] Lamb et al., "Discourses of Climate Delay".
[189] Matthew J. Hornsey and Kelly S. Fielding, "Understanding (and Reducing) Inaction on Climate Change", *Social Issues and Policy Review* 14, nº 1 (janvier 2020): 3-35, https://doi.org/10.1111/sipr.12058.
[190] Max Weber, *Economie et société, tome 1*, 1921.
[191] James G. March et Herbert A. Simon, *Les organisations*, 1958.
[192] Andrew M. Pettigrew, *The Politics of Organizational Decision-Making*, Tavistock, 1973.
[193] M. D. Cohen, J. G. March, et J. P. Olsen, "A Garbage Can Model of Organizational Choice", *Administrative Science Quarterly*, 1972.
[194] Denise Rousseau, "Psychological and Implied Contracts in Organisations", *Employee Responsibilities and Rights Journal*, s. d.

C. Knowledge: societal objectives

Ecological transition aims to put humanity back on a trajectory that allows the preservation, or even the improvement, of living conditions for the greatest number of individuals (in the meaning of well-being, and not only of material conditions). It is therefore essential to understand what is meant by the notion of 'living conditions', which is subjective in nature, and therefore to refer to the social consensus relating to them, which we refer to as societal goals. Achieving these goals implies creating the conditions that will allow realising them: it is impossible to address the subject of societal objectives without dealing with their interactions with physical constraints and institutional, technical and human systems. In particular, physical constraints are a determinant of present and future living conditions.

Thus graduates must also know:

- the different societal objectives most commonly shared,
- the evolution and current status of their achievement at different scales,
- the main mechanisms likely to promote them,
- the interactions between the different objectives and with each of the physical constraints.

This part of the Toolkit does not pretend to deal with the subject of societal goals in its entirety. It lists a number of societal goals that are agreed upon by most local, national and international organisations, and suggests ways to link these goals to physical constraints. The societal goals mentioned are based on the social component of the United Nations Sustainable Development Goals[195].

1. Peace and justice

Sustainable Development Goal (SDG) no. 16: "Peace, justice and strong institutions"

Examples of interactions with physical constraints

- Tensions over resources can lead to conflicts: monopolisation of energy resources, conflicts over access to drinking water, etc.
- Climate justice: exposure to climate change differs according to people, territories and social classes, which do not all have the same means to cope with it and whose vulnerability therefore varies. The countries that have contributed the least to climate change are also often the ones most affected by its consequences. Responsibility for action to mitigate and adapt to climate change must therefore take these factors into account in the interests of justice (in addition to responsibility for emissions).

2. Health and well-being

SDG n° 1: "No poverty", n° 2: "Zero hunger" and n° 3: "Good health and well-being"

Examples of interactions with physical constraints

- The collapse of biodiversity hinders the clean-up of air and water, normally carried out by organisms in the natural environment;

[195] United Nations, "The 17 sustainable development goals", accessed on 24 April 2022, https://sdgs.un.org/fr/goals.

- Climate change and the collapse of biodiversity are reducing agricultural yields and disrupting water resources, leading to poorer diets for the less well-off and creating public health problems;
- Health systems depend on energy for their functioning (transport, drug production and equipment), which could be compromised if energy becomes scarcer or more expensive;
- Resource scarcity could also impact the price of medical equipment.

3. Education

SDG nº 4: "Quality education"

Examples of interactions with physical constraints

- Climate education contributes to the emergence of climate change adaptation policies;
- The education system depends on physical parameters for its functioning (transport system, heated or air-conditioned buildings, equipment, etc.). Climatic events and energy constraints could therefore undermine its functioning.

4. Reduction of inequalities

SDG nº 5: "Gender equality" and nº 10: "Reduced inequalities"

Examples of interactions with physical constraints

- The poorest countries and individuals are on average the most affected by the consequences of climate change;
- The richest countries and individuals are responsible for the largest share of greenhouse gas emissions;[196]
- Women are more affected than men by the consequences of climate change, which contributes to increased gender inequalities;[197]
- International climate negotiations take into account the principle of "common but differentiated responsibilities and respective capabilities";[198]
- The rise in fossil fuel prices, in conjunction with their scarcity, can cause economic crises and weaken the less well-off;
- Tensions over resources (water, food, etc.) tend to exacerbate social tensions and increase discrimination (gender, religion, etc.).

[196] Lucas Chancel et al., "World Inequality Report 2022" (World Inequality Lab, 2022), 115-35, https://wir2022.wid.world/chapter-6/.
[197] S. Nazrul Islam and John Winkel, "Climate Change and Social Inequality", DESA Working Paper (United Nations, October 2017), https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf.
[198] Pierre Barthélémy, "Le principe de responsabilité dans les négociations climatiques : impasse ou nouveau départ ?", IDDRI, 10 December 2015, https://www.iddri.org/fr/publications-et-evenements/billet-de-blog/le-principe-de-responsabilite-dans-les-negociations.

D. The skills of a citizen manager

The cross-disciplinary skills that must be acquired in order to integrate environmental issues as a professional and as a citizen are organised into four macro-competences (see Figure 11).

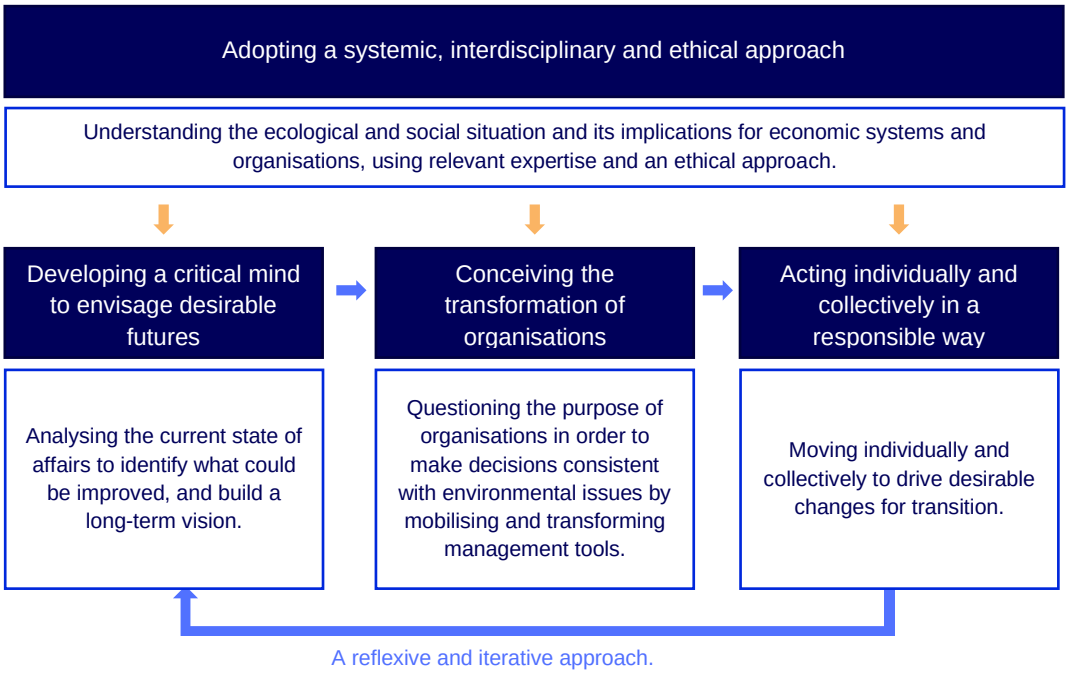


Figure 11 – The major skills of the citizen manager.

1. Adopting a systemic, interdisciplinary and ethical approach

This entails linking the interactions between organisations and economic systems, physical constraints and societies, using the relevant expertise and asking ethical questions. **This approach must permeate all the skills to be developed to integrate environmental issues.**

Adopting a systemic approach means dealing with the elements of a problem as a whole, including the interactions between these elements. In particular, the management student must be able to situate economic systems and organisations in their complex interactions with physical constraints and human societies. This is done by taking into account the interactions between different scales, from local to global. The objective is to be able to manage the complexity of a situation and determine the consequences of an action at different spatial and temporal scales.

Resources

Donella Meadows, *Thinking in Systems*[199]

Linking the knowledge of different disciplinary fields in a context of decision-making aqnd action, means knowing how to mobilise relevant disciplinary fields within the natural sciences (physics, biology, geology, etc.), the engineering sciences and the human and social sciences (philosophy, sociology, anthropology, law, etc.) to understand the situation - in particular the ecological situation - and to guide its actions. The graduate must be able to identify and collaborate with experts in these fields in order to integrate their assessments and recommendations in the decision-making process. The profile of management graduates is of a general nature, and their role may involve leading different fields of expertise.

Resources

Clémence Seurat et Thomas Tari (dir.), *Controverses mode d'emploi*[200]

Examples

- Start from practical cases such as climate refugees, the textile industry, overfishing, etc., and try to identify all the components of the system, and explain them from different angles, at different scales, and using different fields of knowledge.
- Identify and analyse different socio-technical consensuses and controversies (e.g., autonomous cars, 5G...).
- Know how to work with people from different disciplinary fields and with different working cultures: e.g. researchers in natural or social sciences, engineers, etc.

Discerning the ethical challenges means being able to identify the moral theories to which discourses and practices are related, to question the appropriateness of the current state of affairs and one's own positions and opinions, and to adopt an ethical approach to guide one's action, i.e. include moral reflection in one's actions. This requires questioning one's values and imagining the society to which one wants to contribute, as a citizen and as a professional.

[199] Donella Meadows, *Thinking In Systems: A Primer*, Chelsea Green Publishing, 2008.
[200] Clémence Seurat and Thomas Tari, *Controverses mode d'emploi* (Forccast et Presses de Sciences Po, 2021), https://controverses.org/mode-demploi/.

Examples

- Identify the values and representations underlying a decision in order to promote change: for example, which mode of individual transport should be more socially valued, a luxurious SUV, an electric car, a cargo bike? Each can convey membership of a social class, social and ecological impacts, a sense of responsibility and general interest, etc.
- Identify one's different spheres of responsibility, individual (as a citizen and as a professional) and collective (company, local authority, association, State, etc.), and the links between these different spheres.
- Question the type of society that our decisions will favour: improvement of health, impact on biodiversity and on climate change, reduction of inequalities, etc.
- Draw on philosophy and one's knowledge of the links between physical constraints and social issues to imagine a desirable society, in the light of the notions of ethics and responsibility. [201]

2. Developing a critical mind to envisage desirable futures

Taking a historical and intercultural approach provides tools to look at our world critically, to understand why it is the way it is, and to imagine how it might be different. It is the basis for bold forward thinking, which must also be consistent with the physical constraints of the world.

Adopting a historical and intercultural approach allows integrating one's fields of study and activity in history in the long-term, and to situate them in relation to other cultures. This implies having the tools and knowledge to position the relationships between economic systems, business management methods, and social and environmental issues in a historical approach. Finally, it is important to know how to situate one's relationship with nature among other approaches from different cultures.

Resources

Jean-Baptiste Fressoz, Frédéric Graber, Fabien Locher et Grégory Quenet, *Introduction à l'histoire environnementale*[202]

Philippe Descola, *Par-delà nature et culture*[203]

Examples

- Study the history of economic development based on fossil fuels.
- Take a historical approach to the emergence of marketing as a means of encouraging consumption.
- Study the history of the evolution of management disciplines: history of the impact of consumption on the climate, context of the emergence of green finance and societal marketing, etc.
- Study the history of climate and pollution conflicts, which illustrate the turmoil that took place during the construction of the current economic model.
- Study the history of responses to environmental damage by companies (CSR, lobbying, greenwashing, green finance, etc.), public policies (environmental law, regulations, etc.) and nature conservation movements.
- Use anthropology to gain perspective on one's relationship with nature, especially in comparison with non-anthropocentric societies. [204]

[201] Collectif FORTES, *Manuel de la grande transition*, 114-18; Collectif FORTES, 130-34.
[202] Jean-Baptiste Fressoz et al., *Introduction à l'histoire environnementale*, Repères (La Découverte, 2014).
[203] Descola, *Par-delà nature et culture*.
[204] Descola.

- Using anthropology to step back from the Western development model to see it in perspective. [205]

Applying a critical mind, entails knowing how to mobilise knowledge to analyse the current state of affairs, discourses and opinions. Critical thinking can be used, for example, to question dominant discourses and narratives related to environmental issues or management.

Resources

Elena Pasquinelli et Gérald Bronner, "Éduquer à l'esprit critique"[206]

Examples

- Understand how knowledge is constructed, how to search for information, and how to assess the relevance and reliability of sources.
- Draw on knowledge of the philosophy of science to understand scientific construction, the area of validity of scientific theories, the difference between science and dogma, etc.
- Analyse the debates that call into question scientific consensuses.[207]
- Question the meaning of words to reveal their political dimension: what economic, political and ecological paradigms do the notions of "sustainable development" or "CSR" represent? What are their different meanings? To which practices are they linked?[208]
- Mobilise the human and social sciences, especially history, to deconstruct the dominant discourse on our economic systems [209], on technology (the neutrality of technology, equivalence between technical progress and human progress), etc.
- Analyse the different narratives on the relationship between humans and nature: the rationale of domination, assimilation to a reservoir of resources, nature as a sanctuary, symbiosis between humans and nature, etc.

Envisage desirable futures consistent with physical constraints implies building new narratives as much as engaging in a prospective process that is consistent with physical constraints. The prospective approach must take into account the uncertainties and limitations of how the physical world is perceived, and rely on the human and social sciences.

[205] Escobar, *Encountering Development*.
[206] Elena Pasquinelli and Gérald Bronner, "Éduquer à l'esprit critique : bases théoriques et indications pratiques pour l'enseignement et la formation" (Conseil scientifique de l'éducation nationale), accessed on 24 August 2022, https://www.reseau-canope.fr/fileadmin/user_upload/Projets/conseil_scientifique_education_nationale/Ressources_pedagogiques/VDEF_Eduquer_a_lesprit_critique_CSEN.pdf.
[207] The science history book "Les Marchands de doute" gives several examples, including on climate change: Naomi Orsekes and Erik M. Conway, Les Marchands de doute (Le Pommier, 2012).
[208] For the context of emergence and the political dimension of CSR, see *Vers une autre gestion*, section "3.2. La responsabilité sociale de l'entreprise". Lallemand-Stempak and Eynaud, *Vers une autre gestion*, 65-81.
[209] Eve Chiapello recounts in "Vers une autre gestion" the experience of the Alternative Management major created in 2007 at HEC Paris, which aimed to "develop critical reflexivity towards capitalism". Lallemand-Stempak et Eynaud, 53-60.

Examples

- Understand existing scenarios and their limitations, e.g. IPCC scenarios and their uncertainties.
- Identify the limits and uncertainties of technical solutions.
- Know how to search for and verify data, and reason using orders of magnitude when available data is insufficient.
- Build desirable and realistic narratives by calling on different disciplinary fields belonging to the natural sciences, engineering sciences and the humanities and social sciences.
- Know how to use scenarios and prospective studies, understand their interests and limits.
- Identify the consequences of an action or an innovation at different temporal and spatial scales and by considering the indirect, unanticipated or undesired effects (potential rebound effects, changes in use, unintended use, etc.).

3. Conceiving the transformation of organisations

Future graduates must know how to mobilise management tools and practices to make decisions that are consistent with environmental issues within their organisation. The functions of strategist and decision-maker, and the tools for decision-making, are placed in the service of ecological transition. This is the reflection and decision phase, upstream of action.

Resources

Nathalie Lallemand-Stempak and Philippe Eynaud (dir.), *Vers une autre gestion*, collection Petits Manuels de la Grande Transition[210]

Questioning the purpose and social utility of an organisation, product, service or tool: make the link between organisations, the narratives they mobilise, as well as the products or services they provide, and their impacts on societies and the environment. The aim is to apply critical thinking to the role of organisations, and in particular companies, to their activities and management tools and practices, in relation to ecological and social issues, in order to design more virtuous models.

Resources

Clémence Seurat and Thomas Tari (dir.), *Controverses mode d'emploi*[211]

Examples

- Conduct a multi-stakeholder analysis.
- Analyse debates about a product or service.
- Take into account the multiplicity of organisational forms by reflecting on the relevance of the management tools used. For example, identify the human resource management models best suited to an organisation according to its goals, size, age.[212]
- Identify the political dimension of management tools. For example:
  - the utilisation of quantifiable indicators in the evaluation of public action, and the choice of these indicators, are the result of political power relations; [213]
  - accounting choices, such as the accounting balance that represents a company's result, depend on the dominant players in the economic system;[214]
  - marketing has an impact on social norms, by promoting certain standards of consumption.

[210] Lallemand-Stempak and Eynaud, *Vers une autre gestion*.
[211] Seurat and Tari, *Controverses mode d'emploi*.
[212] Lallemand-Stempak and Eynaud, *Vers une autre gestion*, 112-13.
[213] Contribution of Corine Eyraud. Chiapello and Gilbert, *Sociologie des outils de gestion*.
[214] Christine Collette and Jacques Richard, *Comptabilité générale : les systèmes français et anglo-saxons* (Dunod, 2000). Cited by Chiapello and Gilbert, *Sociologie des outils de gestion*.

- Question the dominant cultures in the company, for example the culture of growth.

Incorporating a strategy or business model in a context of physical constraints is a key skill for future graduates. This includes analysing the risks and opportunities of a company in relation to physical constraints, and designing its contributions to collective goals of reducing negative impacts. This can apply to existing companies whose activities should be transformed, redirected or even stopped, as well as to new companies or organisations designed from the outset according to ecological and social issues.

Resources

Resources[215] and feedback from experience[216] of the courses "Energy, Business, Climate & Geopolitics" of Pierre Peyretou, Alexandre Joly, Aurélien Acquier and Charles Sirot for the ESCP.

The Shift Project, "Climate risk analsis"[217]

Emmanuel Bonnet, Diego Landivar and Alexandre Monnin, *Héritage et fermeture*[218]

Examples

- Analyse the risks and vulnerabilities of a company in the face of energy and resource constraints and the effects of ecological crises (physical risks, transition risks, vulnerability to the economic and social consequences of crises linked to the ecological emergency)[219], in particular by conducting a risk analysis according to a scenario under physical constraints. [220,221]
- Analyse business strategies in the light of environmental issues (mitigation and adaptation), based on the knowledge of various scenarios and sector-specific environmental and social issues.
- Conceive a company's contributions to sectoral, national and international regulations to create a regulatory framework relevant to environmental issues.
- Include a product or business model in a circular economy approach using the results of an environmental assessment: sustainable procurement, eco-design, industrial and territorial ecology, economy of functionality, responsible consumption, extension of useful life, recycling.
- Be aware of work on the redirection and closure of organisations, infrastructures and activities that are incompatible with consideration relating to environmental issues. [222]
- Analyse the governance model of an organisation in relation to its goals. [223]
- Make decisions in a situation of uncertainty.
- Integrate environmental issues in an organisation's Green HRM (e.g., by implementing a remuneration system that encourages environmentally friendly behaviour).

Mastering multicriteria assessment tools and transforming existing tools, means being able to assess the environmental footprint and social impacts of a company, product,

[215] ESCP Business School, « Energy, Business, Climate & Geopolitics », Commons For Future, accessed on 22 August 2022, https://commonsforfuture.escp.eu/energy-business-climate-geopolitics.
[216] Acquier and Peyretou, "Business education meets planetary boundaries: how to teach energy and climate in business schools?"
[217] The Shift Project, "Climate risk analysis ".
[218] Emmanuel Bonnet, Diego Landivar, et Alexandre Monnin, *Héritage et fermeture* (Éditions divergence, 2021).
[219] The Shift Project, "Climate risk analysis".
[220] The Shift Project, "Energy-climate scenarios: assessment and user guide" (AFEP, November 2019).
[221] Carbone 4, "Corporate strategy in the era of climatic emergency:
Are old recipes (still) viable?" December 2021, https://www.carbone4.com/publication-strategie-analyse-par-scenario.
[222] Bonnet, Landivar, et Monnin, *Héritage et fermeture*.
[223] Entretien avec Julie Battilana. Lallemand-Stempak et Eynaud, *Vers une autre gestion*, 35-41.

service, process or tool, and knowing how to transform existing assessment tools. This requires a critical examination of the tools used, and if such assessment tools exist.

Examples

- Interpret environmental and social assessments of a company, product, service, process (procurement) or tool (information system).
- Assess the relevance of the environmental and social assessment tools used: environmental and social life cycle analysis (LCA), greenhouse gas emissions, biodiversity indicators, resource indicators, autonomy of use, etc.
- Assess the reliability and relevance of information used for an environmental and social assessment.
- Be familiar with accounting, financial evaluation and multi-capital management control tools (e.g. LIFTS and CARE models).
- Transform existing assessment tools (e.g. decision matrices) by adding environmental and social criteria.
- Be aware of the limitations of the environmental and social indicators used.
- Understand the limits of management by indicators, for example by comparing the treatment of climate issues with the treatment of biodiversity issues
- Integrate the team's contribution to ecological transition in its objectives and assessment.

4. Acting individually and collectively in a responsible way

The role of managers does not end with having a prospective vision and decision making, it also lies in implementation. Leading an ecological transition requires deep transformations that are not all decided in advance and whose implementation is complex. It requires individual and collective mobilisation. Managing teams and demonstrating leadership requires the mobilisation of cognitive, emotional and social dimensions, while demonstrating creativity to reinvent organisations.

Involving one's emotions and taking into account those of others: Listening to one's emotions allows to refine or correct one's initial intuitions, with a view of acting in accordance with one's values. Knowing oneself, identifying one's emotions, also allows to understand others and to show empathy, for example during collective work. Connecting physically and emotionally to the subjects studied allows to refocus on one's values and to find the emotional resources to take action for transition.

Resources

Pédagogie de la transition, collective work coordinated by Cécile Renouard[224]

Examples

- Connect physically and emotionally to the subjects studied by meeting the people involved, by going in the field, by imagining the consequences for the territories and life, by imagining the emotions that situations would trigger in us in order to detect our own values.
- Explore literature, films, theatre, etc., to find tools to foster awareness and reconnect with one's emotions.

[224] Cécile Renouard et al., *Pédagogie de la transition*, Petits Manuels de la Grande Transition (Les Liens qui Libèrent, 2021).

- Understand the defence mechanisms that can be mobilised by oneself or by others, in order to avoid succumbing to them and know how to respond to them: denial, rationalisation, displacement, refusal, overcompensation, etc.
- Apply communication methods that take into account one's own and others' emotions, such as non-violent communication.
- Be able to evolve in unstable environments, in organisations undergoing major transformations or crises.

Leading a group of people to transform organisations and the framework in which they operate: ecological transition depends on the ability to initiate and support change within organisations. To initiate action by a group, it is necessary to know how to analyse the power relationships in place, develop an influence strategy, negotiate, mobilise narratives, show leadership, and understand the levers for and the obstacles against change. Supporting change is necessarily a long-term process, hence the need to master change management techniques and set up collective and democratic governance involving all the stakeholders in the organisation. This skill applies within organisations but also externally, for the construction of regulatory frameworks relevant to environmental issues[225].

Examples

- Apply knowledge of social psychology to the professional sphere, such as social influence: engagement theory, nudge, etc.
- Communicate in a way that enables conflict resolution and identifies the obstacles to these modes of communication: non-violent communication, Palo Alto work on paradoxical communication, etc.
- Analyse the structure of an organisation, its culture, the distribution of power, its incentive systems, in order to identify the transformations to be carried out and the methods for their implementation.
- Understand the different drivers of change in organisations and the levers to activate them.
- Know the different types of leadership and their effectiveness in implementing ecological transition.
- Build mobilising narratives to engage other inspirational forces.
- Utilise understanding of inaction (e.g., climate) to inspire action [226,227]
- Formulate jointly sectoral, national and international regulations with other actors (business groups, public authorities, trade unions, NGOs, etc.) in order to create a regulatory framework that is relevant to environmental issues.
- Apply the principles of multi-stakeholder governance to govern with a variety of actors: trade unions, public authorities, elected representatives, civil society, competing companies, etc.
- Develop the ability to adapt to working with actors from different cultures: trade unions, public authorities, elected representatives, associations, other companies, etc..

Demonstrating creativity to experiment: developing the capacity for innovation and creativity to experiment, particularly by drawing inspiration from the arts, will be invaluable for reinventing practices and organisations - beyond technological innovation alone.

[225] Group 2 of the IPCC thus emphasises the importance of governance with all the stakeholders to ensure resilient development in the face of climate change. IPCC, "Climate Change 2022: Impacts, Adaptation and Vulnerability".
[226] Lamb et al., "Discourses of Climate Delay".
[227] Hornsey et Fielding, "Understanding (and Reducing) Inaction on Climate Change".

Examples

- Find inspiration in artistic creation, in more frugal models (for example *low tech*[228]).
- Be inspired by innovative initiatives: companies that have changed their business model, etc.[229].
- Develop innovative solutions to the problems of environmental and social transformation of organisations, in particular by proposing organisational or social innovations, for example in the context of projects on concrete cases.

5. Demonstrating reflexiveness

This entails taking a critical look at one's own decision-making methods, decisions and actions. Adopting a reflective stance involves developing the ability to understand and question the values underlying one's decisions, and actively updating one's own knowledge.

Example

- Understand the different biases and errors of perception and attribution, in order to develop a critical look on one's own positions: rooting[230], framing[231], basic attribution error, halo effect, etc. *For example, study conspiracy theories and the construction of their discourses.*

[228] See The Shift Project, "Training the engineer of the 21st century - Volume 1, Manifesto", March 2022, 124-25.
[229] Some of the companies that participated in the Citizens' Climate Convention may be interesting case studies: Business for Climate Convention, "A major shift towards regenerative business - Final report of the first Business for Climate Convention", accessed on 26 October 2022, https://cec-impact.org/ressource/rapport-final-de-la-premiere-convention-des-entreprises-pour-le-climat/.
[230] Tversky and Kahneman, "Judgment under Uncertainty: Heuristics and Biases".
[231] Tversky and Kahneman, "The Framing of Decisions and the Psychology of Choice".

E. Zoom on digital technology

1. Why specifically integrate environmental issues in digital technology?

Although business graduates will each enter specific industries, it is certain that all of them will be exposed to digital technology to varying degrees: either as simple users of solutions - often becoming prescribers; or as decision-makers or consultants exposed to the digitisation of business processes; or as managers within an information systems department (ISD) and therefore decision-makers regarding solutions and their implementation; or finally as creators of solutions (digital entrepreneurs). The vast majority of them will therefore be players in what is known as the digitalisation[232] of the economy.

This digitalisation has been accompanied up to now with a large number of myths that require dismantling:

- **The first myth is that of intangibility**. The invisibility of the digital infrastructure supporting services, accompanied by ethereal terminology such as 'cloud/cloud', 'dematerialisation', or 'virtual', have cultivated the belief of a new economy without environmental impact. This is not the case: numerous studies and books[233] have highlighted the material pitfalls of the increasing use of digital technology both in terms of pressure on mineral resources (number and quantity of metals required, some of which are in competition with new renewable energies) and energy resources (including data centres), and in terms of loss of biodiversity (soil reclamation and pollution during the extraction and end-of-life phases of these mineral resources). It also has an effect on climate change (consumption of oil in the construction phase and of electricity, which is more or less carbon-based, in the use phase). Also to be taken into account is the water needed for production (extraction, for example, or the production of electronic chips) and use (cooling, for example). These impacts are growing at the same rate as that of uses, i.e. exponentially (+6% annual growth estimated for GHG emissions[234]).
- **The second is positive externalities.** The environmental benefits of digital technology could "far outweigh its drawbacks"[235] or be "essential to transition".[236]. While some uses, under certain conditions and taking into account all the effects (including rebound effects), may be positive overall, no scientific approach has been able to quantify the overall

[232] Digitalisation refers to the systematic digitalisation of company processes and new business models based entirely on digital technology.
[233] Mention can be made of the Shift Project reports (The Shift Project, "For Digital Sobriety", October 2018, https://theshiftproject.org/article/pour-une-sobriete-numerique-rapport-shift/; The Shift Project, "Deploying Digital Sobriety", October 2020, https://theshiftproject.org/article/deployer-la-sobriete-numerique-rapport-shift/.), Florence Rodhain, *La nouvelle religion du numérique* (EMS Editions, 2019)., the ADEME studies (ADEME, "Evaluation environnementale des équipements et infrastructures numériques en France", January 2022, https://librairie.ademe.fr/cadic/6700/impact-environnemental-numerique-rapport2.pdf.) and a work coordinated by Françoise Berthoud (Françoise Berthoud et al., *Impacts écologiques des technologies de l'information et de la communication : les faces cachées de l'immatérialité*, EDP Sciences, 2012.)
[234] The Shift Project, "Environmental impact of digital technology, trends over 5 years and governance of 5G", March 2021, https://theshiftproject.org/article/impact-environnemental-du-numerique-5g-nouvelle-etude-du-shift/.
[235] "(…) *the environmental benefits of digital solutions can largely outweigh their negative environmental impacts*", Commission Européenne, « Digital Solutions for Zero Pollution », 12 mai 2021, https://ec.europa.eu/environment/pdf/zero-pollution-action-plan/swd-digital-solutions_en.pdf.
[236] Guillaume Chevrollier and Jean-Michel Houllegatte, "Proposition de loi visant à réduire l'empreinte environnementale du numérique en France", Pub. L. No. 242 (2020), http://www.senat.fr/rap/l20-242/l20-2420.html.

contribution of digital technology to the environment[237], no decoupling of the already heavily digitised global economy has been observed[238], and this is even less the case of the cost-benefit ratio of digital technology from the systemic standpoint, which cannot be positive without appropriate governance[239].

- **The last is the belief that all technological innovation is synonymous with social progress.** This theme is part of a very broad problem, digital technology being the glaring example. Numerous social problems linked to digital technology are emerging, such as cybersurveillance, the ethics of artificial intelligence (AI), the effects on health (especially children's health) of technologies and their uses, and the digital divide.

It is therefore necessary to provide these players in the field of digitalisation with a global perspective on the environmental and societal problems of digital technology so that they can acquire a systemic vision of it and thus become **actors in transformation that integrates digital technology in genuine sustainability.**

2. What should graduates know at the end of their education regarding the ecological challenges of digital technology?

All graduates, whatever their options and orientations, must be capable of critically analysing the uses of digital technology and at least know how to question the pertinence and impact of their choices that participate in the digitalisation of society.

Firstly, it is a question of knowing how to understand the materiality of the digital world: the information system and its relationship with the physical world, for example by explaining the life cycle of a digital service (LCA[240]). Secondly, to be able to identify the risks, both those that the digital system poses to the environment, but also those to which the digital system is exposed (double materiality approach). And, finally, to understand the dynamics underlying the growth of these risks and to be able to analyse them with a systemic approach.

These fundamentals, once acquired, should make it possible to understand the need for digital sobriety, to work on the paths of deployment of sobriety in companies (according to a holistic approach[241]) and explore alternative business models of digital technology.

Finally, it will be useful to acquire the necessary knowledge to be able to appreciate the real societal benefits of a digital service, its limits, risks and impacts, for example in the light of quantitative and qualitative studies of specific cases and open debate[242].

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[237] As emphasised by Gauthier Roussilhe, "Que peut le numérique pour la transition écologique ?", March 2021, https://gauthierroussilhe.com/ressources/que-peut-le-numerique-pour-la-transition-ecologique., and the 3rd workgroup of the IPCC: "*there is* medium evidence *that digitalised consumer services can reduce overall emissions, energy use, and activity levels"* (IPCC, "Climate Change 2022: Mitigation of Climate Change", April 2022.)

[238] *"Since 2015, improvements in global energy intensity have been weakening each year".* International Energy Agency (IEA), "Energy Efficiency 2019", accessed on 13 September 2022, https://www.iea.org/reports/energy-efficiency-2019.

[239] "*Digital technology supports decarbonisation only if appropriately governed* (high confidence)" (IPCC, "Climate Change 2022: Mitigation of Climate Change", April 2022.), The Shift Project, "Environmental impact of digital technology, trends over 5 years and governance of 5G".

[240] Through a life cycle assessment (LCA) approach, an analytical method for evaluating the environmental impact of a product or service according to several criteria (climate change, ocean and soil acidification, damage to biotic and abiotic resources, etc.).

[241] The Shift Project, "Deploying digital sobriety".

[242] The knowledge and skills to be acquired on digital environmental issues are detailed in the Excel spreadsheet that accompanies the knowledge and skills base, which can be downloaded from the report webpage.

3. What are the courses and specialities in which these issues can be taught?

With regard to the possible careers and associated specialisations, the breadth and depth of the teaching suggested above may be adapted. Specialisations leading to the following careers, for example, would be well advised to offer substantial content:

- Digital entrepreneur,
- Risk manager,
- Consultant (in digital technology or strategy),
- Sales, marketing, product manager (for digital products and services),
- Digital operations (*product owner*, project manager, data analyst, purchasing service, digital information officer).

All the teaching could be attached to a transverse "Digital" discipline if it exists, or spread over various disciplines, such as:

- Economics, Strategy: digital and systemic business models;
- Entrepreneurship, Innovation, Strategy: positive externalities and cost/benefit ratios;
- Information systems management: environmental impacts (LCA), digital sobriety;
- Ethics: societal impacts of digital technology.

F. The contributions of the base

The foundation is intended to complement existing work, to which it adds a specialisation on management issues, and a part linked to knowledge of environmental issues (pre-existing work mainly focusing on skills).

Several works propose a framework of thought for teaching environmental issues, or related issues (sustainable development in particular). The base proposed here is consistent with the reference works, as summarised in Table 1. **The base approach makes it possible to give concrete expression to institutional reference frameworks** (CPU-CGE, UNESCO, European Union), which are broad and not specific to any one type of training.

The approach presented also proposes a set of knowledge, which is absent from the majority of reference systems often devoted exclusively to skills (apart from UNESCO's learning objectives), the bias being that a good level of knowledge about environmental issues and their implications for our societies is essential for understanding the complexity of environmental issues, and that the aim of the skills is to usefully mobilise the knowledge acquired in order to integrate it into one's professional and civic life. These two categories of elements must therefore be thought of in parallel, and are complementary and inseparable.

The elements presented are largely inspired by the work of the FORTES group [243] published in the Great Transition Manual[244] and the small manual *Vers une autre gestion*[245] with which we share the ambition to "rethink management in the era of ecological and social transition in the most collaborative way possible". This base is an invitation for stakeholders in higher education management institutions to gather, exchange or debate on training and its relationship with environmental issues. The tool constituted by the base is intended to serve as a support for discussion in order to fuel what will eventually be the choices of each institution.

Macro-skills The Shift Project	**6 gateways of the Great transition Manual**	**Skills DD&RS (CPU-CGE)**	**Learning objectives UNESCO**	**GreenComp skills**[246]
Adopt a systemic, interdisciplinary and ethical approach	Oikos	Systemic	Systemic analysis	Systems thinking Problem framing
	Ethos	Responsibility and ethics	-	Embodying sustainability values
Develop a critical mind for envisaging desirable futures	Logos	Prospective scenarios	Anticipation	Futures literacy Exploratory thinking
	Ethos	Responsibility and ethics	Critical analysis	Critical thinking
Reflecting and deciding to trigger change	Nomos	Changes	Integrate normative resolution of problems	Adaptability
Act individually and collectively with responsibility	Praxis	Collectives	Collaboration strategy	Acting for sustainability
	Dynamis		Knowledge of oneself	Embodying sustainability values

***Table 1 – Proposal of correspondence between the skills of the Shift Project base and those of different reference frameworks (according to the Great Transition Manual*, p. 351[247])**

[243] Collective of teachers and professors affiliated with the Campus de la Transition
[244] FORTES group, *Great Transition Manual*.
[245] Lallemand-Stempak and Eynaud, *Vers une autre gestion*.
[246] Bianchi, Pisiotis, and Cabrera Giraldez, "GreenComp - The European sustainability competence framework" (Joint Research Center - European Union, 2022).
[247] FORTES Group, *Great Transition Manual*.

II. Paths of knowledge and skills to be taught in strategy, marketing, auditing, purchasing and logistics courses

These four career sheets propose knowledge and skills to be taught to students in strategy, marketing, management control, purchasing and supply chain, in addition to (and not instead of) the common core of knowledge and skills. These four career paths were chosen according to two criteria: the number of higher education graduates in management that they represent[248], and their role in the implementation of ecological transition.

The finance professions will be dealt with in a specific report, published on 15 December 2022.

For the four professional sectors, the sheets contribute:

- knowledge to be added to the common core, above all intended for specialised students;
- skills to be added to those of the common core or which provide further precision.

The knowledge and skills presented have been identified on the basis of interviews with professors and professionals in these fields.

The sheets provide a "discipline" perspective to the common core, and in this sense complement it. The base (see above, p. 70) answers the question: what should students be taught in relation to environmental issues, regardless of the type of institution, the programme or the disciplines taught? **The sheets answer the question: what should marketing students be taught in relation to environmental issues?**

> *Part of the answer to this question can already be found in the common core. The inserts with a blue border highlight the elements of the knowledge and skills base that were often mentioned by the professors and professionals interviewed.*

Other elements specify, by adapting them to the context of the discipline, elements of the common core. For example, "critical thinking" is a common core competence: what can be used to apply critical thinking to marketing practices? In this case, knowledge of different currents in the discipline or of the history of the emergence of marketing can be mobilised.

Finally, there are also discipline-specific elements that need to be taught in relation to environmental issues. For example, in marketing, specific knowledge of consumer law and the framework of greenwashing supplements knowledge of the legal and standards system that is part of the common core. Depending on its complexity, this specific knowledge and skill can be used either in core courses for all management students or in specialised courses. It is up to the teachers to distribute these elements between the courses.

[248] On the basis of the survey of 2021 of the Conférence des Grandes Ecoles. CGE, "L'insertion des diplômés des grandes écoles", June 2021, 59.

PROFESSION SHEET

STRATEGY

19% of management graduates

Adopting a systemic, interdisciplinary and ethical approach

- Developing a critical mind to envisage desirable futures
- Conceiving the transformation of organisations
- Acting individually and collectively in a responsible way

- Have a physical vision of corporate activities
- Understand the interdependencies between the trajectories taken by different sectors towards transition

- Question the social utility of one's organisation
- Know how to perform a scenario-based risk analysis
- Draw up action plans to contribute to goals for mitigating environmental pressures

- Question the dominant culture in the company, for example the culture of growth
- Integrate the long-term (20 to 30 years) in decision-making

- Carry out the environmental transformation of an organisation
- Mobilise one's teams in a context of uncertainty
- Develop innovative solutions to transform business models

A. The professional skills of strategy

1. Strategy, at the heart of taking environmental issues into account

"The truth of the matter is that strategic thinking still incorporates little relating to physical limits. There is work to be done on the awareness of the drivers of strategy, starting with the managers."

Guillaume Lefebvre, General Manager of the University of the Groupe Crédit Agricole.

The professions dealing with strategy include senior management and strategy consulting functions, the latter being a widespread orientation among young management graduates. This family can include other professions, such as strategic innovation functions.

The ecological emergency calls for a renewal of the approach taken by business strategy.

Firstly, because it obliges that account be taken of the physical impacts of the strategic decisions of organizations, and the viability of the latter in an increasingly constrained physical context. **Strategy professionals need to understand the physical issues associated with business models in order to define an appropriate business strategy** to both mitigate environmental pressures and adapt organizations to ongoing changes. This requires the integration of long-term considerations, beyond the usual strategic horizons.

Resources

The Shift Project, "Climate Risk Analysis" [249]

The Shift Project, "Energy-Climate Scenarios"[250]

Carbone 4, "Business strategy at a time of climate emergency: are old solutions (still) applicable?"[251]

To reduce environmental pressures, strategy students will need to understand the mechanisms for different sectors, and know how to contribute to territorial or global impact reduction goals by setting targets for an organization. They will also need to be able to adapt or redirect an organization's activities to achieve these goals.

Adaptation to new types of risks should also be part of the graduates' background. One particularity of environmental issues is that they will manifest themselves through breaks with historical trends: crises in the supply of fossil fuels and raw materials, extreme climatic hazards, etc. These may be physical risks, but also those of transition. Corporate strategy will have to integrate these disruptions to become more resilient, for example by using scenario-based analysis to prepare for several possible futures. Future strategists, whether they are business leaders or consultants, will have to learn to deal with uncertainties.

Taking a physical approach to strategy thus calls for a profound transformation of organizations, and in particular of companies' business models. For future graduates, this means that they will have to learn methods of transformation and change management. But it also means

[249] The Shift Project, "Climate risk Analysis".
[250] The Shift Project, "Energy-Climate Scenarios".
[251] Carbone 4, "Business Strategy at a time of climate emergency: are old solutions (still) applicable?"

that they will have to adopt a systemic approach by integrating the transformation of an organization in the context of transition of other sectors and other regions of the world.

2. New needs for knowledge

> ***"A scientific basis for environmental issues is absolutely essential."***
>
> *Eric Rampelberg, Vice President & General Manager, Southern Europe, India & South East Asia, Interface*

Physical constraints and societal goals

Common core

Basic knowledge of environmental issues and an understanding of the importance of these issues for our societies is an essential prerequisite for integrating environmental issues into the profession dealing with business strategy.

Models of governance

- It is necessary to know the governance models of various forms of organization, and their advantages and disadvantages in responding to environmental issues: listed companies, private equity companies, cooperative societies, SSE organizations, sociocratic organizations, etc.

Economic and financial system

Common core

It is necessary to know the environmental and social stakes of certain emblematic sectors: textile, cosmetics, energy production, electronics and digital, food industry, construction, transport, plastics, tourism... (Impacts and dependence related to climate, natural resources, biodiversity, health, inequalities, etc.).

- History of the evolution of corporate strategy, its tools and practices: why were they structured as they are today? What vision of the world do they convey? What subjects are unthinkable?
- Know the notion of double materiality, i.e. the company's dependencies on the environment (financial materiality) and its impacts on the environment (material or environmental impact, and social materiality).[252]
- Broaden the notion of value proposition to include social and environmental dimensions.
- Know the notions of social and environmental performance.
- Be familiar with scenario-based approaches to go beyond the short-term horizon and consider possible futures.

[252] BL Evolution, "Double materiality: how to understand this new principle and its implications for non-financial reporting?"

3. New needs for skills

a. Adopting a systemic, interdisciplinary and ethical approach

Adopting a systemic approach

- Think of the company as part of ecosystems, and as a finite system with limited resources.
- Integrate the notion of double materiality into the company's strategic thinking, i.e. the company's dependencies on the environment (financial materiality) and its impacts on the environment (impact materiality, or environmental and social materiality).
- Understand the interactions between different parameters of a system: for example, understanding the interdependencies between the decarbonization strategies of different sectors of activity.[253]

Linking the knowledge of different disciplinary fields

- Rely on multiple fields of expertise to make decisions in a context of systemic risks: human and social sciences to understand sociological and cognitive dynamics (evolution of demands, uses and behaviours; biases in decision making on the part of managers, etc.), natural sciences and engineering sciences to understand physical dynamics.

b. Developing a critical mind to envisage desirable futures

Adopting a historical and intercultural approach

- See the *best practices* of business strategy in perspective by setting them in a historic context, using one's knowledge of the context of emergency of these practices and the discipline of strategy.

Applying a critical mind

- Question the vision driven by the company in order to propose strategically justified reorientations.
- Question the vision of the world that the strategy and the tools of strategic analysis imply.
- Question the dominant corporate culture, for example the culture of growth, in relation to environmental issues.

[253] See the examples of conflicts of resource use cited in Part 1 (p. 23).

Envisage desirable futures consistent with physical constraints

> ***Common core***
>
> *The skills suggested here are complementary to those proposed in the common core (Part 3, I.D.2), which must be acquired in the common core; they do not replace them. These skills go one step further: they are therefore more relevant for students who specialize in strategy.*

- Integrate the long term (20 to 30 years) into strategy and decision making.
- Understand the implications of existing scenarios (climate, energy, etc.) for different economic sectors and be able to refer to them to guide business choices.
- Build a corporate vision consistent with physical constraints.
- Build scenarios and prospective studies in a methodical and transparent way, especially so that they can be debated.
- Determine the consequences of a strategy at different temporal and spatial scales and by considering indirect, unanticipated or undesired effects (potential rebound effects, changes in use, unplanned use, etc.).

c. Conceiving the transformation of organisations

Questioning the purpose and social utility of an organisation, product or service

- Identify the ecological impacts of strategic orientations.
- Question the role of companies in society, beyond the maximization of shareholder profit, based on several approaches to the role of the company.

Incorporating a strategy or business model in a context of physical constraints

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"Uncertainty is the new normal. It is necessary to know how to take decisions in a context of uncertainty, while keeping one's teams motivated and mobilised."

Eric Rampelberg, Vice President & General Manager, Southern Europe, India & South East Asia, Interface

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> ***Common core***
>
> *The skills suggested here are complementary to those proposed in the common core (Part 3, I.D.3), which must be acquired in the common core; they do not replace them. These skills go one step further: they are therefore more relevant for students who specialize in strategy.*

- Design an action plan in response to short, medium and long term environmental issues, taking into account different scenarios, based on one's knowledge of environmental and social issues specific to a sector.
- Start adaptation to anthropogenic disturbances (climate change, destruction of biodiversity, etc.) by preparing organizations and addressing the causes of these disturbances (resilience in the strongest sense of the term), in particular by using the results of a scenario-based risk analysis.[254]
- Embed corporate strategy on the scale of a territory or globally in view to reaching impact reduction goals, by setting objectives based on science using tools such as SBTi and SBTN.
- Develop methods for redirecting and closing down infrastructures and organizations that are incompatible with the consideration of environmental issues[255].
- Design democratic governance to take into account the multiplicity of goals to be pursued by organizations: social utility, sustainability and economic balance[256].
- Develop strategic and organizational agility.

Mastering multicriteria assessment tools and transforming existing tools

Common core

The mastery of environmental and social assessment tools is not specific to the business strategy profession, but it is fundamental to understanding the physical challenges of an organization. These core competencies can be further developed in the strategy specialization courses:

- *Interpret the environmental and social assessments of a company, product, service, process (supply) or tool (information system).*
- *Evaluate the relevance of the environmental and social assessment tools used: environmental and social life cycle analysis (LCA), greenhouse gas emissions assessment, biodiversity indicators, resource indicators, autonomy of use, etc.*
- *Assess the reliability and relevance of the information used for an environmental and social assessment.*

- Integrate a systemic vision of environmental issues in classical strategic analysis tools.
- Broaden the notion of performance to include extra-financial performance.
- Transform financial evaluation tools by integrating extra-financial elements: cost of carbon, pollution, destruction of biodiversity, etc.
- Arbitrate and prioritize in complex and uncertain decision contexts.

[254] Carbone 4, "Business strategy in a time of climate emergency: are old solutions (still) appropriate?"
[255] Bonnet, Landivar, and Monnin, *Héritage et fermeture*.
[256] Entretien avec Julie Battilana. Lallemand-Stempak and Eynaud, *Vers une autre gestion*, 35-41.

d. Acting individually and collectively in a responsible way

Involving one's emotions and take into account those of others

Common core

Involve one's emotions by going out into the field and developing one's empathy and communication skills can be a precious aid in taking action and inspiring action.

Leading a group of people to transform organisations and the framework in which they operate

- Mobilize teams in a context of uncertainty.
- Have a political vision of organizations and the internal power relations that influence decision-making.
- For listed companies, understand the mandate given to the company director and the time horizon of this mandate (short or long term), in order to analyse their ability to implement transformations.
- Master change management techniques to lead the ecological transformation of an organization.
- Involve various stakeholders in the definition of the strategy to identify potential trend breaking phenomena.
- Influence the upstream and downstream sides of the value chain in which the company or organization is involved to better take into account environmental issues.

Demonstrating creativity to experiment

Common core

- *Be inspired by innovative initiatives: companies that have changed their business model, etc.*
- *Develop innovative solutions to problems of environmental and social transformation of organizations, in particular by proposing organizational or social innovations, for example in the context of projects on concrete cases.*

- Know how to extract what is of use from traditional models of strategic decision-making when they are not consistent with taking environmental issues into account. *For example, favouring vertical rather than horizontal integration, by reintegrating the upstream and downstream phases, if this makes it possible to control greenhouse gas emissions in scope 3.*

PROFESSION SHEET

MARKETING

14%

of management graduates

Adopting a systemic, interdisciplinary and ethical approach

- Developing a critical mind to envisage desirable futures
- Conceiving the transformation of organisations
- Acting individually and collectively in a responsible way

- Understand the environmental challenges of several sectors, and what this entails for the role of marketing
- Pay particular attention to ethics in methods of influence

- Question the social utility of products and services
- Use the results of an environmental assessment to review your product portfolio, and your channels of distribution and communication

- Imagine new practices to change modes of consumption
- Make sobriety desirable and accessible
- Take ecodesign approaches

- Develop a critical view regarding current consumption dynamics
- Build a narrative of desirable futures consistent with physical limits

B. The marketing professions

1. The role of marketing in integrating environmental issues

> ***"We have to rethink our product development according to its utility for our target client.***
> ***It will happen alongside sobriety in terms of the product portfolio."***
>
> *Marguerite Laborde, Marketing Manager of Mustela*

The definitions of marketing of the French Marketing Association[257] (AFM) and the American Marketing Association[258] (AMA) have evolved in recent years[259]: they now comprise the creation of value for various stakeholders including society in the broad meaning.

Marketing can evolve still further. **Its role could be to respond to a mission of social utility**[261], by diffusing useful content transparently and accessibly, without pushing people to consume.

Resources

AFM, Wiki Marketing for a responsible society[260]

a. Marketing can contribute to reducing pressure on the environment

Since the reduction of resource use for many goods and services requires decreasing production and consumption, **marketing can help make more frugal behaviour accessible and desirable**. All facets of marketing can contribute to this, but to do so, marketing practices must go against the major trends of increasing consumption in volume.

For example, this may involve **designing and offering products and services that consume fewer resources** throughout their life cycle. Design could favour products with a longer lifespan, that can be repaired and recycled, by minimizing packaging; or developing a repair offer while reducing the supply of new products. The choice of distribution methods could contribute to reducing the environmental footprint of products.

The normative power of marketing can also contribute to **making more frugal behaviour desirable**, by creating new imaginations to encourage less resource-intensive lifestyles. For example, it can encourage people to reduce their consumption, to repair rather than replace

[257] Definition of marketing for the AFM: "specific vision of exchanges, which must be equitable and involve the creation of value for each of the stakeholders (individuals, organizations, institutions)". French Marketing Association, quoted by Lallemand-Stempak and Eynaud, *Vers une autre gestion*.

[258] "*Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large."* American Marketing Association, "Definitions of Marketing", accessed on 11 October 2022, https://www.ama.org/the-definition-of-marketing-what-is-marketing/.

[259] Debra Jones Ringold and Barton Weitz, "The American Marketing Association Definition of Marketing: Moving from Lagging to Leading Indicator", *Journal of Public Policy & Marketing* 26, n°. 2 (September 2007): 251-60, https://doi.org/10.1509/jppm.26.2.251.

[260] French Marketing Association, "Wiki Marketing for a responsible society (Chapter 1)", accessed on 25 October 2022, https://marketingpourunesocieteresponsable.org/index.php/Chapitre_1.

[261] Marketing is already used for social utility purposes in non-market areas, for example to encourage the adoption of preventive behaviours in public health: this is social marketing, which "consists of using commercial marketing techniques with the objective of encouraging behaviours favourable to the well-being and/or health of individuals" (Karine Gallopel-Morvan, Viêt Nguyen Thanh, and Pierre Arwidson, *Marketing social: De la compréhension des publics au changement de comportement*, Presses de l'Ecole des Hautes Etudes en Santé Publique, 2019.)

damaged goods, or to change their habits: prefer a train trip to a plane trip, choose a local tourist destination, etc.

Marketing can also contribute to **defining fairer pricing policies** for all actors in the production chain.

b. Marketing has to adapt to new risks

Marketing teams have an interest in being linked with other entities of the company to prevent certain risks.

It could be useful to strengthen the link between the Marketing and Purchasing teams to anticipate supply risks. These can be related to **physical risks** linked to environmental disruptions, such as disruptions in supply and distribution chains due to the impact of extreme weather events. They can also be linked to the depletion of resources, whether energy or non-energy, which jeopardises the ability of marketing to design products or packaging based on limited or distant resources.

Marketing is also faced with the risks of transition. The following a few examples:

- **Regulatory risks**: marketing must already take into account restrictions on communication amounting to greenwashing[262], and it could be affected, for example, by the banning of advertising the most harmful products and services for the environment[263].
- **Market risks:** marketing must deal with changing consumer expectations towards more responsible products or services - and, ideally, also contribute to this evolution by making these choices desirable and facilitating them.
- **Reputation risks:** marketing is too often associated with advertising campaigns known as greenwashing, which tarnish the image of brands and companies.

2. New needs for knowledge

Physical limits and societal goals

> ***Common core***
>
> *Basic knowledge of environmental issues and an understanding of the importance of these issues for our societies is an essential prerequisite for integrating environmental issues in marketing.*

Economic and financial system

> ***Common core***
>
> *Know the environmental and social issues of several emblematic sectors: textiles, cosmetics, energy production, electronics and digital, food industry, construction, transport, plastics, tourism, etc. (Impacts and dependence related to climate, natural resources, biodiversity, health, inequalities, etc.).*

[262] Established in France by the ethics rules of the Autorité de Régulation Professionnelle de la Publicité (ARPP).
[263] As was proposed, for example in France, by the Convention Citoyenne pour le Climat. Convention Citoyenne pour le Climat, "Les propositions de la Convention Citoyenne pour le Climat", 29 January 2021, 23-34, https://propositions.conventioncitoyennepourleclimat.fr/.

Legal and standards system

- Know the standards and regulations related to environmental issues that have an impact on marketing (consumer protection, due diligence, decree to limit greenwashing, etc.).

Psychology and sociology of change

> ***Common core***
>
> *Be aware of cognitive biases, perception and attribution errors: anchoring, framing, fundamental attribution error, halo effect, etc., especially those biases that can influence consumer behaviour.*

- Know the use of psychological and social marketing levers (advertising, nudges), their operational and ethical interests and limits, and examples of application to meet ecological challenges.

3. New needs for skills

a. Adopting a systemic, interdisciplinary and ethical approach

Adopting a systemic approach

- Resituate marketing in its interactions with environmental issues.
- Resituate marketing in a system comprising all its stakeholders.

Linking the knowledge of different disciplinary fields

- Rely on scientific culture to understand ecological challenges and the impacts of marketing.

Discerning the ethical challenges

> ***Common core***
>
> *Paying attention to ethics is particularly important in the marketing professions, which use cognitive biases and personal data to influence target individuals. It is relevant to develop all the elements of the common core related to ethics (see the macro-skill "Adopt a systemic, interdisciplinary and ethical approach") in marketing specialities.*

b. Developing a critical mind to envisage desirable futures

Adopting a historical and intercultural approach

- Adopt a historical and critical approach to the emergence of marketing, based on knowledge of its history, the context of the emergence of its practices and of the discipline.
- Understand the place of consumption in our societies by comparing it with other cultural references (current and past).

Apply a critical mind

> ***"Marketing should progress from the era of manipulation to that of information."***
>
> *Guillaume Declair, Co-founder of Loom*

- Use one's knowledge to develop a critical view of the role of marketing, e.g. a historical and cross-cultural approach (see above), but also knowledge of the various currents in marketing:
    - Different approaches to marketing, and the paradigms in which they are embedded: cultural approach to consumption, macromarketing, transformative consumer research, critical approach, etc.[264] *For example, should marketing maximise the profits of shareholders or provide value to all the stakeholders (including society in the broad meaning)?*
    - Notions of *demarketing*[265], *green demarketing*[266]
- Know how to identify greenwashing, based on one's knowledge of the environmental issues of several economic sectors, and one's knowledge of orders of magnitude. [267]
- Develop a critical view of the notion of value: financial value, well-being, etc. For example, what value do we want to provide to which stakeholder?
- Develop a critical view of the tools used to influence consumers: cognitive bias, personal data collection, etc..

Envisage desirable futures consistent with physical constraints

Students majoring in marketing will have to rely on their previously acquired knowledge of ecological transition scenarios and business transformation objectives to make these transformations desirable.

- Understand how the economy and businesses can be transformed by taking into account physical constraints,
- Use the normative power of marketing to promote a vision of society that is desirable and consistent with physical limits, by putting desirable futures into narrative form.
    - *For example, make a sober society more desirable.*
    - *For example, build visions and narratives based on inclusive and ecological prosperity, consistent with an economy that respects a social baseline without exceeding planetary limits (according to the donut model*[268]*).*
    - *For example, embody desirable lifestyles in one's brand image and communication, to nudge consumers towards more virtuous behaviours.*[269]

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[264] Lallemand-Stempak and Eynaud, *Vers une autre gestion*, 105-8.
[265] Philip Kotler et Sidney J. Levy, "Demarketing, Yes, Demarketing"", *Harvard Business Review*, 1971.
[266] Catherine Armstrong Soule and Brandon Reich, "Less is more: Is a green demarketing strategy sustainable?", *Journal of Marketing Management*, juin 2015.
[267] Pour un Réveil Écologique, "Guide anti-greenwashing", accessed on 15 September 2022, https://pour-un-reveil-ecologique.org/fr/les-entreprises-nous-repondent/#guide-anti-greenwashing.
[268] Raworth, *La théorie du donut*.
[269] A few examples: EpE, "Représentations des modes de vie et transition écologique - Guide à l'usage des communicants", November 2021, http://www.epe-asso.org/representations-des-modes-de-vie-et-transition-ecologique-novembre-2021/.

c. Conceiving the transformation of organisations

Questioning the purpose and social utility of an organisation, product, service or tool

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"We've understood that there are two things that allow us not to push for overconsumption: having independent financing and doing without a culture of growth."

Guillaume Declair, Co-founder of Loom

- Question the usefulness of a product for its customers, its targets, and for society at large.
- Define a brand mission consistent with environmental issues.
- Question the dominant cultures in companies, for example the culture of growth.

Incorporating a strategy or business model in a context of physical constraints

- Design marketing strategies for various types of organizations, pursuing various objectives: listed company, family business, SSE company, cooperative society, association, public actor, etc.
- Design a marketing strategy in accordance with the objectives of reducing environmental pressures on a company scale: reduction of consumption and therefore of sales volume, extension of the life span of products, etc.
    - Design product development based on a brand mission and the usefulness of products for the customer and society. For example, apply the rationale of sobriety to one's product portfolio.
    - Rethink how advertising is used so that it no longer encourages increased consumption in volume, for example by redirecting it to content that is useful for product users.
    - Design the diffusion of content around a brand mission and the usefulness of products to the customer and society. *For example, rethink customer experience by focusing on access to useful and transparent information*.
- Align key marketing performance indicators (KPIs) with environmental issues. For example, transform the performance indicators of a website which generally run counter to eco-design indicators.

Mastering multicriteria assessment tools and transforming existing tools

Common core

Mastering environmental and social assessment tools is not specific to the marketing professions, but it is fundamental to understanding the physical challenges of an organisation. These core competencies can be further developed in marketing specialization courses:

- Interpret the environmental and social assessments of a company, product, service, process (supply) or tool (information system).
- Evaluate the relevance of the environmental and social assessment tools used: environmental and social life cycle analysis (LCA), greenhouse gas emissions assessment, biodiversity indicators, resource indicators, autonomy of use, etc.
- Assess the reliability and relevance of the information used for an environmental and social assessment.

- Understand the environmental and social impacts of marketing:
    - For example, does marketing create an increase in overall consumption, or an increase in consumption at the expense of other less virtuous products?
    - For example, what are the methods for evaluating the environmental impacts of advertising.[270]
- Understand the environmental and social impacts of marketing decisions throughout the life cycle of a product (changes in packaging, recipes, distribution, etc.).
- Understand and master the environmental impacts of digital tools used for marketing: communication media (websites, videos, etc.), use of data, etc.
- Master the current marketing indicators and tools, and know how to transform them to adapt them to environmental and social objectives (over the entire activity of the organisation, in complete life cycle). For example, change the way of analysing the value created by integrating all the stakeholders and the social and environmental dimensions.

d. Acting individually and collectively in a responsible way

Involving one's emotions and taking into account those of others

> ***Common core***
>
> *Involving one's emotions by going into the field, and developing one's empathy and communication skills, can be precious in taking and encouraging action.*

[270] An example from the United Kingdom: Purpose Disruptors, "Advertised Emissions: the carbon emissions generated by UK advertising", 2021, https://www.purposedisruptors.org/advertised-emissions.

Leading a group of people to transform organisations and the framework in which they operate

- Work in coordination with the other departments of the organization, in particular to avoid greenwashing or social washing.
- Master influence and change management techniques to contribute to the transformation of objectives and tools within the company, in order to align marketing objectives with the needs of ecological transition.
- Build mobilising narratives in order to get people to adhere to other visions and other modes of consumption: within the organization, with customers, etc.
- Develop green nudges in collaboration with various stakeholders (consumers, citizens, NGOs, public authorities, etc.), making sure to take into account the interests of these actors and ethical considerations[271].
- Understand the brakes and motivations of individuals and the socio-cultural norms to which they are subjected.
- Co-construct with other actors (business groups, public authorities, unions, NGOs, etc.) regulatory or organizational frameworks that are more favourable to the consideration of environmental issues.

Demonstrating creativity to experiment

Common core

Students who go on to specialize in marketing often have a fertile ground for creativity. The skills already present in the core curriculum related to creativity (see the macro-skill "Acting individually and collectively in a responsible way"), innovation and experimentation, particularly in the context of projects on concrete cases, would benefit from being reinforced in the specialisation.

- Conduct an eco-design process to reduce the environmental impact of products.
- Integrate biomimicry into innovation and product design processes[272].
- Conduct collective design processes with all the stakeholders to adapt to their needs: end users of products, customers, etc.
- Drawing inspiration from the arts to create new narratives.

Resources

Biomimetics: The Shift Project, “Former l’ingénieur du XXIe siècle - Volume 1, Manifeste”, p.83-85, “S’aider du vivant, et l’aider également”

[271] Lallemand-Stempak and Eynaud, *Vers une autre gestion*, 108-9.
[272] The Shift Project, "Educating the Engineer of the 21st Century - Volume 1, Manifesto", 83-85.

PROFESSION SHEET

MANAGEMENT CONTROL

Adopting a systemic, interdisciplinary and ethical approach

Developing a critical mind to envisage desirable futures

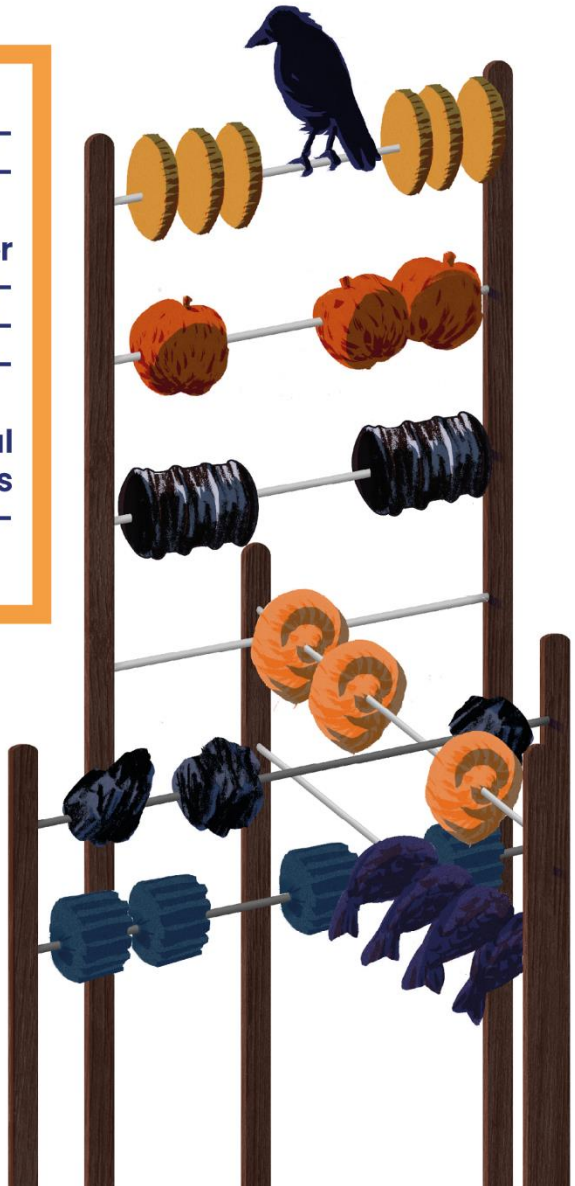
- Develop a scientific culture to use pertinent, science-based indicators
- Identify the political dimension of the choice of indicators used for management control
- Understand the limits of current management control to take into account human and natural capital

Conceiving the transformation of organisations

- Know how to identify and use science-based indicators
- Design tools for controlling the environmental transformation of an organisation
- Identify the physical and transition risks that affect one's organisation

Acting individually and collectively in a responsible way

- Work in coordination with all the departments of one's organisation
- Take inspiration from innovative initiatives to drive ecological transformation



C. The management control professions

1. The role of management controllers in taking environmental issues into account

"Management control will naturally incorporate ecological dimensions, just as it has incorporated social and commercial dimensions in recent decades, by enlarging its scope beyond financial aspects."

Franck Zerafa-Launay, Administrative and Financial Manager of Terrena Filières Végétales

Management control lies at the heart of an organisation's activities, as outlined by Simons (1995) who defined management control as "the information-based processes and procedures that managers use to maintain or change certain configurations of the organisation's activities[273]".

The profession of management controller is still mainly linked to cost control functions in the company. The courses provided in management control mainly concern cost determination techniques (full cost methods, ABC method, etc.), which must be mastered for cost control.

Environmental management control is currently being developed in some organisations. It makes it possible to monitor the organisation's impact on the environment (on the climate, biodiversity, resources, etc.) and, conversely, to prevent the risks associated with the organisation's dependence on the environment[277]. Environmental auditing is based on the monitoring and analysis of data such as greenhouse gas emissions, resources used, impacts on ecosystems, etc., which must be based on scientific data.

Resources

Prophil, "Entreprise et Post-croissance"[274]

C3D, Orée, Orse, "La comptabilité intégrée, un outil de transformation de l'entreprise à la portée de tous"[275]

Nicolas Antheaume and Souâd Taïbi, "La comptabilité multi-capitaux" (audition for The Shift Project)[276]

[273] Simons, "Levers of control: how managers use innovative control systems to drive strategic renewal", *Harvard Business School Press*, 1995.
[274] La Partie 3, "Mesurer ce qui compte vraiment" (p. 98-135) presents among other things feedback from experience of companies that have changed their accounting practices and their management control. Prophil, "Entreprise et Post-croissance", 2021.
[275] This report compares different green accounting models. C3D, Orée, and Orse, "La comptabilité intégrée, un outil de transformation de l'entreprise à la portée de tous", November 2021, http://www.oree.org/source/_567.pdf.
[276] *La comptabilité multi-capitaux*, 2022, https://www.youtube.com/watch?v=lhrzKSQYrrM&list=PLX8LCkV3D8Upybb3Cr8h7eV_cgfRRicjD&index=8.
[277] Antheaume (2013) gives the following definition: "Environmental management control is a set of tools that make it possible to collect data on the state of depletion of natural resources linked to an organisation's activity and to make an internal resource allocation, which sets as a priority constraint the maintenance of the regenerative capacities of ecosystems, and encourages employees to respect this constraint. The data collected should also allow third parties to be informed about how the company is contributing to keeping ecosystem capacities intact. Nicolas Antheaume, "Le contrôle de gestion environnemental. État des lieux, état de l'art", *Comptabilité Contrôle Audit* Tome 19, n° 3 (2013): 9-34.

The entry into force of the European taxonomy [278] and the future entry into force of European due vigilance reinforce this dynamic and bring to light new lessons and new skills related to management controlling[279]. It is now mandatory for large companies and their suppliers to go beyond the traditional cost control system and map their activities, the risks associated with these activities, and the economic impacts associated with these risks. This should lead to preventive and corrective measures[280]. In this framework, **the management controller must also become a specialist in *compliance*[281] and a risk manager**. The taxonomy specifies that these internal controls must be based on scientific data (science-based), and in particular on the data provided by the IPCC. The nature of the audit and the nature of the costs audited are thus changing with these new regulations, which are already in force.

Thus, management control, which historically has been optional, intended for internal use and mainly financial, is changing. With the development of compliance, management control is increasingly intended for external reporting. The evolution of the European regulatory framework is progressively blurring the distinction between financial and non-financial information, as companies are required to assess their sustainable activities within the meaning of the taxonomy and incorporate it into their financial results[282].

Risk management is often already handled by people with a background in management control. Graduates specialising in management control must therefore be particularly aware of the **new types of risks incurred by companies: environmental risks and transition risks.**

Some companies are also developing environmental management control on a voluntary basis, without any regulatory obligation. For example, some small and medium-sized enterprises (SMEs) that do not have external compliance reporting requirements, but whose managers have an interest in environmental issues, are developing their management control procedures[283].

More broadly, given the major transformations in economic activities required to take environmental issues into account, **management controllers have a major role to play in steering the ecological transformations of organisations. The management control function must take on board the challenges of ecological transformation and the**

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[278] The European Taxonomy is a unified EU-wide classification system for economic activities that "establishes the criteria for determining whether an economic activity is considered environmentally sustainable, for the purpose of determining the degree of environmental sustainability of an investment" ("Article 1 of Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework for sustainable investments and amending Regulation (EU) 2019/2088, O.J. No. L 198, 22.6.2020," 1, accessed October 20, 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R0852.)

[279] For a presentation of the changes brought about by the taxonomy and European Green Deal: Florian Favreau, "La taxinomie : redéfinition et contrôle de l'information financière et extra-financière", *Gestion & Finances Publiques*, December 2022. (awaiting publication).

[280] In accordance with the generic criteria presented in the first delegated act specifying the technical criteria used for the implementation of the taxonomy. Florian Favreau, "Les pratiques d'entreprise dans la proposition de directive sur le devoir de vigilance des entreprises", *Revue de droit des affaires internationales*, awaiting publication.

[281] Compliance refers to the procedures carried out by companies to prevent the risks associated with non-compliance with regulations. (Autorité de la concurrence, "Qu'est-ce que la conformité ?", accessed on 11 October 2022, https://www.autoritedelaconcurrence.fr/fr/quest-ce-que-la-conformite-1.)

[282] "Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives", accessed on 20 October 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R2139.

[283] Moreover, SMEs will soon be affected by regulatory changes, as specified in the European Union's taxonomy, the scope of which is intended to extend to the entire economy - the needs of SMEs for support will then be significant.

associated indicators: interactions between economic organisations and their environment, impact reduction objectives, the development of sobriety, even ecological redirection (abandonment of certain activities), etc. This dual culture of the challenges of transforming activities and the indicators for measuring environmental impacts should make it possible to develop a strategy that is consistent with the physical limits in all the components of an organisation.

2. The new needs for knowledge

Physical limits and societal goals

> ***Common core***
>
> *Basic knowledge of environmental issues and an awareness of the importance of these issues for our societies is an essential prerequisite for integrating environmental issues in management control.*

In particular, auditors must now be able to identify scientific sources of information, in accordance with the regulations in force.

Economic and financial system

> ***Common core***
>
> - *Know the environmental and social issues of several emblematic sectors: energy production, electronics and digital technology, agri-food industry, construction, transport, plastics, tourism, etc. (impacts on the climate, natural resources, biodiversity, health, inequalities, etc.).*
> - *Be familiar with the concepts of weak and strong sustainability, including the notion of non-substitutability of natural and financial capital.*

- Be familiar with the concept of double materiality, i.e., the company's dependencies on the environment (financial materiality) and its impacts on the environment (impact materiality, or environmental and social materiality).[284]

[284] BL Evolution, "Double materiality: how to understand this new principle and its implications for non-financial reporting."

Legal and standards systems

- Know the main international standards of environmental and social reporting (*soft law,*[285]).
  - Global Reporting Initiative[286] (GRI)
  - UN Guiding Principles on Business and Human Rights[287] (UNGP)
  - Guiding principles of the OECD[288]
- Know the legal requirements for non-financial reporting (*hard law*).
  - *European Green Deal*[289], which requires the use of international benchmarks, including the UNGP and the OECD Guidelines
  - European Due Vigilance.[290]

3. The new needs for skills

a. Adopting a systemic, interdisciplinary and ethical approach

Adopting a systemic approach

- Transcribe into management control an approach to the company or organisation as part of ecosystems, and in a finite system with limited resources.

Linking the knowledge of different disciplinary fields

- Use scientific culture to understand the environmental issues of organisations and environmental assessment tools.
- Know how to identify experts in different disciplines and work with them to assess the relevance of the data used
- Know the institutional partners capable of supporting the controller in the scientific field: creation of environmental impact data (carbon footprint, LCA, biodiversity footprint, etc.), support, etc. (for example: Ademe, SBTi, etc.).

Discerning the ethical challenges

- Feel responsible for preserving capital that is not only financial capital but also natural and social capital.
- Understand the ethical issues behind the indicators used for management control, and the decisions they will promote.

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[285] Articles 3 and 18 of "EU Regulation 2020/852 of the European Paliament and Council of 18 June 2020 on establishing a framework to promote sustainable investment and amending EU Regulation 2019/2088, JO L 198 of 22.6.2020", 852, accessed on 20 October 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R0852.

[286] Global Reporting Initiative, accessed on 20 October 2022, https://www.globalreporting.org/.

[287] UN Guiding Principles - Reporting Framework, accessed on 22 October 2022, https://www.ungpreporting.org/.

[288] OECD, "OECD Guidelines for Multinational Enterprises", accessed on 20 October 2022, https://mneguidelines.oecd.org/mneguidelines/; OECD, "OECD Due Diligence Guidance for Responsible Business Conduct", accessed on 20 October 2022, https://mneguidelines.oecd.org/due-diligence-guidance-for-responsible-business-conduct.htm.

[289] Favreau, "La taxinomie : redéfinition et contrôle de l'information financière et extra-financière".

[290] Florian Favreau and Marine Bastiège, "La chaîne de valeur dans la proposition de directive sur le devoir de vigilance des entreprises", *Revue de droit des affaires internationales*, awaiting publication.

b. Developing a critical mind to envisage desirable futures

Adopting a historic and intercultural approach

- Adopt a historical approach to accounting and management control, drawing on knowledge of the history and evolution of these disciplines and practices, in order to see the choice of tools and practices in perspective (see for example below, the political dimension of accounting choices).

Apply critical thinking

- Understand the limits of traditional accounting and management control to account for the multiplicity of capital deployed by organisations (human and natural capital), to meet the expectations of stakeholders other than funders.

Envisage desirable futures consistent with physical limits

- Analyse the consequences of the company's actions at different temporal and spatial scales and by considering indirect, unanticipated or undesired effects (potential rebound effects, changes in use, unintended use, etc.).
- Move from a paradigm of maximising the return on economic capital to a paradigm of preserving economic, natural and human capital.
- Conduct regulatory benchmarking to anticipate changes in management control in relation to environmental issues.

c. Conceiving the transformation of organisations

Questioning the purpose and social utility of an organisation, product, service or tool

- Question the purpose of management control. For example, ask the question of the objective of the indicators set up in a company, which may be to maximise profitability for shareholders or to support the company's ecological redirection.
- Identify the political dimension of management tools. For example:
    - the use of quantifiable indicators in the evaluation of public action, and the choice of these indicators, is the result of political balances of power[291] ;
    - accounting choices, particularly those relating to a company's profit or loss, which represent its performance, depend on the dominant players in the economic system [292].
- -Question the notion of financial performance and extend the notion of performance to the respect of a shrinking ecological budget, to contribute to the maintenance of environmental and human capital.

[291] Contribution from Corine Eyraud. Chiapello andGilbert, *Sociologie des outils de gestion*.
[292] Collette and Richard, *Comptabilité générale : les systèmes français et anglo-saxons*. Cited by Chiapello and Gilbert, *Sociologie des outils de gestion*.

Incorporating a strategy or business model in a context of physical constraints

- Contribute to arbitration and decision-making in a complex situation, for example when faced with contradictions in the various elements characterising performance (environmental, economic or social performance), or in a situation of uncertainty.
- Manage scarce and shrinking resources.
- Manage the ecological transformation of an organisation, e.g. reducing its carbon footprint, transforming its business model to achieve environmental objectives.

Mastering multicriteria assessment tools and transforming existing tools

Common core

The mastery of environmental and social assessment tools is not specific to management control professions, but it is fundamental for these professions. The core skills indicated in this insert may be further developed in specialised courses.

- Interpret environmental and social assessments of a company, product, service, process (supply) or tool (information system).
- Evaluate the relevance of the environmental and social assessment tools used: environmental and social life cycle analysis (LCA), greenhouse gas emissions, biodiversity indicators, resource indicators, autonomy in use, etc.
- Assess the reliability and relevance of the information used for an environmental and social assessment.

- Mobilise adequate resources to carry out extra-financial reporting, a declaration of extra-financial performance (DPEF), an integrated report.
- Transform existing assessment tools (e.g. scorecards) by adding environmental criteria.
- Use reliable sources to collect data: Base Carbone[293] of the Ademe, International Energy Agency[294], etc.
- Know how to identify and use *science-based* indicators for management control: for example by relying on the initiative *Science-Based Targets* (SBTi[295]).
- Design relevant monitoring and steering tools to support the ecological transformation of an organisation.
- Know how to mobilise the appropriate resources to implement an ecological accounting system in an organisation, based on knowledge of the various models being developed: for example the CARE (Comprehensive Accounting in Respect of Ecology) and LIFTS (Limits and Foundations Towards Sustainability) models. etc.[296]

[293] Ademe, "Base Carbone : Présentation", GHG balance, accessed on 15 September 2022, https://bilans-ges.ademe.fr/fr/accueil/contenu/index/page/presentation/siGras/0.
[294] International Energy Agency (IEA), "Data and statistics", IEA, accessed on 15 September 2022, https://www.iea.org/data-and-statistics.
[295] Science Based Targets, accessed on 15 September 2022, https://sciencebasedtargets.org/.
[296] See the comparison between several tools: C3D, Orée, and Orse, "La comptabilité intégrée, un outil de transformation de l'entreprise à la portée de tous".

d. Acting individually and collectively in a responsible way

Involving one's emotions and taking into account those of others

> ***Common core***
>
> *Involving one's emotions by going into the field and developing one's capacities of empathy and communication can be precious for acting and encouraging action.*

Leading a group of people to transform organisations and the framework in which they operate

- Work in coordination with other departments in the organisation, in a cross disciplinary manner.
- Master influence and change management techniques to develop a culture of environmental and social performance within the organisation.

Demonstrating creativity to experiment

- Take inspiration from innovative initiatives: companies that have changed their business model, or that have developed environmental management control, etc.[297]
- Develop innovative solutions for managing ecological transformations of organisations, including organisational or social innovations, for example within the framework of projects on concrete cases. For example, developing a management system for a company that wishes to reduce its production volume.

[297] For the case studies, see Prophil, "Entreprise et Post-croissance".

PROFESSION SHEET

PURCHASING & SUPPLY CHAIN

6% of management graduates

Adopting a systemic, interdisciplinary and ethical approach

- Developing a critical mind to envisage desirable futures
- Conceiving the transformation of organisations
- Acting individually and collectively in a responsible way

- Develop a scientific culture, especially to identify the limits of technical solutions for reducing the environmental impacts of transport (hydrogen, biofuels, etc.)
- Fully understand environmental assessment tools
- Understand the needs of economic sectors, including transport, to change in relation to ecological issues
- Take a prospective view of ecological issues when developing infrastructures that demand a long-term commitment from one's organisation
- Contribute to improving the skills of one's teams and clients regarding ecological issues
- Build solutions jointly with your clients and competitors: pool warehouses, transport, etc.

D. Purchasing and supply chain professions

1. The role of purchasers and supply chain managers in taking into account environmental issues

Supply chain managers are responsible for coordinating all the physical flows of an organisation, based on information flows. While discussions are currently focusing on the energy efficiency of transport and new fuels, **it is essential to work on the reorganisation of logistics chains, to limit flows** (in terms of distance and volume) **and to reflect on the relevance of logistics infrastructures in the long term**.

Resources

The Shift Project, "Ensuring freight in a finite world"[298]

Carbone 4, "Climate change and the supply chain: towards the disruption of supplies?"[299]

The role of purchasing managers is to identify, select suppliers and draw up contracts. **Taking environmental issues into account at every stage of purchasing** can be an important lever for transition. Indeed, in many companies, the majority of greenhouse gas emissions come from the activities of subcontractors and suppliers.

a. Reducing pressures on the environment

Responding to the ecological emergency for logistics involves reducing greenhouse gas emissions, dependence on fossil fuels, and impacts on biodiversity - for example, the introduction of invasive species or the artificialisation of land due to the construction of warehouses. This means reducing freight transport (7% of global CO2 emissions in 2010[300]) and therefore global supply chains, in addition to a shift towards less emitting modes of transport and improved efficiency. **Supply chain managers will have to reorganise them**: by increasing the fill rate (thanks in particular to pooling), by reducing the distances travelled (for example with production units closer to the places of consumption) and the volumes of flow.

To extend the life of products and thus limit the consumption of materials and energy, it will be necessary to develop logistic chains adapted to reuse, repair and recycling**,**[301] for example with reverse logistics.

For all sectors, reducing environmental pressures can be achieved **by integrating environmental criteria into purchasing**, at all stages of a purchase: defining the need, issuing invitations to tender, complying with offers, drawing up contracts, monitoring disputes, after-sales services, etc. At the same time, buyers should **help their suppliers to take account of environmental issues.**

b. Being prepared for new risks

Buyers and logisticians will have to deal with new risks that must be integrated in their decisions, particularly by anticipating them when a decision is taken that commits their organisation in the long term (investment in infrastructure, for example). Here are a few examples.

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[298] The Shift Project, "Ensuring freight in a finite world ", March 2022, https://theshiftproject.org/wp-content/uploads/2022/03/Fret_rapport-final_ShiftProject_PTEF.pdf.
[299] Violaine Lepousez and Axel Derouet, "Climate change and supply chain: towards the disruption of supplies?", Carbone 4, 11 July 2022, https://www.carbone4.com/article-supply-chain-approvisionnement.
[300] International Transport Forum, "The Carbon Footprint of Global Trade".
[301] The Shift Project, "Decarbonating industry without sinking it".

Physical risks:

- The increasing frequency and intensity of extreme weather events, rising sea levels, higher supply risks in globalised supply chains. The slowdown in the production of electronic chips in Taiwan due to a drought in 2021 which has placed the European automotive industry in difficulty[302], is an example.
- Production in some sectors is already affected and will be more so in the future by climate change and biodiversity loss (e.g., crop yield losses), leading to a need for flexibility in supply[303].
- The depletion of resources, particularly fossil resources, poses supply risks that will become increasingly pressing: fossil fuels for transport, oil, metals or other mineral resources for the production of manufactured goods and electricity infrastructures, for example. The resources that could replace them are also limited (see conflicts of use above), p. 29).

Transition risks: transition-related developments such as regulations, technological changes or market shifts could quickly render obsolete decisions that have not taken them into account. For example, the decarbonisation of the energy produced in Europe combined with increasing taxation of emissions could lead to the relocation of supplies.

2. The changes begun

The concept of extended responsibility means that companies must consider the ecological footprint of their entire supply chain [304]. This makes the purchasing and logistics professions central to the ecological transition of companies.

At present, the integration of environmental issues is mainly achieved through the quantification of greenhouse gas emissions in procurement, transport and storage. In transport, this is supported by the price of carbon on the European carbon market, and could be reinforced by an increase in the price of carbon and by the implementation of the carbon adjustment mechanism at the EU's borders.

This requires an increase in the skills of buyers and logisticians in the management of data on greenhouse gases, which should soon be extended to biodiversity indicators. Beyond the technical skills and the cultural change that accompanies them, the addition of environmental indicators makes arbitration more difficult. Buyers and logisticians must now make decisions on the basis of multiple indicators that do not necessarily converge: the carbon criterion may thus clash with the cost and customer experience criteria that prevailed previously.

The implementation of reverse logistics in circular economy approaches is still very limited, although it has been identified by several companies as a model to aim for in the medium or long term.
Finally, in logistics, several collective actions have emerged in France and Europe, such as voluntary commitments by companies or company support programmes (EVE, FRET21 and Objectif CO_2 programmes, driven by Ademe).

Despite these developments, market trends in logistics are at odds with the need for sobriety. For example, for consumer goods, the demand for shorter delivery times goes against the optimisation of routes. It is therefore necessary to know how to argue (with customers for a carrier; internally or with end customers in the context of integrated logistics) to raise awareness

[302] Lepousez and Derouet, "Climate change and supply chains: are we heading towards disruptions in supply?"
[303] Lepousez and Derouet.
[304] In France for example, due to the law on due diligence.

of the importance of these issues.

The need to develop skills in organisational or technical solutions is also a challenge for logistics. Several types of solutions can be used to reduce environmental impacts: bringing production units closer together, pooling transport, modal transfer, changing the type of motorisation, etc. Here too, it is important to be able to work together with different internal and external stakeholders to understand the different existing solutions and define the most appropriate ones.

3. New needs for knowledge

"We are implementing internal resources to train all employees, whatever their background. People from business schools are not very mature on these subjects; schools will probably have to integrate climate modules in their teaching."

Sébastien Ravily, Purchasing manager of Bouygues Travaux Publics

Physical limits and societal goals

Common core

Basic knowledge of environmental issues and an understanding of the importance of these issues for our societies is an essential prerequisite for integrating environmental issues in the purchasing and logistics professions.

Some elements that do not appear in the common core seem to be particularly important for the purchasing and supply chain specialisations:

- Know the limits of technical solutions to physical limits (hydrogen, biofuels, etc.) that are favoured by professionals in the field.
- Be aware of the social issues linked to globalised supply chains, particularly in terms of human rights (modern slavery, living and working conditions, etc.).
- Be aware of the mechanisms at work during relocation, the risks of social and ecological dumping and its human consequences.

Economic and financial system

Common core

Know the environmental and social issues of several emblematic sectors: textiles, cosmetics, energy production, electronics and digital, food industry, construction, plastics, tourism... and in particular transport: impacts and dependence linked to the climate, natural resources, biodiversity, health, inequalities, etc.

- Know the history of the evolution of procurement systems: why they were structured the way they are today (trends towards outsourcing and offshoring).[305]
- Know the evolution of modal shares in freight transport.

[305] Lallemand-Stempak and Eynaud, *Vers une autre gestion*, 120-21.

- Know the environmental impacts of the different forms of freight transport in order of magnitude.
- Know the main approaches for a supply chain that limits the use of resources: industrial ecology, circular economy.

Governance models

- Know the notion of due diligence, its application in law, the reasons for its emergence (in particular scandals such as the Rana Plaza), examples of its implementation.

Legal and standards system

- Know the standards and regulations related to environmental issues that have an impact on procurement and supply chains.

4. New needs for skills

a. Adopting a systemic, interdisciplinary and ethical approach

Adopting a systemic approach

- Understand the interconnection of the different components of the supply chain: impact of consumer behaviour on the company and its supply chain, links between physical limits and the supply chain, etc.
- Incorporate the technical choices of decarbonisation of transport into a systemic transformation: for example, conflicts of use on electricity for the production of hydrogen or on wood biomass for the production of biofuels, impacts of droughts on oilseed-based biofuels.

Linking the knowledge of different disciplinary fields

- Draw on the natural and engineering sciences to understand the technical challenges of reducing environmental impacts.

Discerning the ethical challenges

- Use one's knowledge of the social issues related to supply chains (see above), and of the links between physical constraints and societal objectives, to identify the impacts of their decisions in the short and long term.

b. Developing a critical mind to envisage desirable futures

Adopting a historic and intercultural approach

- Develop a historic and geographically situated approach to global value chains,
    - By analysing the power relations between actors.
    - By analysing resource constraints (especially finite resources).
    - By linking different geographical contexts and historical phases of capitalism (e.g., by considering the legacies of colonial regimes.

  For example, analysing how dependencies and interdependencies between countries and companies are constructed in terms of access and exploitation of natural resources

Demonstrating critical thinking

- Take a critical approach and understand the political nature of value chain accountability practices, their scope and limitations: labels, multi-stakeholder initiatives (MSIs). For example, study these collective governance initiatives in the light of the asymmetrical relations between the countries of the North and South.
- Know how to identify greenwashing, based on one's knowledge of the environmental issues of several economic sectors, and the limits of technical solutions, for example.

Envisage desirable futures consistent with physical limits

- Use future scenarios to question the strategic choices of the present, and put these choices into perspective in a long-term systemic vision (construction of factories, warehouses, use of hydrogen or biofuel, etc.).
- Apply forward thinking to logistics: take into account the limits of the development of technical solutions (hydrogen, digital, etc.), the development of urban logistics, the evolution of physical constraints, etc.
- Conduct active benchmarking to adopt the best practices available and be ahead of regulatory requirements.

c. Conceiving the transformation of organisations

Questioning the purpose and social utility of an organisation, product, service or tool

- Identify the social, economic and ecological impacts of purchasing and supply decisions in global chains.

Incorporating a strategy or a business model in a context of physical constraints

The aim is to align the purchasing and logistics functions with a global strategy (of the company, the sector, the economy) in order to take account of physical limits.

- Set targets that are consistent with the company's sustainability strategy (e.g., capping GHG emissions at a certain level).
- Reverse the hierarchy of factors taken into account when designing a supply chain strategy, for example by acting more on the public-private interface (very strong in transport and logistics: developed areas, ports, airports) in order to make logistics actors aware of the impact of their decisions on the territory, by strengthening the consideration of the contribution to the general interest.
- Build a multimodal transport strategy in the current energy context (requiring arbitration and anticipation).
- Design a reverse supply chain, integrating it into the organisation's current logistics.
- Conduct a supply risk analysis including physical and transition risks (see above, Preparing for new risks).
- Align internal monitoring indicators with supply chain and procurement sustainability objectives (budget allocation, training, prioritisation in relation to profitability objectives, etc.).

Mastering multicriteria assessment tools and transforming existing tools

> ***Common core***
>
> *The mastery of environmental and social assessment tools is not specific to procurement or logistics, but it is fundamental for these professions. The core skills indicated in this insert can be deepened in specialised courses.*
>
> - *Interpret environmental and social assessments of a company, product, service, process (supply) or tool (information system).*
> - *Evaluate the relevance of the environmental and social assessment tools used: environmental and social life cycle analysis (LCA), greenhouse gas emissions assessment, biodiversity indicators, resource indicators, autonomy of use, etc.*
> - *Assess the reliability and relevance of the information used for an environmental and social assessment.*

- Identify the limitations of the assessment tools used, for example in a context where reliable information is difficult to obtain (from a subcontractor for example).

- Mobilise traditional strategic procurement segmentation tools (traditionally focused on risks and benefits) and review them by prioritising their ecological and social dimensions.

- Understand and control the environmental costs of digital tools for supply chain management.

- Arbitrate and make decisions in a complex situation, particularly on the basis of multiple indicators that do not converge (carbon, biodiversity, financial indicators, etc.).

d. Acting individually and collectively in a responsible way

Involving one's emotions and taking into account those of others

Common core

Involving one's emotions by going out into the field, and developing one's capacities of empathy and communication can be precious for acting and encouraging action.

Leading a group of people to transform organisations and the framework in which they operate

- Contribute to the development of the skills of one's team, its suppliers and its customers (end customers or companies that are customers of a transport company) on environmental issues: awareness, understanding of the different solutions, etc.
- Know how to identify competent service providers concerning environmental issues for one's logistics, and call on them to start changing practices.
- Co-construct solutions with customers and competitors (pooling warehouses, transport, etc.).

Demonstrating creativity to experiment

Common core

Develop innovative solutions to problems of transforming purchasing and supply chains, in particular by proposing organisational or social innovations, for example in the context of projects on concrete cases.

III. How can environmental issues be taught?

A. Using environmental issues to strengthen the development of critical thinking

The teaching of environmental issues implies a certain number of pedagogical transformations, but also new dispositions for the teaching staff. Among these, the question of the neutrality of teaching raises questions. Does integrating the challenges of ecological transition risk making teaching normative, or does it, on the contrary, allow the necessary debates to be brought to light?

There is a debate in the management sciences: are they neutral or normative? Among teachers who consider that current teaching is not normative, that it aims to transmit neutral techniques and practices, **there is a fear that teaching environmental issues breaks with the disposition of neutrality**. Some teachers have expressed concerns about imposing values on students, or even proselytising, which goes against their role as teachers.

It seems important to state that management practices are part of normative choices, which already impose a framework of values on students. As mentioned above (see p. 31), management methods, sciences and tools embody a certain vision of the world. Ève Chiapello and Patrick Gilbert emphasise the influence of the dominant ideology on management practices[306]. Likewise, the current functioning of companies that is taught to students is not neutral. It is, for example, imbued with a certain vision of nature, often presented as a reservoir of resources.

On the contrary, the teaching of environmental issues can be seized as an opportunity to develop critical thinking by highlighting conflicts over values. The integration of these new elements in management education can allow debates to emerge, by exploring the different ideologies and value frames of reference conveyed by the different solutions put forward in the face of transition issues. Far from any imposition of values, this teaching must be based on scientifically established facts, and the debates raised must be supported by scientific data, by broadening the disciplinary field of teaching to include the natural sciences, engineering sciences and the human and social sciences.

This debate calls into question the role of teachers. For example, some teachers see themselves as having a mission of professionalization: their priority objective is to prepare their students for a competitive job market. From this perspective, their role is primarily to prepare students as well as possible for access to socially recognised positions with high levels of responsibility and income[307]. So what room is left to challenge the status quo? Without necessarily being antagonistic to the desire to develop students' critical thinking, this approach gives teachers other priorities.

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[306] Notably by citing the works of Barley and Kunda, 1992. Chiapello and Gilbert, *Sociologie des outils de gestion*, 37.

[307] This is partly due to the influence of rankings, which value institutions according to the level of income of their graduates, and to the expectations of students, who are often seen as customers in business schools (see the obstacles to the transformation of management education linked to rankings, p. 56).

B. Integrating new disciplines in management courses

Integrating environmental issues in a management course does not simply mean teaching the same disciplines differently. Having a systemic vision requires making the link between one's own discipline (finance, marketing, strategy, etc.) and multiple disciplinary fields that allow one to understand the physical limits, the related social issues, and the responses that our societies must provide.

To fully understand environmental issues, teachers must be trained in them. The teachers consulted on the knowledge of physical constraints in the foundation expressed a strong need for training in order to be able to integrate them in their thinking. This reaction was confirmed by the replies to the questionnaire sent to professors and part-time management teachers (see Part 2, p. 45): more than 40% of teachers stated that they needed training in order to integrate environmental issues in their lessons.

Consideration of the integration of issues in teaching can be carried out via workgroups and research projects. As illustrated by the experience of an ESCP course on energy and climate issues, knowledge related to environmental issues for management courses "is not available 'off the shelf'": integrating these issues in business management courses requires dedicated work. This can take the form of mixed workgroups (teachers, programme managers, students, etc.) dedicated to integrating these issues into core or specialised courses, or for a particular discipline for example. In addition to dedicated working groups, linking environmental issues to management disciplines opens up research questions that are currently little investigated, particularly because of the lack of interdisciplinarity in management research (see p. 57).

Finally, in the classroom, the attitude of facilitator could be favoured over that of connoisseur. It does not seem possible, nor necessarily desirable, to make management teachers experts on environmental issues, even if they have received training on these subjects. Teachers often feel they lack legitimacy when teaching content related to issues that they do not fully master; all the more so as the research subjects of professors are often far removed from these subjects. Moving from a posture of expert to one of facilitating the collective construction of knowledge could make it possible to teach these issues from the outset by overcoming a feeling of non-credibility. This posture could remain relevant even after a strong increase in teachers' skills on these issues, **insofar as these are constantly evolving fields of knowledge, which require continuous updating**.

C. Adapting pedagogical methods

Integrating environmental issues in the classroom in a comprehensive way means rethinking not only the content, but also the teaching methods for many teachers. We raise two issues here, for which the answers remain open.

How can we get students to take action? Integrating environmental issues in one's professional life implies making a significant effort to transform organisations and companies. Teachers who deal with these issues are faced with the question of how to take action: students may understand the issues, their links with the economic world, and yet not know how to act. Active teaching methods and work on concrete cases can help solve this equation by putting students in a position to provide concrete responses to environmental issues. Several institutions share in the Collection of feedback of institutions[310] the experience of courses along these lines: for example, the "Acting for the climate" course by Xavier Blot and Hans Schlierer at EM Lyon, the "Creativity" seminar by Fanny Reniou and Baptiste Bahu at IAE Rennes, or the "Designing tomorrow" seminar by Aurélien Acquier and Ann-Charlotte Teglborg at ESCP.

Resources

FORTES Collective, *Pédagogie de la transition*[308]

Feedback from experience of teachers during the occasion of publishing the intermediate (video).[309]

How can students' eco-anxiety be dealt with? The emotional impact of these issues cannot be underestimated. We have seen above (see p. 43) that manifestations of eco-anxiety are common among young people, involving a wide range of emotions: worry, fear, anger, pain, despair, guilt, shame, hope.[311] The avenues frequently put forward to avoid leaving students with a feeling of powerlessness are to present means of action and solutions - after highlighting the scale of the issues at stake, without minimising them. Addressing environmental issues therefore means facing up to this emotional dynamic, and ideally helping to support it, which is new for many teachers. However, they note that there is a lack of clear business alternatives that are equal to the issues at stake, which can leave students feeling uneasy[312]. Beyond the content transmitted in class, one of the challenges for teachers is to **learn to recognise and manage the emotional dynamics linked to eco-anxiety.** Exchanges within the teaching staff would undoubtedly help to develop these skills.

If eco-anxiety is confirmed as a massive problem among students, **it should also be taken into account by institutions,** for example by offering follow-up and support outside the classroom

Moreover, **the question of eco-anxiety and, more broadly, of emotional burden also applies to the teachers themselves**. As far as they are concerned, one avenue (and a lever available to schools) may lie in the match that teachers can perceive between their concerns and the meaning given to their activity by the school, and the collective dynamic in which they can engage alongside their peers. For several teachers, engaging in a process of integrating environmental issues, often in a collective manner, makes it possible to reduce or better manage their eco-anxiety.

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[308] Renouard et al., *Pédagogie de la transition*.
[309] From 2h 5min 38s to 2h 21min 57s. *"ClimatSup Business - Teaching the actors of tomorrow's economy" : intermediate report*, 2022, https://www.youtube.com/watch?v=9SIZ-Hz5Yzw&list=PLX8LCkV3D8Upybb3Cr8h7eV_cgfRRicjD&t=7538s.
[310] The collection is available on the webpage of ClimatSup Business: https://theshiftproject.org/former-acteurs-economie-de-demain/
[311] Based on a study conducted in ten countries on five continents. Hickman et al, "Young People's Voices on Climate Anxiety, Government Betrayal and Moral Injury: A Global Phenomenon".
[312] Acquier and Peyretou, "Business education meets planetary boundaries: how to teach energy and climate in business schools?"

D. Remedying the lack of teaching material

The limited amount of teaching material available for teaching environmental issues in management is often mentioned as a hindrance. In particular, the lack of case studies on these topics is a problem for teachers.

In this context, the practice of sharing courses is to be encouraged. Several institutions and teachers have already taken this step, going beyond the intellectual property logic that often prevails. The Dauphine course "The environmental challenges of the 21st century[313]" was published free of copyright; the ESCP set up a platform called *Commons for future*[314] which hosts the "Energy, Business, Climate and Geopolitics" course and its tools. Several teachers from various institutions have posted their courses or presentation materials on the Teaching Climate platform, co-created by The Shift Project and The Shifters[315].

Likewise, institutional approaches encouraging the creation of case studies related to environmental issues could be replicated. For example, Audencia organised a case study creation session by bringing together professors, companies and the Ministry of Culture to discuss issues related to ecological transition[316]. Initiatives taken by companies that are changing their strategy in line with planetary limits, such as the companies that participated in the Business for Climate Convention, can be an interesting case study[317].

[313] Ekeland, Ben Dhia, and Treiner, *Les défis environnementaux du XXIe siècle*.
[314] ESCP Business School, "Commons For Future", accessed on 27 July 2022, https://commonsforfuture.escp.eu/.
[315] "Collaborative teaching platform "Enseignerleclimat.org", accessed on 27 July 2022, enseignerleclimat.org.
[316] Feedback from experience indicated this in the “Collection of feedback from experience of establishments” published as a supplement of this report and available on the webpage of the project ClimatSup Business: https://theshiftproject.org/former-acteurs-economie-de-demain/
[317] Climate Enterprise Convention, "Final report of the first Climate Enterprise Convention".

IV. How can the core be integrated in a programme?

A. How can new fields of knowledge be integrated in programmes?

The need for interdisciplinary teaching to integrate environmental issues raises practical questions for teachers, but also for institutions. How can basic knowledge in natural sciences, humanities and social sciences be provided in institutions which, especially business schools, are largely specialised in management sciences?

Offering a core course dedicated to environmental issues may require the involvement of teachers from disciplines outside the management institutions. Partnerships with institutions offering engineering courses on energy issues, biology courses on biodiversity, geopolitics, etc. can be developed in order to gain access to expertise that is barely available or unavailable in business schools. This is what Audencia has done, for example, with the specialised Master's degree 'Actor for Energy Transition' (MS APTE), co-certified by Audencia and Centrale Nantes, in partnership with the École de design Nantes Atlantique and the École nationale supérieure d'architecture de Nantes. This practice would undoubtedly benefit from being generalised, not only in specialised courses but also in core courses.

Another avenue is to diversify the disciplinary fields within management education institutions. For example, the University of St. Gallen in Switzerland has a faculty of humanities and social sciences, which makes it possible to give courses on the psychology of decision-making in relation to climate change to management students.

It should be noted that the disciplinary compartmentalisation mentioned here is mainly based on observations in business schools. University courses could more easily benefit from the disciplinary diversity of other faculties.

B. How can consistency be ensured in the transformation of teaching?

1. Ensuring the consistency of teaching within a programme

Exchanges with teachers has revealed considerable heterogeneity regarding representations of ecological transition.

Some teachers, admittedly a minority, consider that teaching environmental issues is not their responsibility, that it is the role of primary and secondary education to prepare them. What is apparent in these statements is that these teachers often do not make the link between their field of teaching and research and environmental issues, or that they do not consider themselves competent and legitimate to teach subjects relating to ecological transition - subjects that are the responsibility of specific academic communities outside their field of competence. Some of them also display a form of hostility towards environmentalist discourse, which they consider to be a form of ideology.

Conversely, other teachers radically question business as usual, and consider that it is their responsibility to review the whole field of management in the light of planetary limits, by tackling controversial subjects such as degrowth.

Between these two extremes, a number of teachers seem to consider that they are already integrating environmental issues, for example when their teaching is linked to one of the 17 UN Sustainable Development Goals, or when certain parts of programmes make room for CSR or ethical issues (by evoking, for example, dilemmas linked to stakeholder management or conflicts relating to human rights or discrimination, by analysing non-market strategies, hybrid organisations or 'sustainable' business models)[318].

The heterogeneity of teachers regarding these issues leads to a risk of inconsistency in the messages received by students in the programmes and between courses, with the coexistence of courses calling for profound questioning of the system with others that stick to superficial changes or even business as usual.

This issue is all the more complex because the academic freedom of professors is a fundamental principle of any university academic institution. Similarly, it is quite understandable that the appropriation of environmental issues requires time and does not occur at the same pace among all teachers. Finally, this does not entail questioning the need for academic debates within management training institutions regarding the solutions to be brought to the challenges of ecological transition. Nevertheless, **it is the responsibility of each institution to ensure that these debates and this appropriation take place within a common framework, founded on a scientific basis, and which positions the issues of ecological transition at the right level**.

How can schools make their approaches consistent? First of all, there is the issue of training trainers and leading a collective approach, to which school management should allocate objectives and resources. In addition to sharing common knowledge about the planet's limits, each teacher needs to be supported in their work to help them to rethink the content of their teaching in the light of ecological transition. The Guide for school principals (see below, p. 153) proposes a method for creating these dynamics within schools. From an organisational point of view, one practice to be encouraged is to federate networks of professors within the institutions. ESCP and ESSEC, for example, have implemented this type of approach: the Sustainability Academic Department at ESCP and the Sustainability Guild at ESSEC (see the feedback from these institutions in the dedicated collection[319]). For all that, it is essential that environmental issues are not seen as the subject of a restricted club, which can do without the input of the rest of the educational community.

2. Linking the teaching of environmental issues in full course programmes

Whatever the type of programme, the link with the students' previous training must be thought out in order to ensure the acquisition of core knowledge while avoiding redundancy.

For example, some of the knowledge is already, or should be, covered during the preparatory class (for students in the Grande Ecole (elite school) programme). In this perspective, it is also

[318] While these developments are positive, the problem is that they remain minor adjustments and are not aligned with the systemic issues raised by ecological transition.
[319] Available on the webpage of the project ClimatSup Business: https://theshiftproject.org/former-acteurs-economie-de-demain/

necessary for schools recruiting through competitive examinations to develop their examinations to include environmental issues, so that their students arrive with a background in these subjects. However, this foundation also covers post-baccalaureate courses, courses for students with a non-management background (e.g. specialised masters for students who already have a master's degree in another discipline), and programmes for foreign students with a variety of academic backgrounds. The deployment of knowledge related to environmental issues within a programme should take into account the entire background of the students.

It would also be appropriate for the elements thus updated in the institutions' offer to be transposed into continuing education so that they can be offered to professionals already in posts and who have not had access to them, in order to guarantee lifelong training in environmental issues.

C. Adaptation of the knowledge base in a core curriculum: the example of a three-year Grande Ecole Programme

The base is a set of knowledge and skills related to environmental issues that should be taught to all students in higher management education, regardless of their institution, programme and discipline of specialisation. These are the basic knowledge and skills that should enable management students to understand environmental issues and give them the capacity to be actors in ecological transition.

The job descriptions specify the knowledge and skills related to environmental issues that are essential to teach from the point of view of the family of jobs concerned (marketing, strategy, management control, purchasing and logistics).

But how can this knowledge and skill be concretely applied in a curriculum? In which discipline should we teach which concept? How much time should be devoted to it**? In order to help programme managers and teachers answer these questions, an example of how these knowledge and skills are broken down in a typical Grande Ecole Programme**[320] **(PGE) is proposed in the following pages**[321]. It is up to each school to take up this example and adapt it to its specificities and programmes.

Reflection has focused on knowledge. As skills are cross-disciplinary, each of them can be taught in several courses. It therefore seemed less important to us to link each of the competences to the core courses of a programme. On the other hand, it is up to the programme managers to ensure that the competences are taught in relation to the environmental issues and in a consistent way throughout the programme (e.g., by avoiding unjustified redundancies).

The knowledge in the base has been matched to the subjects in which it could most logically be taught (see Table 4). This is sometimes an arbitrary choice, as certain concepts may be taught in several courses. Other knowledge is taken from job descriptions. This is the basic knowledge taught in the basic courses devoted to the disciplines that are linked to these professions.

Finally, some disciplines are not associated with knowledge related to environmental issues. No core knowledge seemed to be teachable in these subjects. This does not mean that they cannot

[320] Grande Ecole Programme are three-year programs starting on the 3rd year of studies. They are specific to French *grandes écoles* (elite schools). The example given here is applicable for Bachelor's degrees or any other three-year program providing the bases of management education.

[321] See detailed methodology in the annexes - the annexes of the report will be published in November 2022, and can be downloaded from the webpage of the ClimatSup Business project: https://theshiftproject.org/former-acteurs-economie-de-demain/

address environmental issues at least as examples. For example, in language classes, debates on the different topics of the foundation can be organised, making students reflect on cultural differences in approaches to environmental issues and societal goals. The same applies to subjects that are not part of the core courses.

Within each subject, the concepts have been arranged in the order in which it seems most logical to teach them.

For each subject, the number of hours to be devoted to this teaching was estimated. **In total, the teaching of the knowledge base within a Programme Grande Ecole (PGE) represents approximately 165 hours of lessons**, of which 48 hours are taught in two dedicated courses created for this purpose named here "Physical limits and societal goals". This represents 23% of the first three semesters of a typical PGE and 33% of the core courses (see Table 3).

Indication of number of hours for teaching core knowledge	**165 h**
Number of hours of the first three semesters of a standard Grande Ecole	720 h
% of the first three semesters of a standard Grande Ecole devoted to teaching knowledge and skills linked to environmental issues *(in hours)*	23%
Number of hours of core courses of a standard Grande Ecole	504 h
% of core courses of a standard Grande Ecole devoted to teaching knowledge and skills linked to environmental issues *(in hours)*	33%

Table 3 - Indication of number of hours for teaching core knowledge.

Before presenting this work, it is worth recalling a few points concerning the knowledge and skills base and the job descriptions:

- **They are not normative.** Their purpose is to inspire establishments wishing to integrate environmental issues in their training courses, which must be adapted to their context, their objectives and the programme in question.
- **They are not exhaustive,** even though a great deal of work has been done to identify the main knowledge and skills. The numerous references provided in the Excel spreadsheet[322] included in this report provides paths for exploring notions and identifying others.

[322] The Excel spreadsheet that provides references to the knowledge and skills of the foundation can be downloaded from the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/

***Table 4 - Proposal of distribution of knowledge by discipline taught in the common core** (1/5)*

Disciplines	**Sections of core knowledge and skills**	**Examples of knowledge (classed in chronological order within each discipline)**	**Indication of number of hours**
Physical limits and societal goals	Physical limits Societal goals Institutional, technical and human levers Cultural systems	• The notion of a planetary limit and the donut theory (Kate Raworth). • Climate change. • Energy supply. • Collapse of biodiversity • Mineral (non-energy) resource depletion. • Societal goals. • Institutional, technical and human levers. • Anthropological works on the relationship between human societies and (the rest of) nature. • Works on the Western development model. • Historical and philosophical works on the place of technology in Western societies. • Know the environmental and social stakes of certain emblematic sectors: energy production, electronics and digital technology, food industry, construction, transport, plastics, tourism, distribution, etc.: impacts on the climate, natural resources, biodiversity, health, inequalities, etc., and ways of mitigating these impacts; dependence of these sectors on the climate, on living organisms, on resources, etc., and resilience factors.	48
Purchasing and & Supplies.	Physical limits Societal goals Purchasing-Logistics skills sheet	• History of the evolution of supply systems: why have they been structured as they are today (trends towards outsourcing and delocalisation)? • Know the evolution of modal shares in freight transport. • Know the environmental impacts of the different forms of freight transport in order of magnitude. • Know the main approaches for a supply chain that limits the use of resources: industrial ecology, circular economy. • Know the environmental and social issues of several emblematic sectors: energy production, electronics and digital technology, food industry, construction, transport, plastics, tourism, distribution, etc.: impacts on the climate, natural resources, biodiversity, health, inequalities, etc., and ways of mitigating these impacts; dependence of these sectors on the climate, on living organisms, on resources, etc., and resilience factors.	9
Accounting	Management control skills sheet	• History of accounting and management control and their tools: why were they structured as they are today? What vision of the world do they convey? What are the unthinkables?	3
Management control	Financial system Management control skills sheet	• Be familiar with ecological accounting and the principle of double materiality, i.e. the company's dependencies on the environment (financial materiality) and its impacts on the environment (impact materiality, or environmental and social materiality).	3

Proposal of distribution of knowledge by discipline taught in the common core *(2/5)*

Disciplines	**Sections of core knowledge and skills**	**Examples of knowledge (classed in chronological order within each discipline)**	**Indication of number of hours**
Law	Legal and standards system	• Know the origin of laws and standards related to the environment (pollution and health impacts, insurance risk, etc.) and the changes they have brought about in society and the economy. • Know the diversity of environmental protection laws and standards, between countries (national laws) and on an international scale (international standards, European directives...). • Know the main legal approaches in relation to environmental protection: hard law, soft law, self-regulation, authorisation regimes, etc.. • Know the hierarchy of norms, including those not specifically dedicated to environmental protection, and the binding force of public and private law, in order to understand how to make higher interests emerge. • Know the effectiveness of laws and standards, as well as their limits. • Know the benefit of laws and standards, especially at the international level, to promote change without being burdened by unfavourable competitive conditions. • Be familiar with examples of climate-related legal actions (about 2,000 worldwide to date) brought on different legal grounds against States, companies and financial actors. • Know the decision-making institutions at different territorial levels and in other countries in relation to environmental issues. • Know the interactions between organisations and politics (lobbying, advocacy, consultations, regulation). • Knowledge of decision-making mechanisms, e.g. the organisation of lobbying in the European Union. • Know the links between energy resource exploitation and political power. • Know the limits of representativeness (political, scientific, citizen, etc.). • Know the diversity of legal forms of organisation and the modes of governance associated with them (particularly concerning social economy enterprises), their advantages and disadvantages in taking account of ecological and social issues.	15

Proposal of distribution of knowledge by discipline taught in the common core *(3/5)*

Disciplines	**Sections of core knowledge and skills**	**Examples of knowledge (classed in chronological order within each discipline)**	**Indication of number of hours**
Economics	Economic and financial system	• Know the major economic theories, the historical context of their emergence, their links with the human and social sciences and the way in which they integrate or not nature. • Be familiar with economic theories that aim to integrate environmental issues and envisage other trajectories and hypotheses than perpetual growth (in particular envisage an economy without growth). • Know the indicators of value creation and human development, their history and their limits, particularly in relation to environmental issues and the associated debates. • Know the notion of "sustainable development" and its limits, the concepts of weak and strong sustainability. • Know the notions of physical risks, transition and responsibility. • Know the diversity of economic policies implemented in the world, the political and theoretical context of their emergence and evolution; • Know their strengths and limitations in taking into account environmental issues. • Know the dynamics of economic globalisation, its externalities (particularly negative) and the interdependencies between countries. • Know the relationship between the economy and the physical world: e.g., materials and infrastructure needed for products and services; link between GDP, energy and greenhouse gas emissions. • Know the links between the energy system and political power (e.g., access to abundant energy is a major factor in a country's power). • Know the environmental and social issues of a several emblematic sectors: energy production, electronics and digital, food industry, construction, transport, plastics, tourism, distribution, etc. impacts on the climate, natural resources, biodiversity, health, inequalities, etc., and ways of mitigating these impacts; dependence of these sectors on the climate, on living organisms, on resources, etc., and resilience factors. • Know the basics of the carbon markets, their scope and their limits.	42

Proposal of distribution of knowledge by discipline taught in the common core *(4/5)*

Disciplines	**Sections of core knowledge and skills**	**Examples of knowledge (classed in chronological order within each discipline)**	**Indication of number of hours**
Finance	Economic and financial system ClimatSup Report Finance	• Understand that the financial system is embedded in the economy, which is itself part of the biosphere and therefore part of the Earth system - know these terms and concepts. • In this context, understand the role and mission of finance (money, debt, economic cycles) and their evolution, drawing on anthropology, history, philosophy and ethics. • Be familiar with the concepts of green and sustainable finance, extra-financial reporting, ESG indicators, etc., as well as their limits and their limited place in traditional finance.. • Be familiar with the works giving orders of magnitude of the financing needs for ecological transformation (adaptation, mitigation, biodiversity…). • Know the theory and practice of discounting, its effects on the consideration of environmental issues (e.g., discounting leads to an underestimation of long-term environmental degradation.	12
Marketing	Marketing professions sheet	• History of the emergence of marketing and its tools: why were they structured as they are today? What vision of the world do they convey? What are the unthinkable aspects? • Know the place of consumption in different societies in an intercultural perspective. • Know the different approaches to marketing and the paradigms in which they are embedded, the notions of demarketing and green demarketing. • Know the environmental and social issues of several emblematic sectors: energy production, electronics and digital technology, food industry, construction, transport, plastics, tourism, distribution, etc. impacts on the climate, natural resources, biodiversity, health, inequalities, etc., and ways of mitigating these impacts; dependence of these sectors on the climate, on living organisms, on resources, etc., and resilience factors.	6
Organisations	Organisational and governance models Political systems (interactions between organisations and politics)	• Know the history of corporate governance: managerial governance vs. shareholder governance. • Know the limits of the current modes of governance in companies from the point of view of taking into account environmental issues. • Know the main obstacles to the democratisation of decision-making in organisations (for example, the iron law of oligarchy). • Know the main principles and limits of multi-stakeholder governance, inclusive governance and governance of the commons. • Be familiar with the debate on the tragedy of the commons (Hardin) and the governance of the commons (Ostrom), and the effects of the privatisation of the commons.	9

Proposal of distribution of knowledge by discipline taught in the common core *(5/5)*

Disciplines	**Sections of core knowledge and skills**	**Examples of knowledge (classed in chronological order within each discipline)**	**Indication of number of hours**
HRM (Human Resources Management)	Psychology of change Sociology of change	• Know the main cognitive biases, errors of perception and attribution: anchoring, framing, fundamental error of attribution, halo effect, etc. • know the psychological mechanisms and the discourses rationalising inaction. • Know and identify the individual and collective sources of resistance to change and how to manage them. • Understand the individual, collective and structural aspects of the inertia of ecological transition. • Know the different levers of motivation (intrinsic, extrinsic, notion of psychological contract). • Distinguish between the notions of instrumental rationality and value rationality, and the different forms of authority. • Be familiar with models of decision-making in an organisational context and the limits of the rationality of actors (rational decision model and bounded rationality model, political model, bin model). • Be familiar with the notions of social determinism and power relations between social groups.	9
Corporate strategy	Economic and financial system Strategy management sheet	• History of the evolution of corporate strategy and its tools: why were they structured as they are today? What vision of the world do they convey? What are the unthinkable aspects? • Know the notion of double materiality, i.e. the company's dependencies on its environment (or environmental risks) and its impacts (or risks of impacts) on the environment (physical, societal/economic, regulatory)). • Broaden the notion of value proposition to include social and environmental dimensions. • Be familiar with the concepts of social and environmental performance. • Be familiar with scenario-based approaches to go beyond the short-term horizon and consider possible futures. • Learn about the environmental and social issues of several emblematic sectors: energy production, electronics and digital technology, agri-food industry, construction, transport, plastics, tourism, distribution, etc. Impacts on the climate, natural resources, biodiversity, health, inequalities, etc., and ways of mitigating these impacts; dependence of these sectors on the climate, on living organisms, on resources, etc., and resilience factors. • Know the digital business models and their limits from the point of view of Physical limits and Societal goals (externalities, cost/benefit ratio). • Know the notion of digital sobriety.	9

The different types of knowledge were then broken down by year (L3, M1) and by core course within a typical PGE (see Table 5). Once again, this is an exercise to illustrate what the concrete breakdown of knowledge might look like. In practice, programme managers should define the core with teachers and other stakeholders, then distribute the lists of knowledge to be taught to the departments concerned, after which the teachers in these departments, according to their practices and course content, should distribute the knowledge among the courses (see the Guide to the Transformation of Education for School Managers, p. 153.

Table 5 - Proposal of distribution of knowledge by core courses of a standard Grande Ecole (1/5)

Year L3

Discipline	Semester	Core courses	Examples of knowledge (by way of indication)	Comments
Physical limits & Societal goals	S1	Physical limits & Societal goals 1	• Know the concept of the planetary limit and the donut theory (Kate Raworth). • Climate change. • Energy supplies. • Collapse of biodiversity. • Depletion of mineral (non-energy) resources).	New course This course should be obligatory
	S2	Physical limits & Societal goals 2	• Societal goals. • Panorama of institutional, technical and human levers. • Be familiar with anthropological works on the relationship between human societies and (the rest of) nature. • Be familiar with works on the Western development model. • Be familiar with historical and philosophical works on the place of technology in Western societies. • Be familiar with the environmental and social issues of several emblematic sectors.	New course This course should be obligatory
Accounting	S1	Accounting	• History of accounting and management control and their tools: why were they structured as they are today? What vision of the world do they convey? What are the unthinkable aspects?	
	S2	Management control 1	• Know ecological accounting and the principle of double materiality.	
Law	S1	Basics of law	• Know the origin of laws and standards related to the environment (pollution and health impacts, insurance risk, etc.) and the changes they have brought about in society and the economy. • Know the diversity of environmental protection laws and standards, between countries (national laws) and on an international scale (international standards, European directives... • Be familiar with the main legal approaches to environmental protection: hard law, soft law, self-regulation, authorisation schemes, etc. • Know the hierarchy of standards, including those not specifically dedicated to environmental protection, and the binding force of public and private law, in order to understand how to make higher interests emerge.	

Proposal of distribution of knowledge by core courses of a standard Grande Ecole *(2/5)*

Year L3

Discipline	Semester	Core courses	Examples of knowledge (by way of indication)	Comments
Law	S1	Basics of law (cont.)	• Know the effectiveness of laws and standards, as well as their limits. • Know the benefit of laws and standards, especially at the international level, to promote change without being burdened by adverse competitive conditions. • Be familiar with examples of climate-related legal actions (about 2,000 worldwide to date) brought against States, companies and financial actors on different legal grounds. • Know the decision-making institutions at different territorial levels and in other countries in relation to environmental issues. • Know the interactions between organisations and politics (lobbying, advocacy, consultations, regulation). • Know decision-making mechanisms, e.g., the organisation of lobbying in the European Union. • Know the links between energy resource exploitation and political power. • Know the limits of representativeness (political, scientific, community, etc.).	
Law	S2	Corporate law	• Know the diversity of legal forms of organisation and their associated modes of governance (particularly concerning social economy enterprises), their advantages and disadvantages in taking into account ecological and social issues	

Proposal of distribution of knowledge by core courses of a standard Grande Ecole *(3/5)*

Year L3

Discipline	Semester	Core courses	Examples of knowledge (by way of indication)	Comments
Economics	S1	Economics 1	• Know the major economic theories, the historical context of their emergence, their links with the human and social sciences and the way in which they integrate nature or not. • Be familiar with economic theories that aim to integrate environmental issues and envisage other trajectories and hypotheses than perpetual growth (in particular, envisage an economy without growth). • Know the indicators of value creation and human development, their history and their limits, particularly in relation to environmental issues and the associated debates. • Know the notion of "sustainable development" and its limits, the concepts of weak and strong sustainability. • Know the notions of physical risks, transition and responsibility. • Know the diversity of economic policies implemented in the world, the political and theoretical context of their emergence and evolution; know their strengths and limitations in taking into account environmental issues. • Know the dynamics of economic globalisation, its externalities (particularly negative) and the interdependencies between countries. • Know the relationship between the economy and the physical world: e.g., materials and infrastructures needed for products as well as for services; link between GDP, energy and greenhouse gas emissions. • Know the links between the energy system and political power (for example, access to abundant energy is a major factor in a country's power). • Know the environmental and social issues at stake in several emblematic sectors: energy production, industry, etc.: impacts on the climate, natural resources, biodiversity, health, inequalities, etc., and ways of mitigating these impacts; dependence of these sectors on the climate, on living organisms, on resources, etc., and resilience factors. • Know the basics of the carbon market, their scopes and limits.	The contents of the courses are almost entirely focused on the knowledge of the core. The distribution of the different concepts between the two economics courses is left to the discretion of the teachers.
	S2	Economics 2		

Proposal of distribution of knowledge by core courses of a standard Grande Ecole *(4/5)*

Year L3

Discipline	Semester	Core courses	Examples of knowledge (by way of indication)	Comments
Finance	S1	Finance 1	• Understand that the financial system is embedded in the economy, which is itself part of the biosphere and therefore part of the Earth system - know these terms and concepts. • In this context, understand the role and mission of finance (money, debt, economic cycles) and their evolution, drawing on anthropology, history, philosophy and ethics. • Be familiar with the concepts of green and sustainable finance, extra-financial reporting, ESG indicators, etc., as well as their limits and their restricted place in traditional finance. • be familiar with works giving orders of magnitude of financing needs for ecological transformation (adaptation, mitigation, biodiversity, etc.). • Be familiar with the theory and practice of discounting, its effects on the consideration of environmental issues (for example, discounting leads to the undervaluation of long-term environmental degradation).	The distribution of the different concepts between the two finance courses is left to the discretion of the teachers.
	S2	Finance 2		
Management	S1	Organisations	• Know the history of corporate governance: managerial governance vs. shareholder governance. • Know the limits of the current modes of governance in companies from the point of view of taking into account environmental issues. • Know the main obstacles to the democratisation of decision-making in organisations (for example, the iron law of oligarchy). • Know the main principles and limits of multi-stakeholder governance, inclusive governance and governance of the commons. • Be familiar with the debate on the tragedy of the commons (Hardin) and the governance of the commons (Ostrom), and the effects of the privatisation of the commons.	
Marketing	S1	Marketing 1	• History of the emergence of marketing and its tools: why were they structured as they are today? What vision of the world do they convey? What are the unthinkable aspects? • Know the place of consumption in different societies in an intercultural perspective. • Know the different approaches to marketing and the paradigms in which they are embedded, the notions of demarketing and green demarketing. • Know the environmental and social issues of several emblematic sectors: …	

***Proposal of distribution of knowledge by core courses of a standard Grande Ecole** (5/5)*

Year M1

Discipline	Semester	Core courses	Examples of knowledge (by way of indication)
Purchasing / Supplies	S3	Purchasing / Supplies	• History of the evolution of supply systems: why they were structured as they are today (trends towards outsourcing and delocalisation). • Know the evolution of modal shares in freight transport. • Know the environmental impacts of the different forms of freight transport in order of magnitude. • Know the main approaches for a supply chain that limits the use of resources: industrial ecology, circular economy. • Know the environmental and social issues of some emblematic sectors: energy production, electronics and digital technology, food industry, etc.
HRM / Management	S3	Change management of men and women in organisations	• Know the main cognitive biases, errors of perception and attribution: anchoring, framing, fundamental error of attribution, halo effect, etc. • Know the psychological mechanisms and discourses rationalising inaction. • Know and identify the individual and collective sources of resistance to change and how to manage them. • Understand the individual, collective and structural aspects of the inertia of the ecological transition. • Know the different levers of motivation (intrinsic, extrinsic, notion of psychological contract). • Distinguish between the notions of instrumental rationality and value rationality, and the different forms of authority. • Know the models of decision making in an organisational context and the limits of the rationality of actors (rational decision model and bounded rationality model, political model, bin model). • Be familiar with the notions of social determinism and power relations between social groups.
Corporate stragey	S3	Corporate strategy	• History of the evolution of corporate strategy and its tools: why were they structured as they are today? What vision of the world do they convey? What are the unthinkable aspects? • Know the notion of double materiality, i.e. the company's dependencies on its environment (or environmental risks) and its impacts (or risks of impacts) on the environment (physical, societal/economic, regulatory). • Broaden the notion of value proposition to include social and environmental dimensions. • Be familiar with the concepts of social and environmental performance. • Be familiar with scenario-based approaches to go beyond the short-term horizon and consider possible futures. • Know the environmental and social issues of some emblematic sectors: energy production, electronics and digital, food industry, construction, transport, plastics, tourism, distribution, etc. • Know the digital business models and their limits from the point of view of physical limits and societal goals (externalities, cost/benefit ratio). • Know the notion of digital sobriety.

PART 4. ALL ACTORS IN HIGHER EDUCATION MUST DO THEIR SHARE

The purpose of this section is to accelerate the movement of the various stakeholders in business schools towards greater integration of environmental issues in education.

Institutional directors have a major role to play, as their involvement is necessary for the success of the transformation of courses. They have important levers for changing courses, even if these vary according to the type of institution considered (public school, university, IAE[323]). They have the possibility to disseminate the actions of the pioneers of this field. **We propose here a detailed and operational guide for them, to quickly identify the actions to be implemented and, beyond these first actions, to engage in a real project to transform their courses** (p. 155).

However, higher educational institutions are part of an ecosystem in which all other actors must also evolve to support their efforts. Maintaining the status quo does not allow 100% of students to be educated in environmental issues (see the chapter titled "The barriers to generalising the inclusion of environmental issues in education are many", p. 52).

The recommendations are thus aimed at the Government and institutional actors, because without them, the changes cannot go fast enough or far enough. Already in 2019, The Shift Project insisted on the need for institutional support, particularly from the Ministry of Higher Education and Research (MESR)[324]. In February 2022, the working group "Teaching ecological transition in higher education" published a list of recommendations for the MESR [325]. The many discussions held with the higher education management ecosystem as part of this project have reinforced and clarified these recommendations to accelerate a transformation that meets the challenges (p. 190).

The other stakeholders in higher education are not left out, as each has a role to play. Recommendations are made for stakeholders within institutions: students, who have been the catalysts of these changes and who must continue to act as catalysts (p. 199); and teachers and staff (other than teachers) of institutions, an increasing number of whom are involved in the transformation of teaching (p. **Erreur ! Signet non défini.** and 198).

With regards to non-institutional stakeholders, recommendations are made with regard to alumni (p. 203) *and companies* (p. 206), which provide the recruiter's point of view and can thus testify to the need for skills and support the institution's management in the changes they wish to initiate; and finally, with regard to **academic associations**, in order to advance management sciences in the light of environmental issues (p. 207).

Organisations according accreditation and establishing rankings will also be the subject of specific recommendations so that, in the case of accreditation, they can better guide institutions in taking account of environmental issues in the education they dispense (p. 208) and, in the case of rankings, better report on them (p. 209).

[323] Instituts d'administration des entreprises (IAE) are components of universities whose mission is to develop research and higher education in management.
[324] The Shift Project, "Mobilising higher education for the climate".
[325] Jean Jouzel and Luc Abbadie, "Sensibiliser et former aux enjeux de la transition écologique et du développement durable dans l'enseignement supérieur" (Ministère de l'Enseignement supérieur de la Recherche et de l'Innovation, February 2022).

I. Guide for transforming education intended for senior management and organisational heads

Training 100% of students in environmental issues requires implementing a genuine project of transformation which, because of its scope, must be supported by the entire administrative and academic body, and in particular by the directors and presidents of the institutions[326]. The management of the institution has an essential role to play: to give impetus to this transformation, to provide the necessary resources, and to ensure that this transition is undertaken rapidly and in good conditions for all, while respecting the academic freedom of professors. Here, we propose a generic guide [327] that sets out the main steps of this **transformation project**. Indeed, the goal of this is: **a radical transformation of management teaching in light of environmental issues**, a transformation that reaches the very heart of education establishments[328].

We invite management teams to draw inspiration from it in order to build its own approach, adapted to the specificities of its establishment and in particular to its scope of responsibilities, **while remaining clear about the work to be done, the priority to be given to it and the means to be allocated.**

Before going on to read the guide, **we would like to stress the importance for all of us to learn of the consensual conclusions of the scientific work that warns of the ecological challenges.**

- Read the summaries and syntheses for decision-makers of the IPCC, IPBES, Ademe[329], High Council for the Climate[330], and other scientifically recognised bodies. In this respect, the knowledge and skills base proposed in this report provides numerous references.
- Train[331] (and train one's teams) in contact with experts (for example, see the hearings organised by The Shift Project and available on YouTube[332] as well as the resources identified, p. 156).
- Reflect on the consequences of environmental issues at the level of our social, economic and political organisation, and at the individual level.
- Conversely, reflect on the impacts of our professional and personal actions on environmental issues.
- Carry out participatory workshops with teams to define the vision of the ecological transition carried by the organisation and how to contribute to it.

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[326] On the objective of training 100% of students in environmental issues, see Part 2 for the conclusions of the Jouzel report and the October 2022 announcements by the Minister for Higher Education and Research (from p. 45).
[327] Given the diversity of higher education institutions in management, the notion of "institutional management" refers to many situations that it has not been possible to detail in this guide. In particular, in the case of the IAEs, which are attached to and sometimes under the supervision of universities, the management of the IAE has a variable degree of autonomy depending on the spheres of responsibility considered. It will be up to these departments to decide what is their responsibility and what is the responsibility of the university president.
[328] This guide has been developed on the basis of feedback accumulated by Shift over the last few years, including the feedback contained in the Compendium of Feedback, available for download: https://theshiftproject.org/former-acteurs-economie-de-demain/.
[329] The French agency for the ecological transition
[330] A French independent institution on climate (*Haut Conseil pour le Climat*)
[331] Ideally, The Shift Project recommends 20 hours and a minimum of 10 hours of training for management and non-teaching staff and 48 hours of training for teachers.
[332] *Playlist ClimatSup Business* (The Shift Project), accessed on 7 September 2022, https://www.youtube.com/playlist?list=PLX8LCkV3D8Upybb3Cr8h7eV_cgfRRicjD.

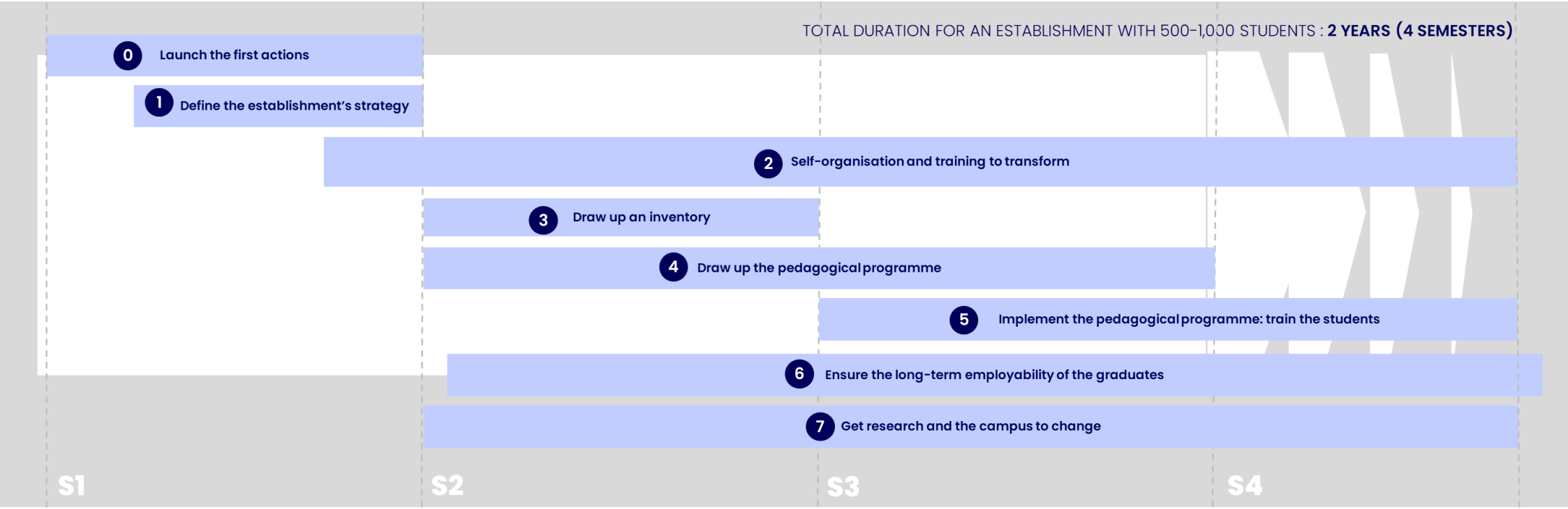
- Be informed by the media that deal specifically with these subjects while keeping a critical mind.

Finally, the table below (see Table 6) summarises the main mistakes to be avoided by management wishing to engage in teaching transformation.

No.	Errors	Consequences
1	**Misunderstand environmental issues**	• Underestimation of the project and consequently of the means devoted to it (see errors 2 & 3). • Superficial modification of courses. • Risk of *greenwashing*
2	**Launch multiple projects at the same time as trying to transform teaching**	• Exhaustion and demobilisation of those involved. • Lack of time from management and key people to move the project forward, especially in the stocktaking and curriculum development stages.
3	**Poorly anticipate the human resource needs required** by the project (DDRS manager, temporary staff or teachers to reinforce the teaching team and compensate for the time spent training, getting involved in the project and modifying their courses, educational experts, project managers, etc.).	• Exhaustion and demobilisation of those involved. • Lack of time from management and key people to move the project forward, especially in the stocktaking and curriculum development stages. • Lack of skills to make the project a success.
4	**Over-reliance on external consultants for the transformation process**	• Lack of ownership of the project by staff and teachers. • Lack of teacher buy-in to the curriculum and lack of implementation.
5	**Underestimating teachers' efforts to support change**	• Low mobilisation of teachers to train and develop their courses. • Disparate evolution of courses, with teachers who are already convinced trying to get their courses to evolve while others do not or do little.

Table 6 – Main errors to avoid when carrying out a project to transform teaching.

Transformation step by step



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Take the first steps

Act now to integrate environmental issues into one's teaching through simple actions that can be put in place while waiting to adopt an institutional strategy that meets the challenges.

1

Define the establishment's strategy

Collectively define an institutional strategy that gives an important place to environmental issues and takes into account the teaching, campus and research dimensions. The management must orchestrate this reflection and provide the project with adequate resources.

2

Get organised and train to transform

Collective organisation is necessary to achieve the objectives, taking into account the specificities of the school. This requires training for all teachers so that they can teach environmental issues and include them in their research, as well as for the rest of the staff so that they can effectively accompany this transformation.

3

Stocktaking

Analyse the training courses currently provided from the point of view of environmental issues and to see to what extent they meet the objectives set by the institution. The aim is to qualify and quantify the extent to which these issues are already integrated and to identify strengths and weaknesses.

4

Create a teaching programme

Define the knowledge and skills base, new pedagogical approaches and the phasing of training. All this through exchanges between all stakeholders.

5

Implement the teaching programme: teach the students

Implement the educational programme in the training courses. Each department and each teacher must be able to carry out the changes expected. All of this must be done while maintaining exchanges between the steering body and the field in order to provide teachers with the best possible support in this transformation.

6

Ensure the employability of the graduates in the long-term

Make a relevant link between education and the professions that will have to adapt to the consequences of crossing the limits of the Earth system, and if possible contribute to reducing the impacts of human activity on it.

7

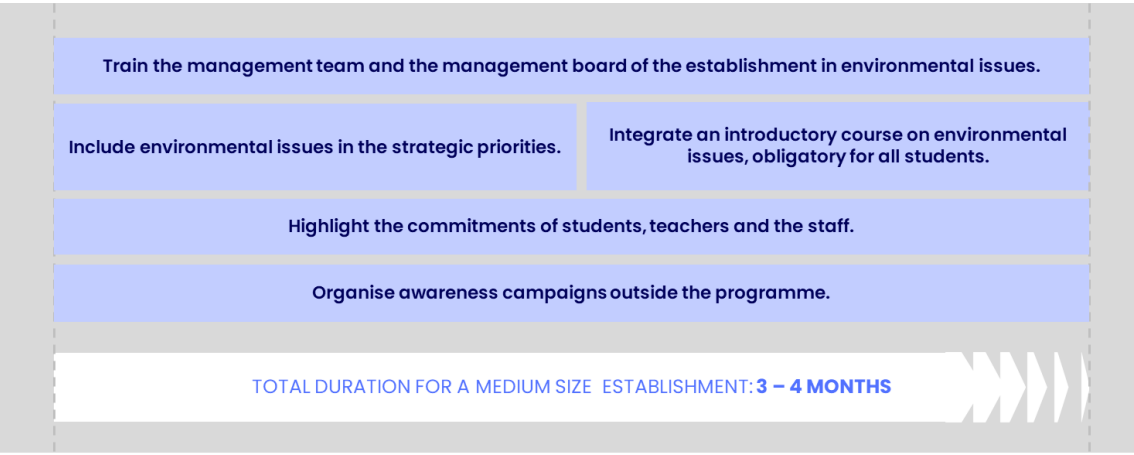
Get research on the campus to evolve

Integrate the campus-training-research triptych (while being driven by the governance pillar, which also needs to be developed). Focus a significant part of research on environmental issues in order to nourish teaching and learning.

Step 0: Starting the first actions

Each institution must act now to integrate environmental issues in its teaching through simple actions to be put in place. While waiting for an institutional strategy and a person dedicated to the transformation project (SD&SR manager, for example), actions can be taken to start training and to identify the actors who can be - or are already - driving forces on environmental issues.

1. Example schedule for the main actions to be carried out



This entails rapidly initiating the first actions:
the first simple but fundamental changes to be put in place, awareness-raising and even changes in training to give impetus until a strategy commensurate with the challenges is adopted.

2. Detail of the main cations to be carried out

a. Train the management team and board of directors in environmental issues

We cannot stress enough the need to train the management team and the board of directors of the institution in environmental issues[338]. **A major difficulty encountered in the transformation of training is the widespread belief among individuals that environmental issues are well understood**, particularly because this subject has been present in the public debate for a long time. **On the contrary, we note that the urgency and systemic nature of environmental issues, their consequences on our societies and the extent of the changes required to deal with them are very largely underestimated, including in the academic world**. This stage of training for the management team and the board of directors is therefore absolutely essential and constitutes an indispensable step for the success of the transformation of teaching. Indeed, it is these people who will define the vision and strategy of the institution. They will set the "tone". It is therefore essential that they are well aware of the complexity and scope of the subject.

Resources

Transition Campus [333]

Online courses of the sustainable development managers (C3D)[334]

Université Virtuelle Environnement & Développement Durable (UVED)[335]

Teach the Shift Conferences [336]

Courses of Jean-Marc Jancovici at the Ecole des Mines[337]

Ideally 20 hours of training (minimum 10 hours) are needed to have a basic understanding of environmental issues and the link with management training. This training cannot be reduced to awareness-raising activities such as the Climate Fresk.

b. Include environmental issues in strategic priorities

Amending the institution's current strategy to include environmental issues as a priority and a structuring factor will make it possible to initiate the first actions. This change can be made more organically during the formal strategic review (see next step).

Environmental issues, and in particular the progress of the transformation of training courses, will also be regularly placed on the agenda of decision-making bodies (board of directors, management committee, executive committee, etc.).

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[333] " Transition Campus. On-demand training for teachers", accessed on 7 September 2022, https://campus-transition.org/formations-a-la-demande-pour-les-enseignants/.
[334] C3D, "MOOC Comprendre la crise écologique pour réinventer l'entreprise", accessed on 8 September 2022, https://www.cddd.fr/mooc-comprendre-crise-ecologique-reinventer-entreprise-c3d-pre/.
[335] "Université Virtuelle Environnement & Développement Durable (UVED)", accessed on 7 September 2022, https://www.uved.fr/.
[336] To demand a *Teach the Shift* conference*:* https://docs.google.com/forms/d/e/1FAIpQLSeCVI1E7FF7p0tBzgk4Z9rnfU_V-FD29GGlxdTM4yvSIf-KRQ/viewform ("Teach The Shift! Conferences", The Shifters, accessed on 20 October 2022, https://www.theshifters.org/activites/conferences/.)
[337] *Courses of Jean-Marc Jancovici at the Ecole des Mines*, 2019, https://www.youtube.com/playlist?list=PLMDQXkItOZ4LPwWJkVQf_PWnYHfC5xGFO.
[338] Teacher training is addressed in stage 2 of the transformation plan entitled: "Organising and training for transformation"

c. Integrating an obligatory introductory course on environmental issues for all students

Creating an introductory course on environmental issues and making it compulsory for all students by relying on the teachers most committed to these subjects is the first step in transforming the programmes. In the absence of teachers who drive, or who are competent in, these subjects internally, it is possible to call on external expertise, as was done to create the elective course "Energy, Business, Climate & Geopolitics"[345] of the ESCP, or to establish partnerships with institutions providing training in the natural sciences. To save time, teachers can rely on the knowledge and skills base and its bibliographical references (from p. 70), as well as on the course content freely available.

Resources

The Shift Project, Enseignerleclimat.org[339]

ESCP Business School, "Commons For Future"[340]

Ivar Ekeland, Aïcha Ben Dhia, Les défis environnementaux du XXIe siècle[341]

Jacques Treiner, *Fil conducteur pour une introduction à l'Anthropocène en début d'études supérieures*[342]

Jean-Marc Jancovici, Energy and Climate Change Course at the Ecole des Mines[343]

Enjeux de la transition écologique: enseigner la transition écologique aux étudiants de licence à l'université, supervised by Jean-Michel Lourtioz, Jane Lecomte and Sophie Szopa[344]

Several institutions that have implemented introductory courses on environmental issues present them in the Collection of Feedback from establishments[346]:

- **The University of Paris Dauphine** has created a compulsory course on environmental issues in the 1st and 2nd years of the Bachelor's degree [347].
- **The ESCP** gives a compulsory course dedicated to these issues in each degree programme of at least one year (a box dedicated to the creation of core courses is available in the Collection of Feedback Report).
- **EMLyon** gives a compulsory course for the Grande École Programme (PGE), titled "Acting for the climate" (the detailed content of the course is available in the Collection of Feedback report.
- Other institutions give compulsory courses in the PGE programme: this is the case, for example, at **Audencia** ('Economics and energy transition'), **HEC Paris** (course on planetary limits) and **ESSEC**[348].

[339] "Plateforme pédagogique collaborative" "Enseignerleclimat.org"" .
[340] ESCP Business School, "Energy, Business, Climate & Geopolitics".
[341] Aïcha Ben Dhia and Ivar Ekeland, *Les défis environnementaux du XXIe siècle*, 2022, https://www.ceremade.dauphine.fr/~ekeland/Articles/06-2021/Climat.pdf.
[342] Treiner, *Fil conducteur pour une introduction à l'Anthropocène en début d'études supérieures*.
[343] *Courses of Jean-Marc Jancovici at the Ecole des Mines*.
[344] Lourtioz, Lecomte, and Szopa, *Enjeux de la transition écologique. Enseigner la transition écologique aux étudiants de licence à l'université*.
[345] ESCP Business School, "Energy, Business, Climate & Geopolitics".
[346] Wee the Collection of feedback from experience of establishments available by downloading (only in French): https://theshiftproject.org/former-acteurs-economie-de-demain/
[347] The university Paris Dauphine did not produce feedback for this report, but a presentation of the course was made for The Shift Project by Ivar Ekeland and Aïcha Ben Dhia: *Les défis environnementaux du XXIème siècle*. The course content is freely available: https://alignment-playbook.com/resource/467 (accessed on 21 April 2022).
[348] See the Collection of feedback from experience of establishments available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

d. Leveraging the commitments of teachers, students and staff

Teachers

To encourage and exploit the treatment of these themes in their courses and projects:

- Integrate the treatment of environmental issues in teaching and research into the institutional objectives of teachers.
- Provide financial and material support for teaching and research initiatives on environmental issues (involvement in projects, extra time, teaching leave, training, etc.).
- Suggest to teachers that they include a section on environmental issues in their course syllabi.
- Make visible the courses and research that deal with environmental issues in the institution's communications.

Students

Facilitate and leverage collective and individual student commitments in order to encourage their involvement in these issues during their school and extra-curricular time:

- Free up class time for students from associations that work on environmental issues;
- Dedicate ECTS credits to this type of activity;
- Support students and associations financially and materially in these commitments;
- Ask student associations to set up environmental reference contacts in their associations and to report publicly on the actions they have taken.

Staff

Facilitate and leverage the commitment of staff (e.g., Career Services, Quality Services, etc.) in order to encourage their involvement in these issues (projects, training, etc.).

e. Organise extra-curricular cycles of raising awareness

There are many extra-curricular opportunities to raise awareness of environmental issues among the institution's various audiences [349]:

- Organise lectures on these subjects.
- Integrate environmental issues into start of academic year events (e.g., start of academic year climate, organisation of murals, etc.).
- Involve teachers who have integrated environmental issues into their courses and/or their research in departmental workshops.
- Etc.

NB: Awareness-raising is only a superficial stage in relation to the objective to be achieved, which is the training of all students in environmental issues. Thus, **it is essential not to consider that these elements can replace the cross-disciplinary and systemic transformation of teaching.**

[349] It should be noted that knowledge of ecological issues is essential, but some authors also stress the importance of mobilising one's emotions to bring about a change in behaviour.

Step 1: Defining the strategy of the establishment

It is important to collectively define an institutional strategy that gives a prominent place to environmental issues. This strategy will take into account the campus, teaching and research dimensions of the institution. The management must orchestrate this reflection and provide the project with adequate means to achieve the objectives set. Finally, agreeing on the terms used in the framework of this project ("environmental issues", "transition", etc.) is essential for everyone to understand and to form a common vision[350].

1. Possible schedule of the main actions to be carried out

This stage is a key moment in the process of changing courses and makes it possible to turn the transformation of teaching into a collective project, clearly prioritised and provided with adequate resources. By widely involving the various stakeholders inside and outside the institution, it makes it possible to enrich reflection and encourage support, thus creating the conditions for the successful implementation of the plan. Changes may sometimes be difficult to implement and concerns should be taken into account in collective reflection.

[350] Reference can be made to Part 1 of this report, which provides a definition of environmental issues and discusses the limitations of other terms often used (from p. 12).

2. Detail of the main actions to be carried out

a. Set up an ad hoc workgroup and collectively organise the strategy

Set up an ad hoc workgroup to formulate the strategic plan

The workgroup will have to define the institution's strategic plan in consultation with all the institution's internal and external stakeholders **in order to integrate the primary objective of training 100% of students in environmental issues.**

In addition to the management, the workgroup should include at least representatives of the school's main stakeholders: teachers, students, staff. It should also consult the school's alumni and partners, particularly representatives of the socio-economic world.

The management will lead the workgroup and will be the guarantor of the ambition: the means and answers provided must match the challenges.

It will appoint a person in charge of integrating environmental issues into training on the school's management committee, with broad decision-making powers [351]. This reference person will be integrated into the ad hoc working group.

Relying on existing resources

The workgroup could consider drawing on the work of other institutions, in particular by referring to the "Collection of feedback from institutions" in the report [352], associations that have already worked on the issue or inter-institutional exchanges that take place within national bodies (FNEGE's DDRS commissions, CEFDG's working group on the teaching of the Ecological Transition, France Universities' ecological transition committee, etc.) or local bodies.

It should take into account existing work, in particular the report "Raising awareness and training for the challenges of ecological transition"[353] and the Grenoble Agreement[354].

Being realistic about the work to be done

The definition of a strategic plan is often an opportunity to identify the challenges and define the objectives for the institution. It is the starting point for the implementation of several projects aimed at achieving these objectives. In this respect, **it is important to emphasise the scale of the transformation project and the many challenges it presents**. It entails **profoundly changing all teaching and therefore of mobilising and training the entire teaching staff**. Such a project should not be carried out at the same time as other structural projects for the institution[355].

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[351] In the case of universities, only the university president has this power in full. However, a university president can appoint a vice-president (to the DD and RSU) who submits decisions to him or her, and the decisions can then be presented to the boards.

[352] Available for download on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/

[353] Jouzel and Abbadie, "Sensibiliser et former aux enjeux de la transition écologique et du développement durable dans l'enseignement supérieur".

[354] "Livre Blanc de l'Accord de Grenoble" (Convention pour la Transition des Etablissements du Supérieur, March 2022), https://la-ctes.org/livreblanc-2/.

[355] In the case of public institutions, we recommend that the State provides the means for public institutions to undertake their transition in order to enable them to have the necessary resources to carry out this transformation (see below "Our recommendations to the State and the actors of the institutional framework, *p. 181).*

b. Formalising and displaying the establishment's commitment

The strategy and objectives must be validated by the Board of Directors.

The strategic plan and any other commitments will be made public.

- Sign the Grenoble Agreement (CTES).
- Publish the establishment's strategic plan.

c. Participating in a national movement affecting the entire higher education and research sector

Support other agreements, commitments and initiatives that could accelerate the transition of the entire higher education sector in France.

Participate in best practice sharing initiatives to integrate environmental issues into education. For example, share resources with the virtual university for sustainable development (UVED[356]).

Support lobbying actions in favour of measures aligned with the establishment's commitment.

Feedback from experience[357]:

- **TBS Education** has adopted the status of company with a mission and presented this process in feedback from experience.

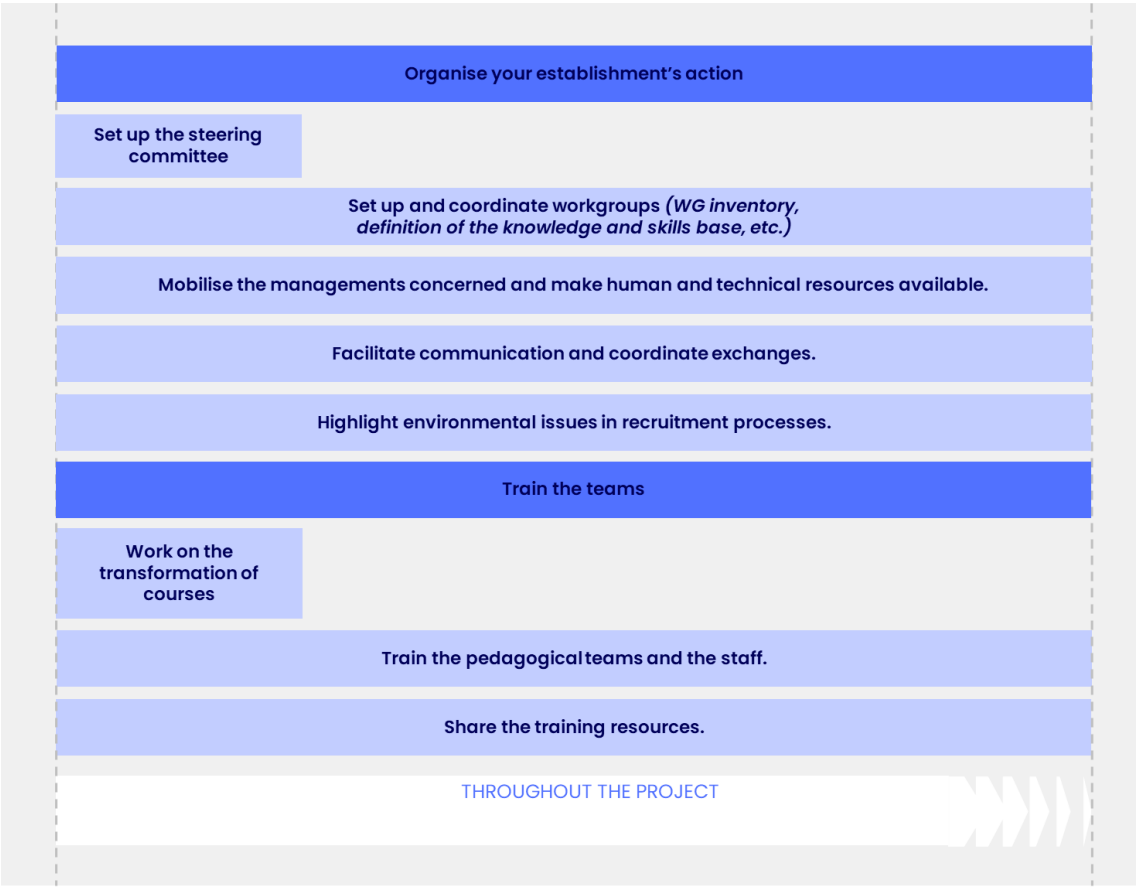
[356] UVED, " Higher Education and Ecological Transition: Institutional Initiatives", Virtual University Environment and Sustainable Development, accessed on 17 October 2022, https://www.uved.fr/menu-ressources/initiatives.
[357] See the Collection of feedback from experience of establishments available for downloading on: https://theshiftproject.org/former-acteurs-economie-de-demain/

Step 2: Getting organised and training to transform

Organising collectively at local level (institution, campus, city, region, etc.), national level (group of institutions, networks of institutions, etc.) and even international level (PRME - Principles for Responsible Management Education, SDSN, Sustainable Development Solutions Network, Higher Education Sustainability Initiative, etc.) is necessary in order to meet the challenges as quickly as possible.

The aim is also to **train all teachers** to teach environmental issues and include them in their research, as well as the **rest of the staff** so that they can effectively accompany this transformation.

1. Possible schedule of the main actions to be carried out



In such a change project, the organisation in place plays a fundamental role in encouraging participation in collective construction, ensuring that everyone has good understanding of the issues at stake and obtains the support of the greatest number. Training must be carried out as early as possible so that all stakeholders develop the training courses by sharing the same observation on environmental issues.

2. Detail of the main actions to be carried out

a. Organising the mobilization of your establishment

Set up the steering committee of the teachers' transformation project *(see the proposals for organisation detailed on page 169)*

The ad hoc working group mobilised to define the institution's strategic plan can, with a few adjustments, become the project steering committee. **It is essential that the steering committee be positioned at the right level in the organisation of the institution in order to have the necessary levers of action for major transformation**. We therefore recommend that influential members of the management committee be included. In particular, the academic and faculty programme management[358] seem to be key players.

The resources mobilised must be given time to devote to the project, which should be conducted openly and must be recognised at the institutional level.

Set up the main workgroups

- **The workgroup responsible for stocktaking**
  This workgroup is responsible for taking stock of the environmental issues in the courses given at present *(see step "Taking stock" for more details, p. 171)*.
- **The knowledge and skills definition workgroup**
  The purpose of this workgroup is to define, in consultation with the main stakeholders, the common knowledge and skills in relation to environmental issues that all students of the institution must be trained in. This must be done on the basis of existing resources, in particular the base proposed in this report.
  It is also responsible for helping to define the knowledge and skills related to environmental issues that should be taught in training and specialisation courses in collaboration with the relevant departments. (*See the step "Developing the curriculum" for more details", p. 175)*.

Mobilise the managements concerned and make available human and material resources

Mobilise all of the institution's departments around the project so that they can prepare to implement the actions required. In addition to the Sustainable Development and CSR department, the faculty and the programmes, the HR, quality, communication and partnership departments, the documentation centre and the careers department are particularly concerned.

- **Recruit employees dedicated to the transformation of courses.**
  Sustainable Development and CSR manager(s), training transformation officer, pedagogical engineers, etc.

  The workload of the Sustainable Development and CSR management, faculty members, programme management, quality management and pedagogical engineering will be particularly affected.
- **Possibly be accompanied by external actors (associations, experts, institutions, etc.) who:**
  - Provide a more neutral view on the transformation of training.
  - Provide the necessary skills for the project.

[358] In this report the term "faculty" means the establishment's permanent teaching staff.

- Assume the role of change facilitator, ensuring the involvement of all stakeholders within the institution.

Facilitate communication and coordinate dialogue

- **Facilitate communication between all those directly involved in the project and between the project and the rest of the institution:**
  - Set up a dedicated project page on the institution's intranet.
  - Allow the institution's stakeholders to clearly identify the people in charge of this transformation at all levels.
  - Use internal tools (intranet) and/or free, open-source licences to work in a transparent, collaborative and constructive manner.
- **Get involved in workshops to think collectively about the transformation of training**
  - The management should facilitate exchanges with the different stakeholders to discuss and contrast the visions of the ecological challenges and the transformation of training.

Highlight environmental issues in the recruitment and assessment process

Highlight the level of understanding of environmental issues of teachers (including temporary teachers) and their willingness to work in an interdisciplinary way (for professors) in their recruitment.

- Encourage the recruitment of **teachers** who have already developed courses or carried out research integrating environmental issues.
- Encourage the recruitment of **temporary teachers** who have expertise in environmental issues.
- Include criteria related to the consideration of environmental issues in **course assessments** by students.
- Incorporate incentives to encourage the consideration of environmental issues in **research activities**.

Put to the fore students' level of understanding of environmental issues in their selection process.

- In the long term, integrate new topics related to environmental issues **into student entrance exams.**

b. Train teams

Train the teams who work on transforming courses

Members of the Steering Committee and WGs who are new to these issues should, like the Management Committee and the Board of Directors, learn about environmental issues by taking account of **the conclusions of scientific studies that warn of environmental issues and on which there is consensus** (see resources p. 156).

Train the pedagogical teams and the staff

This is the most fundamental step and the most difficult to carry out because of the **underestimation of training needs by some teachers**, the fact that **some of them consider that the teaching of environmental issues is not their responsibility**, **and the presence of many temporary teachers**. The heterogeneity of teachers' skills and interests in these issues **leads to a risk of considerable inconsistency in the programmes**, with the co-existence of courses calling for strong critical questioning and others evolving only at the margins, or evolving much more slowly and remaining very much anchored in 'business as usual': the way the economy has been taught for decades.

- **Identify training needs: investigate the training needs of all the teachers** so that they are able to integrate environmental issues into their teaching. This step should be carried out at the time of the inventory so as not to increase the number of requests made to faculty members.

  Beyond the use of a questionnaire, **it is important to take time to organise meaningful moments of exchange**, for example a series of discussions of 90 to 120 minutes each at the level of a department, or even less, to allow the participants to express their questions, needs and fears and to be able to provide adequate answers.

  These discussions are an opportunity **to identify the people who are experts** on the subjects and interested in them, on whom to draw. They can form a small group of motivators, who will be the ambassadors of the transformations to be carried out. Ideally, at least one reference person should be identified per department so that they can be relied upon when the knowledge and skills base is adapted to each department.

- **Organise and implement training: Position reference experts as support persons in training and updating course content and free up their time for this purpose** so that other teachers can call on their expertise, either to train them on environmental issues or as reviewers of their course content.

  Organise peer-to-peer training (by those who have mastered some of the issues, to those who have not yet mastered them) or training by external speakers.

  Actively participate in communities of practice on the theme of teaching environmental issues within their discipline, either within their own institution or in communities of teachers from several institutions.

  Dedicate part of research seminars to topics related to environmental issues.

  Create continuous training modules on environmental issues for staff and teachers and draw on external resources (see p. 156).

Teachers should have at least the same level of knowledge as their students following compulsory courses dedicated to environmental issues. They should therefore receive at least 48 hours of training, just like the students (see the description of the foundation for a Grande École programme, p. 138).

For the institution's other employees, who do not have to pass on knowledge related to these subjects, **ideally 20 hours and at a minimum of 10 hours of training are required** to have a basic understanding of environmental issues and the link with management training (as well as for the management team: see p. 156).

Priority needs for teacher training *(according to our discussions with management teachers in higher education).*

1 - **Introduction to environmental issues.** Systemic and scientific approach to environmental issues, planetary limits, international and national objectives.

2 - **Link between environmental issues and the economic world.** Environmental issues and impact reduction objectives by sector, implications for the economy and businesses, regulatory developments, etc.

3 - **Possible changes to the content taught to ensure that management is up to the challenge.** New management methods and new indicators, evaluation tools (LCA, carbon accounting, etc.), etc.

4 – **Pedagogical approaches.** Participatory approach, stance of the mediator, etc.

5 – **Focus on certain environmental issues.** Biodiversity, resources, energy, climate, etc.

Share training resources

The Steering Committee facilities sharing in-house training resources.

- Facilitate self-training, in particular by mobilising the institution's documentation centre so that it can produce tools and content available and disseminate them internally.
- Make existing training resources accessible to as many people as possible by disseminating free access platforms such as the Virtual University for the Environment and Sustainable Development (UVED) or even collaborative platforms such as *enseignerleclimat.org*.
- Pool contacts of speakers on environmental issues among permanent teachers through a shared directory.

Feedback from experience[359]:

- **At MBS,** 15 professors attended a 4-day training course at the Transition Campus, and a climatologist spoke for half a day to the entire teaching staff.
- **TBS Education** has entered into a partnership with UVED to train its teachers.
- **ESSEC** allowed several professors to follow training at the Transition Campus.

[359] See the collection of feedback from establishments, available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

The training courses and assistance of the Transition Campus

Teacher training is one of the central missions of the Transition Campus to initiate and promote the "Great Transition". It is important that all the stakeholders in higher education institutions receive training, as well as teachers, in order to understand the systemic nature of socio-environmental issues, to have spaces for reflection, to be equipped to act according to their profession, their function and their missions, and thus to develop the educational courses and the institutions themselves. The training of managers and teachers is a major challenge in order to respond to the growing demands of students to receive education that meets the challenges of the Anthropocene era.

Following on from the Little Manual on Transition Pedagogy, the Transition Campus offers training courses to develop active pedagogies and align its teaching with socio-environmental issues, particularly by making room for the psychosocial and physical dimension.

Teacher training: the Transition Campus has been able to test training modules on socio-environmental issues with various groups of professors (Montpellier Business School, ESSEC, University of Paris VIII, etc.). These programmes combine theoretical contributions and practical workshops to fuel the thinking of the teaching staff, while at the same time helping to integrate these issues into the curriculum. They help to fuel collective impetus within the institutions to accelerate their transformation.

Support for the transformation of the institution: for the past two years, the Transition Campus has also supported Cergy Paris Université (CY Université), which has a management sciences and economics component. This support includes training for management via thematic seminars, training for administrative staff as part of their continuing education, training and individual support for teaching staff, the creation of teaching maps, the creation of new content and the development of teaching practices.

In short, the objective of the Transition Campus is to develop teaching content by systematically integrating a socio-environmental perspective into the various courses, and by moving towards a systemic approach.

3. Proposal for internal organisation

The following steps involve all the stakeholders involved in steering and implementing the training transformation. **However, management remains responsible for ensuring that the responses provided are commensurate with the issues and objectives defined in the strategic plan, providing the means to supply these responses and helping to remove any obstacles that may arise during the project.** With a few exceptions, the actions will be broken down in the following text for two groups of actors: the steering committee and the operational workgroup.

a. The Steering Committee

This committee represents the main stakeholders in the project, whose purpose is to frame, structure and steer the process, ensure follow-up and organise internal communication. It is the privileged interface with the management of the establishment, the operational WGs, the departmental management and the communication team and enables the issues identified by the stakeholders to be brought to the forefront and the subjects that may be of interest to them to be communicated. The SD&RS manager must be a member or even lead the COPIL.

Organisation: the Steering Committee meets on a monthly basis. Several members of the Steering Committee meet on a weekly basis as required. Meetings with the sub-workgroups are possible to move forward more quickly and easily on certain well-defined topics.

Example of sizes of a Steering Committee in an establishment with 500-1,000 students.

	COMPOSITION	ESTIMATED MONTHLY LOAD For an establishment with 500-1,000 students
Limited group (total 6-7 people) Weekly work meetings	**1 supervisor with decision-making power** (e.g. member of the management board, SD&SR director, programme director, faculty director, teacher, etc.)	30 h if helped by a mission executive, 60 h if not Provide for shedding teaching workload.
	1 mission executive	30 h
	Programme director	10 h
	Faculty director	10 h
	SD&SR director *If they are not the supervisor*	30 h
	1 pedagogical engineer	10 h in the project definition phase, then a longer time dedicated to assisting teachers during the implementation phase.
	1 student representative	10 h
Expanded group (10-20 people) Monthly meetings (plenary)	**The workgroup supervisors** If they are not already members of the steering committee.	20 h
	Guests as a function of the topics dealt with (e.g., programme, department directors, etc.).	Variable
	Voluntary teachers and students.	Variable

b. The operational workgroups (WG)

The aim of the WGs is to work on a well-defined subject or within a specific perimeter. They may be WGs devoted to the state of the art, the definition of knowledge and skills, pedagogical expertise, the setting up of training courses for teachers, etc.

Composition: depending on the WG, the leader may be, for example, the director of training or a teacher. The composition will vary according to the theme, taking care to include representatives of the stakeholders concerned: teachers, students, teaching experts, communication manager, staff, etc.

Organisation: meetings should be frequent enough to make progress on specific topics, without being unsustainable. A fortnightly meeting may be a compromise. Sub-groups can meet more often on topics that can be dealt with quickly by themselves.

Estimated monthly workload: depending mainly on the theme of the WG and its output targets.

Example of orders of magnitude for a WG in a department, with the task of contributing to the development of the curriculum (consider an institution with 500-1000 students).

COMPOSITION	ESTIMATED MONTHLY WORKLOAD For an establishment with 500–1,000 students
1 supervisor (department director, teacher, SD&SR director, etc.)	20h
1 mission executive (if appropriate)	Variable
1 pedagogical engineer	Variable
1-2 reference teachers for environmental issues	5 to 20h depending on availability
1 student of the programme	10h
Volunteers	Variable

Feedback from experience[360]**:**

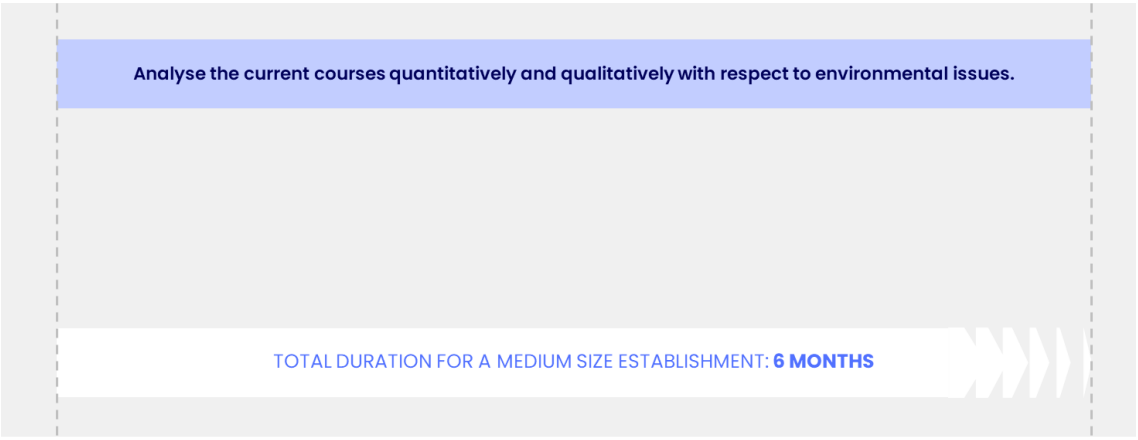
- **The ESSEC** has created the Sustainability Guild, which brings together professors from all departments interested in these topics.
- **At the ESCP** an academic Sustainability department has been created, with 'academic connectors' who link with the rest of the faculty.

[360] See the collection of feedback from establishments, available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

Step 3: Drawing up an inventory

The inventory enables the starting point of the work to be clearly understood, identify pre-existing internal resources (courses on ecological transition, competent teachers), and to **identify the strengths or potential challenges of the institution. It entails analysing the training courses currently provided from the point of view of environmental issues** and looking at the extent to which they meet the objectives set by the institution in this area. The format and operational methods chosen for the inventory can be based on the elements provided in the report: methodological recommendations are detailed on p. 215.

1. Possible schedule of the main actions to be carried out



Ideally, make a quick initial assessment with a general vision. This vision can be revised once the skills and knowledge base has been defined.

A clear definition of what is included in "environmental issues" should be provided to the teachers and students questioned as part of this stock-taking exercise to reduce interpretation bias. When the skills and knowledge base to be implemented within the institution is defined, it will be possible to cross-reference it with existing training. This makes it possible to prepare the distribution of skills and knowledge between the different modules and over the duration of the training course.

2. Detail of the main actions to be carried out

Analyse the current training courses quantitatively and qualitatively with regard to environmental issues

The Steering Committee defines a framework for analysing the institution's courses, possibly based on the methodology and tools used in the ClimatSup Business project (see p. 220). This analysis framework includes:

- A clear and actionable definition of "environmental issues" that can be understood by the different stakeholders involved in the assessment and used to assess the effective consideration of these issues in the courses.
- A survey protocol (surveys, interviews, workshops, etc.).
- Indicators to quantify the level at which current training courses deal with environmental issues (hourly volume, semantic analysis of the syllabus, etc.).

It is essential to adopt a protocol that allows cross-checking the perspectives of teachers and students and mixing qualitative and quantitative approaches.

The dedicated workgroup implements the protocol which involves:

- Proposing a tool (spreadsheet, report, collaborative tools, other) to synthesise the results and visualise them;
- Collecting quantitative data from the surveys of teachers and students, and analysing the existing pedagogical models;
- Conducting interviews on content, approach, pedagogical methods, in order to collect feedback and training needs.

Methodological recommendations are proposed below (see Part 5, p. 220) and are based on the experience of Audencia's training inventory. This method is based on the synergy of three elements: the analysis of course syllabi, the feedback from professors and temporary teachers, and the feedback from students. The results of the analysis of Audencia's syllabi are also available below (p. 222).

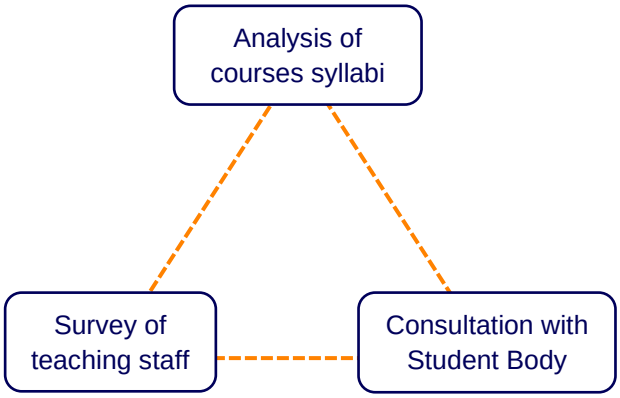


Figure 12 – The three elements of the inventory of the integration of environmental issues in the courses.

This inventory should be updated regularly in order to monitor the institution's progress in integrating environmental issues into training.

Feedback from experience[361]:

- **The Shift Project** has developed tools to carry out an assessment of the Audencia case (see methodological recommendations p. 220 and results of the analysis of course syllabi p. 222).
- **EM Lyon** has conducted an assessment of the integration of CSR skills and the consideration of the SDGs in its courses.

A few paths for drawing up a qualitative inventory

1 — **Conduct interviews and a survey of students** to assess their interest, expectations, opinion on the current training, the level to which the courses already address environmental issues, etc.

2 — **Interview and survey all teachers** to assess their interest, understand whether they are already integrating certain concepts into their lessons, whether it is relevant and feasible, whether they feel competent to do so, and identify their training needs.

3 — **Cross-reference the results between students and teachers** to identify potential gaps in perception regarding the level at which environmental issues are addressed in courses.

[361] See the collection of feedback from establishments, available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

A few paths for drawing up a qualitative inventory: analysing syllabi

1 — **Distinguish between courses dedicated to understanding environmental issues** or the link between environmental issues and the discipline taught, and those that are not dedicated to them but include them, from those that deal with them marginally or not at all, by associating precise definitions, if possible quantified, with these notions.

2 — **List** in a spreadsheet all courses that address socio-environmental issues in one way or another, by specifying:

- the name of the course,
- the teachers,
- the programme,
- the semester,
- whether it is a course option/specialisation,
- whether it is an obligatory or optional course,
- the number of students who have followed the course,
- the number of hours,
- the associated ECTS credits,
- the department.

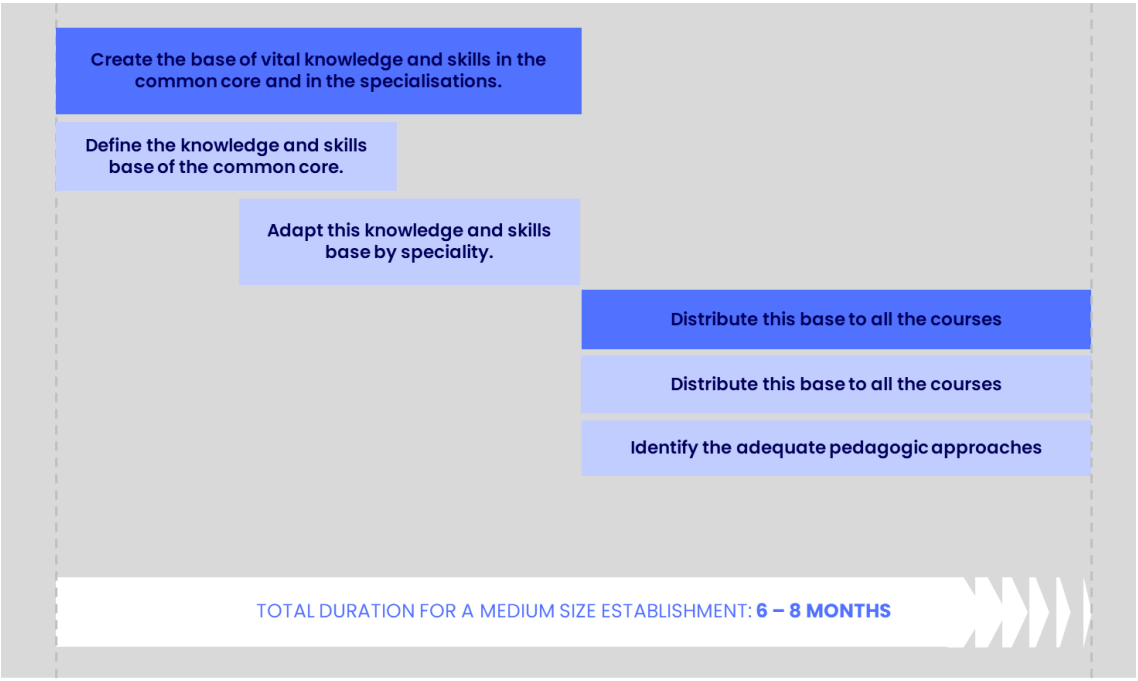
3 — **Identify all the courses available in the cursus**, by specifying, in particular on the basis of interviews with the teachers:

- If the course is suitable for integrating the issues.
- Whether the teacher or facilitator teaching it is ready (willing/able) to integrate them. If so, at what level and how?
- Which resources the teacher needs to achieve this?

Step 4: Developing the teaching programme

Developing the curriculum **consists of defining the content (knowledge and skills) related to environmental issues that will be integrated into the programmes, adapting this content to the specific programmes of the institution and adapting the teaching methods to these new lessons.** It is essential, in the interests of efficiency and consistency, that the development of the curriculum is the result of exchanges between the following stakeholders: management, teachers, students, alumni, and possibly partner institutions.

1. Possible schedule of the main actions to be carried out



The involvement of teachers in the definition of knowledge and skills requirements plays a key role in their appropriation and implementation. It is essential to anticipate the workload and the need for exchanges with stakeholders for this complex work. An interdisciplinary approach is also essential: think about the place of natural, human and social sciences. Take into account the potential eco-anxiety of students and teachers, and the consequences for everyone.

2. Detail of the main actions to be carried out

a. Develop the core of essential knowledge and skills in the core curriculum and in the specialisations with regard to the specificities of the institution

Define the knowledge and skills base of the common core

The approach aims to answer the question: **what knowledge and skills should be taught to all the management students in the institution?** The workgroup in charge of defining the knowledge and skills base should:

- Identify existing tools (including the knowledge and skills base on p. 70 of this report) and appropriate them.
- Define a first version of a foundation for the school, as a basis for discussion.
- **Debate this base to enable its appropriation** and adaptation to the specificities of the school and its territory (e.g., illustrate the environmental issues with territorial environmental problems or local environmental events).
- **Collectively validate a final version of the common knowledge and skills base.**

A few guiding principles for orienting this work:

- Organise cross-disciplinary workshops, involving teachers from different departments and involving students and alumni.
- Be open to other sciences: consider natural sciences and other humanities and social sciences (including ethics, epistemology, sociology, history, philosophy, etc.).
- Do not come to the workshop with a blank page, provide a draft for the participants to react to, criticise, amend and complete.
- Ensure that each workshop has a few participants who are well trained in environmental issues so that they have a knock-on effect on the other participants.
- Gradually broaden the consultation to include all faculty members so that as many people as possible can take ownership of the base.
- Remain attentive to the questions, needs and fears expressed during the workshops, which can be used as indicators that will help to overcome resistance to change.

Adapt this knowledge and skills base by department

This step aims to answer the question: **what knowledge and skills related to environmental issues need to be taught or developed for students majoring in a given discipline?**

The workgroup should rely on the most expert teachers of environmental issues (reference experts) in each department to **organise workshops on this issue within each department**. Professionals working in the field of environmental issues should be included in the discussions in addition to teachers and students.

> **Feedback from experience[362]:**
>
> - **Kedge** offers an example of a fundamental course in economics, compulsory in the 1st year of PGE, which has been completely redesigned in the light of ecological issues.
> - **ESSEC** is leading a process to transform all its fundamental courses of the PGE.

[362] See the collection of feedback from establishments, available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

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b. Extend this base across all the programmes

Once the knowledge and skills base and its application by department have been defined, the Steering Committee can mandate the programme management teams to ensure that it is integrated into all programmes (for an example, see the proposal for the application of the knowledge and skills base to a Grande Ecole programme in a business school, p. 138).

The tool developed at the inventory stage will make it possible to quickly identify, by programme, the courses dealing with environmental issues and the teachers ready to integrate them. Work will need to be done at departmental level to **distribute the knowledge and skills related to environmental issues in the various courses of each programme**.

In relation to the Steering Committee, the programme management must:

- Arbitrate the changes to be made to the model to integrate it with the base (courses to be removed, added, reduced, modified, etc.).
- Identify experts (external speakers, teachers) capable of teaching this knowledge and skills base and ready to integrate them into their courses.
- Create without delay course modules for students who are at the end of their programme and will not be able to benefit from the programmed developments. These modules will be removed when the classes trained in environmental issues in previous years reach their final year.

A few principles for guiding this work:

- **For long programmes** - 3 years (Bachelor, Grande Ecole Programme), as far as possible, position the knowledge and skills of the core curriculum at the beginning of the programme in the form of dedicated courses and integration into existing courses. The knowledge and skills need to be broken down by speciality for integration with existing courses in the final years of the programme.
- **For short programmes** - 12-24 months (Master, MSc, etc.), the temporary creation of compulsory dedicated courses will be necessary to compensate for the short duration of the programme while teaching a basic foundation in environmental issues. These courses could be discontinued once the junior classes of the student body have been trained, generally after three years, while providing "catch-up" modules for students coming from other institutions. The knowledge and skills broken down by speciality are essentially intended to be integrated into existing courses.

The work will also consist of identifying opportunities for exchanges between establishments:

- Identify the complementary subjects/content between what is taught at your institution and what is taught at other institutions.
- Establish partnerships with other institutions that offer courses on environmental issues, ideally in close geographical proximity.
- Forge partnerships with them to identify experts who can speak on environmental issues at your own institution (and vice versa).

c. Identify suitable pedagogical approaches

This reflection on the integration of content into programmes must be carried out at departmental level, **together with reflection on pedagogical approaches**, involving pedagogical engineers where possible (see the dedicated section above, p. 131).

- Encourage participatory teaching approaches (see, for example, several feedbacks in the dedicated collection).
- Take into account the potential eco-anxiety of students, teachers and staff: make sure to always address both findings on environmental issues and concrete courses of action.
- Call on educational engineers and other experts in educational science to provide recommendations or guidance on the most relevant pedagogical approaches for teaching environmental issues.

3. Organise teaching around environmental issues: paths for evolving programmes

How should education be organised around environmental issues? At what point in the training should each issue be addressed? How can dedicated and non-dedicated teaching be linked? In what formats can they be addressed (projects, courses, workshops, etc.)? The following general principles may provide some answers.

a. General principles for organising the teaching of environmental issues

Courses dedicated to environmental issues in the core curriculum are often necessary in order to present a complete overview of them, given their complex and systemic nature. Due to the cross-disciplinary nature between many of these courses, the pedagogical approach can be 'innovative'. Many of these courses can provoke anxiety or a feeling of powerlessness; students should be encouraged to have an active attitude of students, as well as work on possible and desirable responses.

Feedback from experience[363]:

- **The ESCP** offers a compulsory course dedicated to these issues in each degree programme of at least one year.
- **Emlyon** offers a compulsory course for the Grande École programme (PGE), called "Acting for the climate".
- Other institutions offer compulsory courses in the PGE: this is the case, for example, at **Audencia** ("Economy and energy transition"), **HEC Paris** (course on planetary limits) and **ESSEC**. Similarly, the **University of Paris Dauphine** has created a compulsory course on environmental issues in the first and second years of the Bachelor's degree[364].

Dedicated courses on environmental issues in the specialised departments are needed to teach new techniques such as LCA (Life Cycle Assessment) and environmental accounting.

In addition to dedicated courses, much of the change resides in the integration of environmental issues into existing courses. Each course may address them to different degrees. Some courses may address these issues through illustrative examples or epistemological, historical, cross-cultural or ethical perspectives. Others may fully integrate these issues (e.g., law, organisation, or economics courses).

Projects carried out as part of courses, whether dedicated or not, can be selected and evaluated by the teacher and students according to criteria relating to environmental issues. They are an opportunity to reduce the distinction between knowing and non-knowing, to collectively build knowledge about these issues and to develop concrete skills by confronting reality and the group.

- Study a socio-technical and/or ecological controversy in real time. See the methodology for mapping controversies developed at the School of Political Science[365].
- Work on a practical case study of a company wishing to rethink its economic model in relation to environmental issues.
- Carry out a project following protocols of investigation, design, assessment, and decision, taking into account environmental issues.

Real continuous projects, over the whole course and between years can make it possible to deal in depth with a complex theme by having the various departments of the institution work together.

- How can the institution's digital technology be used to support transition by making it compatible with the physical limits?
- Use your campus or university residence as a laboratory for experimentation (studies and experiments on your campus, etc.).

[363] See the collection of feedback from establishments, available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

[364] The University of Paris Dauphine did not write feedback for this report, but a presentation of the course was made for The Shift Project by Ivar Ekeland and Aïcha Ben Dhia: Les défis environnementaux du XXIème siècle. The content of the course is freely available: Ekeland, Ben Dhia, and Treiner, Environmental Challenges of the 21st Century.

[365] Seurat et Tari, *Controverses mode d'emploi*.

Training courses can be selected and assessed by the institution and the students according to criteria related to environmental issues.

- Ask for reports and oral assessments on the development of environmental issues into the training courses.
- Develop partnerships with structures that offer training courses related to these criteria (company impact forum, link with alumni, etc.).
- Build a database of internships related to environmental issues.

Propose university partnerships that take into account environmental issues, for example for interdisciplinary projects.

- Promote partnerships that offer training on environmental issues.
- Develop partnerships with training courses in other disciplines to enable teachers to exchange with colleagues from other backgrounds (or even to make occasional cross-curricular interventions) and to get students to work on projects with cross-cutting issues.
- Set up a carbon quota for students' travel abroad and ask them to assess their carbon footprint in order to raise questions about emissions and their individual footprint.

Allow students time to take a step back from their training and build their career path with greater clarity.

The intense pace of the preparatory years for some students, of training and then of professional activity does not encourage them to analyse their own career path. Organising changes in the pace of training and time for staff and group reflection, possibly accompanied by guidance counsellors and testimonies from professionals (and former students of various backgrounds), would enable students to develop greater clarity concerning the implications of their career choices, particularly in relation to environmental issues.

Time set aside to work collectively on this reflection makes it possible to clearly identify the responsibilities and levers available. Individually, this helps to free oneself from many situations of stress, eco-anxiety and even depression.

This work and questioning can be the subject of dedicated courses (epistemology, history, philosophy, etc.), spread throughout the existing courses or be the subject of extra-curricular activities. Guidance counsellors play a central role in this reflection.

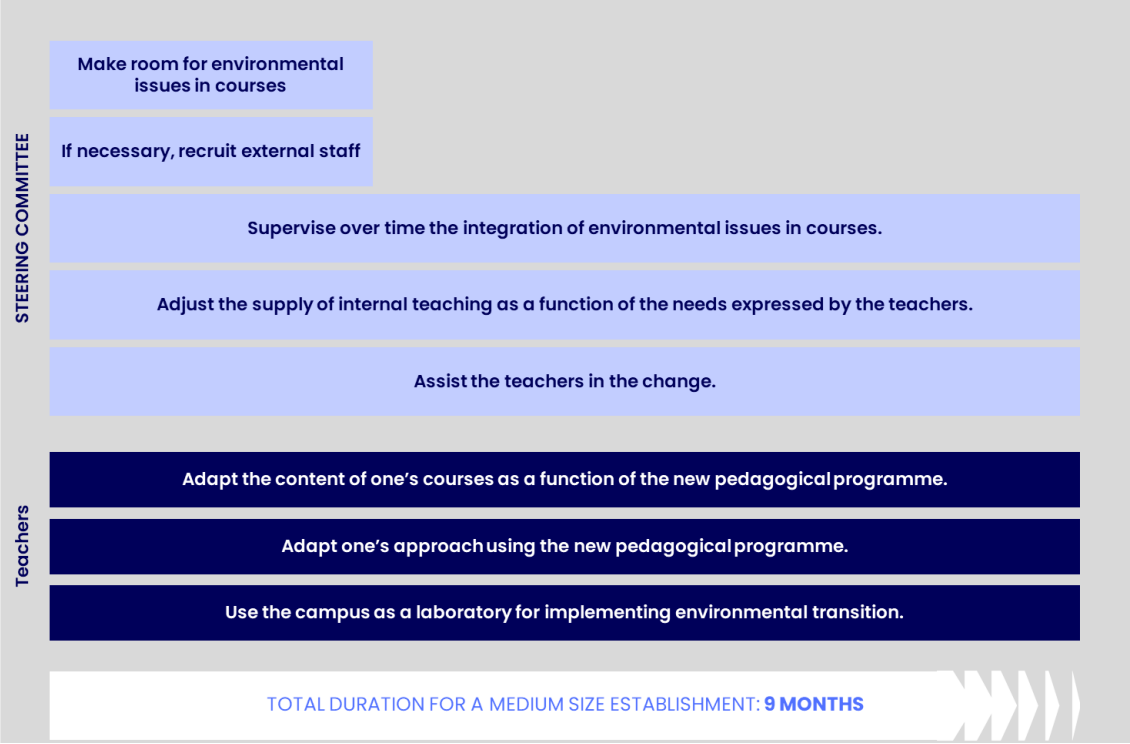
b. Adaptation of the base in a common core programme: the example of a Grande École programme

An example of how the knowledge and skills base can be translated into a Grande Ecole programme is presented earlier in this report, following the base (see Part 3 above, p. 138). This work focuses on the knowledge of the foundation only, as the skills are cross-curricular and can each be taught in several courses.

Step 5: Carrying out the pedagogical programme: teaching the students

Once the educational programme has been established, it must be implemented in the training courses. Each department and each teacher must be able to carry out the expected changes. The ecological and social emergency implies transforming the curricula as quickly as possible. Taking into account the working conditions of teachers and other staff in the institution is of critical importance in the implementation.

1. Possible schedule of the main actions to be carried out



Some knowledge evolves rapidly in these areas. Rather than seeking a perfect transformation at the first attempt, an iterative approach is sometimes more appropriate: certain formats can be tested in the first year in order to make adjustments as required. During the following year, more profound changes can thus be envisaged with greater confidence to respond to the school's strategy.

2. What is to be done by …

a. The Steering Committee

Make room for environmental issues in courses.

- Ensure that teachers who need it have peer support to help them decide what priority to give to environmental issues in their lessons (e.g., in terms of time and concepts).
- Add or replace some courses in the curriculum to ensure that the content of the base is covered.

If necessary, recruit external lecturers.

- Teachers from the natural sciences or qualified external lecturers are particularly suitable for teaching physical limits.
- For management courses, external lecturers can be a transitional solution to teach some courses until teachers are trained to do so - which is desirable. Some lecturers may even be able to train teachers directly.

Supervise the implementation of environmental issues in courses over time.

- Use the tools that have already found within the framework of the inventory.
- Working with the teachers concerned, set objectives for the development of courses over time and monitor their implementation.
- Be proactive in identifying bottlenecks and helping to remove them.

Adjust the internal training offers according to the needs expressed by teachers.

- Enable teachers and students to easily express their training needs.
- Adjust teacher training according to this "feedback".
- Free up time for teachers to attend this training.

Assist teachers to cope with change.

- Support teachers in creating or adapting new content, implementing new teaching approaches, writing courses, etc.
- Enable teachers to easily share their feedback and comments.
- Organise within each department and programme feedback and mutual support between teachers on the transformation of their teaching. For example, by identifying expert advisors on environmental issues and giving them time to support their colleagues in transforming their courses (e.g., by lightening the teaching load).
- Encourage teachers to co-deliver certain courses together in order to promote an interdisciplinary approach as well as skills and knowledge transfer
- Mobilise the documentation centre to support teachers by providing access to the necessary sources and references.

b. Teachers

Adapt course content to meet the needs of the new programme.

Depending on the nature of the course (whether or not it lends itself to a major integration of environmental issues), this work may involve a simple illustration of the course using examples, or a complete overhaul of the course, according to the choices made.

Adapt one's pedagogical approach using the new pedagogical programme.

Implement, ideally with the support of pedagogy experts, the approaches chosen for teaching environmental issues in line with the development of the educational programme. For example, moving from an expert posture to a facilitator posture: for the teacher, this makes it possible to overcome a possible feeling of non-credibility in teaching environmental issues and to build the knowledge related to these issues with the pupils.

Utilise the campus as a laboratory for implementing ecological transition.

Propose topics (application exercises, student projects) to improve the campus and its environment from an ecological perspective. Examples: carbon footprint of the campus, deployment of digital sobriety, etc.

Feedback from experience[366]:

Several establishments have created innovative programmes and courses:

- The Gaia semester **Audencia.**
- The MSc Strategy & Design for the Anthropocene[367] of the **ESC Clermont.**
- The Climate Action Program of **TBS Education.**
- The "Act for the climate" course at **Emlyon.**
- The hackaton of IGR-IAE Rennes.
- The Social Innovation Game of **IMT Business School.**
- " Energy, Business, Climate & Geopolitics" course of **ESCP**[368].

[366] See the collection of feedback from establishments, available by downloading from: https://theshiftproject.org/former-acteurs-economie-de-demain/

[367] ESC Clermont BS and Strate Ecole de Design Lyon, MSc Strategy & Design for the Anthropocene, accessed on 17 October 2022, https://strategy-design-anthropocene.org/fr.

[368] ESCP Business School, "Commons For Future".

Step 6: Ensure the long-term employability of the graduates

One of the purposes of higher education is to provide training for a profession. This will be done in a world where the weight of physical limits will be increasingly felt. Consequently, it entails making a relevant link between education and professions that will have to adapt to the consequences of exceeding the limits of the Earth system, and if possible, contribute to reducing the impacts of human activity on it.

1. Possible schedule of the main actions to be carried out

It is necessary to trigger this action quickly but also to consider it in the long-term.

2. What is to be done by the …

a. Steering committee

Propose and have validated by the Management Committee the following orientations for implementation by the departments responsible:

- **Develop the capacity to carry out continuous prospective reflection on the medium- and long-term evolution of the sectors and professions for which the institution's training courses are intended, particularly in relation to environmental issues.**
    - Set up a dedicated working group including academic experts, educational managers, and representatives of the institution's economic ecosystem.
    - Carry out and regularly publish an assessment of possible changes in the skills and professions for which the institution prepares.

- **Define a new partnership strategy according to ecological criteria.**
    - Define new criteria for assessing the institution's partnerships. In particular, ensure that they are anchored in the dynamics of the institution's territory in relation to environmental issues, as the impacts of the transformations underway differ from one area to another due to specific physical, geographical and human characteristics.
    - Assess existing partnerships against these criteria.
    - Initiate new partnerships according to ecological criteria.

- **Mobilise the alumni in regards to the establishment’s strategy and in its operational implementation.**
    - To participate in drawing up the educational programme with regard to their experience (as students and professionals).
    - To intervene in courses, round tables, conferences, café-debates, etc.
    - To contribute to the partnership strategy through their network.

- **Propose to students training courses selected according to ecological criteria.**
    - Strengthen links with organisations involved in these issues and highlight the internship opportunities they offer.
    - Highlight internships and projects that integrate environmental issues.

b. Management

Add compulsory sections on environmental issues in the internship reports.
Impose a specific section on environmental issues (carbon accounting, ethical reflection, reflection on the social utility of the organisation and the profession, LCA, etc.) in each internship report.

Support students in their search for internships and jobs related to environmental issues.
Guide students towards job search platforms that are compatible with their aspirations. Examples: the Shift Your Job platform, the RESES platform, Jobs that make sense, etc.

Organise meetings with individuals and organisations who deal specifically with environmental issues.
Organise meetings and forums with alternative companies, social and solidarity economy (café-debates, conferences, etc.).

Step 7: Getting research and the campus to evolve

An ambitious and coherent strategy must integrate the campus-training-research triptych (while being driven by the governance pillar, which also needs to evolve, in particular by involving in members of the Board of Directors who are driving forces in ecological transition). It is in the interest of the establishment to focus a significant part of their research on environmental issues, in particular in order to fuel teaching. On the campus side, many actions make it possible to bring infrastructures and practices in line with the institution's strategy on environmental issues, while mobilising it as a laboratory for experimentation.

1. Possible schedule of the main actions to be carried out

It is necessary to trigger this action quickly but also to consider it in the long-term.

2. What is to be done by …

a. Research Management

Assess each new research project through the prism of environmental issues.

- Integrate an ecological dimension into research projects and thesis applications.
- Question the purpose and impact of each research project by adding a set of questions to the thesis application form.
- Encourage research dedicated to environmental issues and favour interdisciplinary and systemic approaches.

Develop interdisciplinary research.

- Integrate environmental issues into existing laboratories and develop interdisciplinary laboratories.
- Encourage exchanges between research centres, for example by developing inter-laboratory research projects.
- Support interdisciplinary research projects.

b. The Establishment Management

Bring the campus in line with the establishment's strategy relating to environmental issues.

Implement a campus management policy that takes into account physical flows in an efficient way in design and sober utilization, by considering the infrastructures and the practices: the establishment property, short and long distance mobility, digital technology, purchasing, waste and catering.

- Avoid moving the campus away from the city and the construction of new buildings. Instead, improve its accessibility through infrastructure and low-carbon transport, limit the use of cars on campus.
- Reduce air travel for students, researchers and staff, favour train travel and long stays.
- Reduce purchases (reuse, make equipment last, pool resources, etc.), and then make purchases that are more energy efficient and have less environmental impact (energy optimisation, local production, low-tech equipment if possible, etc.).
- Renovate buildings for better thermal comfort in winter and summer and decarbonise heating.
- When the dining is part of the offer, minimise the carbon footprint of the meals (vegetarian meals, plant proteins as a substitute for certain animal proteins, food processed on site, local sourcing, reduction of waste, etc.).
- Implement ambitious waste management.

Conclusion

The integration of knowledge and skills commensurate with environmental issues and their systemic nature into management education, requires **a genuine transformation and not simply a change.** To carry out this large-scale project, an organiation is needed that facilitates transformation, following different stages and proposing concrete actions for each stakeholder.

Institutions have a lot of room for manoeuvre to transform, but they need support. Public institutions can accompany these changes with an array of measures. The expression of students, teachers and companies is equally valuable to legitimise and accelerate these steps in the ecosystem.

Finally, we must remember that while the various actions proposed aim to facilitate transformations, it is **important for organisations to remain flexible and to find the balance between the urgency of the transformation and satisfactory conditions for all**. Support for change is key. It is a question of ensuring the quality of relationships and understanding the situations experienced by each person.

It is above all a question of making it a human project.

II. Our recommendations intended for the government and actors in the institutional framework

The government and the actors of the institutional framework play a decisive role in **generating momentum among all the establishments, setting up an incentive academic framework and providing the means to massively increase the teaching of environmental issues**.

The government also plays a decisive role in accelerating the integration of environmental policies within companies, which is a necessary condition for fuelling momentum within educational institutions. Government involvement is essential because the current rate of reduction of GHG emissions by companies is insufficient to comply with the Paris Agreements. Other environmental issues (collapse of biodiversity, depletion of resources) are also insufficiently taken into account.

The acceleration of an ecological transition within businesses is a powerful lever to encourage changes in the teaching of business management. It leads companies to turn to higher education institutions to train their employees and recruit young graduates. These institutions are thus encouraged to develop training courses to meet this need.

A. The need for a clear political drive from the government

1. Government-driven impetus in favour of integrating environmental issues into education

A national strategy for higher education to keep within planetary limits should be defined by associating all the stakeholders, both internal (ministries, institution management, teachers, researchers, students) and external (associations, companies, local authorities, etc.) to the institutions, and should be broken down into three areas: research - teaching - campus.

This strategy, while respecting the autonomy of the institutions as well as academic freedom, must outline the **major orientations that the institutions will have to take into account and adapt** according to their specificities.

It must take up the objective of educating 100% of the population in environmental issues, as set out in the report "Raising awareness and providing training in ecological transition and sustainable development issues in higher education" by Jean Jouzel[369] and enshrine it in law with an ambitious goal in terms of timing with intermediate milestones**.**

It must be accompanied by a **national observatory of ecological transition**, making it possible to measure the progress made in its implementation.

Finally, it must take into account **the necessary continuity between higher and secondary education in the teaching environmental issues**.

The statements made by the French Minister for Higher Education and Research in October 2022 are consistent with this. In particular, she asserted the importance of "adapting

[369] Jouzel and Abbadie, " Raising awareness and providing training in ecological transition and sustainable development issues in higher education".

existing courses" to integrate the challenges of ecological transition, as well as offering courses "specific to it[370] ». These objectives apply to all Bachelor degree programmes, all courses combined: they therefore affect 100% of students. At the time of writing, the resources allocated to these far-reaching changes, as well as the procedures for their implementation, have yet to be announced. They will be decisive in ensuring that these stated objectives are effectively achieved.

For this strategy to be consistent, the government must set out the broad lines of the "ecological transition" that it intends to carry out, so both the actors in the economy and in education clearly know in which direction to go and how to make trade-offs. Providing this direction and this framework would enable teachers to tackle these issues in a straightforward manner[371]. This would involve determining the scope of the subject (physical issues and societal goals, etc.), and prioritising the objectives to be achieved, which may compete with each other. For example, do we agree to give up growth opportunities in favour of reducing our greenhouse gas emissions?

This clarification will have to be accompanied by the rewriting of a certain number of injunctions that are made at present - in particular to public agents - that are likely to run counter to the objectives of transition. For example, Article L123-2 of the Education Code stipulates that the public service of higher education contributes to "the growth and competitiveness of the economy" in second place, and "awareness and training in the challenges of ecological transition and sustainable development" in fourth place (bis). As one can be pitted against the other, this hierarchy seems to indicate that growth must come first, but the instruction deserves clarification. This article is an example of the need to revise the institutional framework, but we can also cite SDG8 "Promote sustained, shared and sustainable economic growth" (at the international level), which may in practice be in contradiction with a number of the other SDGs.

The High Council for Evaluation of Research and Higher Education should also be mandated to **evaluate the teaching of environmental issues in all institutions** and their inclusion in research.

In collaboration with the Ministry of Labour, Employment and Integration, the Ministry of Higher Education and Research (MESR) should initiate and support prospective reflection on the evolution of sectors and professions in the medium and long term, with an objective to prepare for professions that integrate the risks and means of action for a resilient and decarbonised society in the long term.

The government must also **set an example by training all its civil servants** in environmental issues without delay. The content of the training plan for public servants on the ecological transition must be strengthened and adapted by ministry.

[370] Ministry of Higher Education and Research, "Educating for ecological transition in higher education: challenges and solutions (Press kit)".
[371] Today, some teachers may be uncomfortable addressing issues that are often perceived as political because of the principle of neutrality in education.

2. Government impetus oriented towards actors in the business sector

Beyond higher education, **it is also up to the government to provide clear and coherent guidelines to face ecological challenges so that companies can align with the ecological transition**. Companies should therefore train all their employees and recruit graduates trained to accompany this transformation.

The National Low Carbon Strategy (SNBC) and the National Biodiversity Strategy (SNB) must be placed at the heart of the Government's action. Each of the ministries, and in particular the Ministry of the Economy and Finance (MINEFI), the Ministry of Industry, the Ministry of Agriculture and Food Sovereignty and the Ministry of Labour, Employment and Integration, must incorporate them so that they guide their actions[372]. **Ministerial roadmaps should prioritise the reduction of France's GHG emissions, biodiversity footprint and material footprint over increasing GDP.**

Collaboration between ministries should be encouraged to manage environmental issues that are systemic in nature.

In order to set an example, targets for reducing ecological impacts (emissions, biodiversity, materials, etc.) should be assigned to each ministry.

The government must define clear trajectory and objectives regarding environmental issues, including sectoral and planned targets for reducing GHG emissions and ecosystem pressures. **Actors in the business sector must adhere to the direction defined by the government**, based on a clear timetable (e.g., banning a particular technology by 2030), in order to adjust their own development and investment trajectories.

Such impetus is essential in order to set a clear framework and to allow economic players to plan and adapt. Without guidance - which actors in business are calling for - the measures will fail to cope with the ecological emergency.

[372] The evaluation of laws with regard to their adequacy or otherwise with the SNBC is a recommendation of the High Council for the Climate, to which we add compliance with the SNB. See "Le Haut conseil pour le climat recommande une évaluation des lois plus ambitieuse", Haut Conseil pour le Climat, 18 December 2019, https://www.hautconseilclimat.fr/actualites/le-haut-conseil-du-climat-recommande-une-evaluation-des-lois-plus-ambitieuse/.

B. The need for an incentive academic framework

The implementation of the national strategy for higher education for keeping within planetary limits and the achievement of its objective requires adapting the academic framework, which includes:

- **Ask public assessment bodies to include criteria for assessing training in environmental issues in their standards**. These key bodies can verify the efficient integration of ecological transition issues in all higher education courses. The reference systems of the High Council for Evaluation of Research and Higher Education and the National Training Framework (NTF) should be revised to enhance the teaching of transition issues. The CEFDG has just added a question on the institutions' commitment to environmental, social and societal transition issues to the programme evaluation file, and could further develop the approach (see recommendations to accreditation bodies, p. 203)[373].
- **Require institutions to make public the content of their programmes** (title, description and timetable of courses and other educational activities) in order to allow students to take into account the integration of environmental issues in their choice of institution and programme, and to allow steering at national level.
- **Systematise the environmental impact assessment of research programmes and projects,** in order to direct research to serve, if not at least not worsen, the environmental crisis.
- **Make institutional funding conditional** on the teaching of environmental issues.
- **Promote interdisciplinarity** in research and teaching.
- **Support and encourage exchanges of practices between institutions,** particularly via digital platforms that enable cooperation between higher education actors.
- **Promote and disseminate existing initiatives** (UVED, Enseigner le climat, teacher cooperatives, etc.).
- **Encourage the development and coordination of networks of actors**, in particular teachers, in order to promote the sharing of good practices.
- **Systematically consult these structured actors** (teachers' associations, students' associations, etc.) in order to best meet their needs.

[373] As a reminder, all students should benefit from at least 48 hours of training (6 ECTS) dedicated to the physical consequences of human activity (climate disruption, collapse of biodiversity, social, health and humanitarian crises, etc.) and that teachers should have the same level of knowledge that their students are supposed to acquire by following these courses.

C. Giving public institutions the means to make the transition

1. Teach environmental issues now

Raise the employment and wage bill ceilings on a permanent basis to:

- **Create teaching posts** for teachers trained in environmental issues.
- **Create a position of SD&RS manager within each institution,** in charge of the evolution of the curricula towards better consideration of environmental issues.

Increase the resources of universities on a one-off basis so that they can implement the transformation of teaching. As an example, the teaching transformation project described in the guide for establishment managements (see above, p. 153) requires resources estimated at 3% of their budget[374] **for at least 3 years,** on training alone. These resources must in particular make it possible to:

- **Implement teaching leave** to allow teachers to train, to contribute to the transformation project (to carry out an inventory, to define the teaching programme, etc.) and to develop their courses to integrate environmental issues.
- **Recruit temporary teachers** to give courses while the professors are being trained or to supplement their teaching.
- **Train the management team and teachers**[375]**.**
- **Recruit educational engineers** to help teachers adapt their course formats to the teaching of environmental issues and of **project managers** to help implement the transformation project.

To this end, the Government could put in place a "structured [funding] offer (methodology, toolbox, expertise) to support this fundamental change"[376] by mobilising funding at European, national or local level. For example, at national level, the future investment programmes (PIA) could be mobilised.

2. Mobilise research to produce contents to fuel teaching and courses

The aim is to raise the employment and salary ceilings on a permanent basis in order to **fund the recruitment of professors in management with research topics related to environmental issues.**

It is also to encourage and fund PhD thesis on environmental issues over the long term (in particular by increasing the number of calls for research projects on subjects related to environmental issues).

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[374] The Shift Project estimates that a minimum of 3% of an establishment's operating budget is required over a three-year period in order to initiate a change in education and teaching. To this must be added the costs of transforming research and the campus.

[375] As a reminder, Shift considers that adequate training for management should ideally be 20 hours (and at least 10 hours) and not be limited to awareness-raising activities (mural, workshop). Teachers must have the same level of knowledge as their students are supposed to acquire by following the 48 hours of courses dedicated to the physical consequences of human activity (climate change, collapse of biodiversity, social, health and humanitarian crises, etc.).

[376] Jouzel and Abbadie, "Sensibiliser et former aux enjeux de la transition écologique et du développement durable dans l'enseignement supérieur".

III. Our recommendations to stakeholders within the establishments

A. Students

Students can be the driving force in transforming both the teaching and the campuses of their schools and universities. Collectively, they have many levers that they should not underestimate in order to contribute to the rise of environmental issues in higher education.

Resources

For an Ecological Awakening "Ecological Transition Teaching Platform"[377]

Jouzel report, "Mobilising learners" [378]

RESES, "The guide for advocacy on your campus"[379]

Report on the Shift Project workshop on students' expectations and levers[380]

1. Getting involved in collective actions linked to environmental issues

Associations and collectives dealing with environmental issues contribute to the evolution of education insofar as higher education institutions are attentive to the satisfaction of their students and are often keen to meet their expectations. These associations initiate projects by involving students. Here are some paths of action:

- **Get involved in your institution's association dealing with environmental issues**, or create one if it does not yet exist.
- **Join student groups dedicated to environmental issues** outside your institution (Collectif pour un réveil écologique, RESES, CTES, etc.).
- **Contribute to your institution's projects on environmental issues**, such as the redesign of a programme or reflections on teaching methods**, by giving your point of view with a view to better taking environmental issues into account.**
- Where possible, **get involved in the institution's governance** bodies to ensure that environmental issues are prioritised.
- **Send questions and comments to the institution** (via the programme director or the student representative on the Board of Governors) **about the inclusion of environmental issues in courses and, more broadly, about the coherent integration of these subjects in the programmes** (no redundancy, subjects covered at the right level of complexity, absence of contradictions between courses, etc.)
- **Ask the career service** to see companies that are committed to environmental issues.
- **For the Students' Office:** provide financial support to associations that work in favour of ecological transition.
- **Systematise the inclusion of environmental issues in the activities of associations,** including those not dedicated to these subjects.

[377] For an Ecological Awakening, "Ecological Transition Teaching Platform", 2019, https://enseignement.pour-un-reveil-ecologique.org/#/.
[378] "Jouzel Report - Mobilising the learners".
[379] RESES, "The guide for advocacy on your campus", November 2021, https://le-reses.org/wp-content/uploads/2021/11/GUIDE-n%C2%B02-PLAIDOYER-RESES-nov-2021-WEB.pdf.
[380] The Shift Project, "Integrating environmental issues in business schools - The students' point of view", accessed on 25 October 2022, https://theshiftproject.org/wp-content/uploads/2022/10/CR-Atelier-6-Le-point-de-vue-des-etudiants-ClimatSup-Business.pdf.

- **Assert in recruitment interviews one's willingness to invest in environmental issues,** to make employers aware of these expectations.

Student life and associations also have a role to play in transforming practices on the campus and experimenting with the implementation of ecological transformations in the field. It is therefore possible to have 'ecological' or 'CSR' reference persons in the associations, so as to include this subject into all aspects of student life.

Getting involved in an association or collective also helps to reduce eco-anxiety by acting with peers who share the same concerns.

2. Communicate expectations to teachers

Most teachers listen to their students**. Students can explicitly ask in class about the links between the subject being taught and environmental issues.** This will encourage teachers to integrate these issues more into their courses.

3. Teaching oneself and mobilising all the students

- **Train yourself** (through reading, videos, conferences, etc.) in order to be more relevant in the actions carried out.
- **Organise awareness-raising activities** (conferences, screenings, debates, etc.), training (training weekends with lectures-talks by experts/facilitators) or even participation in specific events (COP, city councils, climate assemblies, etc.) helps to strengthen the awareness and knowledge of all students on these issues.

B. Professors and teachers

Professors and teachers also play an important role in the transformation of programmes. They can act at the level of their establishment, their courses and their research to better integrate environmental issues into their training, independently of their establishment's commitment. Their levers for action are multiple.

Like students, **they can get involved in collective actions, communicate their expectations and those of their students to the institution's administration and contribute to the mobilisation of their fellow teachers.** As with students, getting involved in collective actions that deal with environmental issues also helps to reduce eco-anxiety by acting with peers who share the same concerns.

They need to educate themselves, develop their courses to include environmental issues, especially with the help of students, and focus their research on topics related to these issues.

Recommendations on how to deal with environmental issues in courses are presented earlier in this report (see Part 3, p. 132).

1. Getting involved in collective actions linked to environmental issues

The formation of groups or connection with existing groups is a major lever for transforming teaching. Higher education institutions also launch projects in which teachers are involved and which provide an opportunity to ensure that environmental issues are included in discussions.

- **Join forces with committed peers or create an internal network of teachers committed to integrating environmental issues into education** (Teachers for Transition, Teachers for the Planet). For example, at ESSEC, a group of teachers has created the *Sustainability Guild*, which brings together teachers from all departments interested in environmental issues who meet regularly to exchange and share information and opinions. The ESCP Transition Network brings together teachers, students and alumni[381].
- **Contribute to the institution's projects**, such as a curriculum review or reflections on teaching methods, to ensure that environmental issues are taken into account.
- Where possible, **get involved in the institution's governance bodies to ensure that environmental issues are prioritised**.
- Where possible, encourage and support student associations that address environmental issues, or encourage students to start one if it does not yet exist.

2. Training to better educate students on environmental issues

- **Self-teaching**, especially using resources contained in this report (p. 156).
- **Request training on environmental issues from your institution**.
- **Train among peers**, for example by joining or launching a community that acts to integrate environmental issues into their respective disciplines, by devoting departmental meetings to sharing practices on this subject, by inviting teachers from other institutions to share their training and research practices, or by participating in conferences.
- **Learn to recognise and question prejudice** and false solutions.
- **Identify the links between environmental issues and the content of the course** by answering the question "how does the knowledge taught in the course impact or is impacted by the ecological situation?"
- Illustrate theoretical notions seen in class with **examples related to environmental issues.**
- **Develop courses and cases related to environmental issues**, based in particular on the elements of the knowledge and skills base and **make them available to all** (see the recommendations on "How to teach environmental issues", following the base, p. 135).

3. Encourage students to question and enrich the teaching given regarding environmental issues

- **Support and encourage the treatment of environmental issues in projects**.

[381] Presentations from various alumni networks can be consulted in the appendix: they will be published in November 2022 and available for download on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/

- **Invite students to speak on environmental issues** in the classroom (oral presentation, workshop, etc.).
- Provide time dedicated to the **constructive review on teaching with regard to environmental issues.**

4. Orienting research on environmental issues (for researchers)

- **Contact researchers** working on environmental issues within their discipline or within multidisciplinary teams (management disciplines and other disciplines).
- **Participate in conferences** of researchers working on environmental issues.
- **Invite leading researcher**s on the integration of environmental issues into their discipline to internal seminars.
- **Disseminate research on environmental issues to colleagues** in order to encourage the re-use of research results in teaching.

Resources

Collective Labos 1point5[382]

C. The staff of establishments *(non-teaching staff)*

The staff of higher education institutions (excluding professors) play an important role in the consideration of environmental issues by the institutions, whether it be at the level of teaching content, research or the campus. They have many roles to play. They can draw on the ideas mentioned for teachers to define the most appropriate actions for their situation.

In every case, it is important to emphasise **the need for training in environmental issues**[383]**, to join or create groups on these subjects, and to participate in the institution's reflections to ensure that these issues are taken into account.** In general, it is necessary to understand that adaptations to the pedagogical framework and student support will be necessary to transform teaching and, more broadly, student itineraries.

IV. Our recommendations to alumni

There are already a number of alumni networks involved in environmental issues[384]. Alumni, because of their position in direct contact with the world of work, also have an important role to play in **relaying to institutions and teachers the needs of their organisations in terms of skills related to environmental issues and their concerns about these subjects**.

As collective action is the most effective, **they can form or join an alumni network that is committed to environmental issues**. Within this collective framework, they can work in three main areas: **developing their institution's training programmes, getting directly involved in**

[382] Labos 1point5, accessed on 25 October 2022, https://labos1point5.org/.
[383] As a reminder, Shift considers that adequate training for staff (excluding teachers) should ideally be 20 hours (and at least 10 hours) and not be limited to awareness raising activities (fresco, workshop)
[384] Presentations of several of these alumni networks can be consulted in the appendix: they will be published in November 2022 and available for download on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/

training and awareness-raising on environmental issues, and helping students and alumni to move towards careers that are in line with environmental issues.

A. Getting the courses of the establishment to evolve

Alumni can act directly or through their employers to support school managements and teachers who wish to integrate environmental issues.

- **Get your company involved with your school to demonstrate the importance of environmental issues in your sector**, for example by becoming a partner or even a member of the school's board. This is essential to legitimise the work of integrating environmental issues into training in the eyes of certain teachers and the management.
- **Participate in the creation of courses that integrate environmental issues**. For example, the Energy, Business, Climate & Geopolitics course[385] was developed at ESCP with the contribution of alumni.
- **Introduce case studies (business cases)** and feedback on company transformation to fuel the teachers.
- **Be involved in the various councils and working groups of the institution to ensure that environmental issues are taken into account**, particularly during the reform of the programmes or the institution's skill sets.

B. Be directly involved in training and awareness raising relating to environmental issues

- **Learn** (through reading, videos, conferences, etc.) in order to be more relevant in the actions carried out.
- **Contribute to the training** of students, alumni and various stakeholders of the establishment on environmental issues (participation in teaching courses, animation of murals, writing of tribunes, etc.).
- **Initiate or get involved in events** at your establishment (such as the “Rentrée climat” for example).
- Organising awareness-raising events (organising thematic discussions, inviting experts, etc.).

C. Helping students and alumni towards professions aligned with environmental issues

For alumni associations this can be done through:

- Identify employers integrating green issues into their operations and strategy.
- Disseminate inspiring career paths or testimonials from alumni who work in green conscious professions.
- Organise a forum of professions or companies having impacts.

[385] ESCP Business School, « Energy, Business, Climate & Geopolitics ».

Ambitions Transitions

Date of creation: November 2021

Mission: Ambitions Transitions is a collective of committed higher education alumni. We **inspire, federate and facilitate transitions and commitments of alumni in favour of an inclusive and sustainable society.**

Levers of action:

- Helping creation and sharing between committed clubs.
- Pooling actions to strengthen their impact.

Areas of action:

- Teaching (reviewing the content of training courses / supporting schools).
- Skills (meetings with companies / webinar / forum / inspirational paths).
- Awareness raising (forum / new narratives / frescoes / advocacy).

Main actions:

- Organisation of the Ambitions Transitions 2022 forum at the Paris Climate Academy in April 2022 and online (+1,100 visitors, 66 organisations involved in recruitment, 6 training organisations, 12 round tables and 12 workshops).
- Co-organisation of the closing evening of the Universities of Tomorrow's Economy of (UEED) 2022 initiated by the Impact France Movement on the theme of sobriety.

Projects:

- Organisation of the Ambitions Transitions Forum 2023.
- Mobilisation of higher education alumni, in addition to business and engineering schools (universities, IUT, architecture schools, journalism schools, communication schools, etc.).
- Creating synergies with actors for transition in higher education: For an Ecological Awakening, Alumni for the planet, etc.
- Mapping of ecosystem actors of transition in higher education.
- Creation of local Ambitions Transitions communities in France (starting with Lyon and Nantes).
- Assistance for creating groups in higher education establishments.
- Creation of a group creation kit.
- Organisation of seminars / webinars.
- Writing forums.

https://forum-ambitionstransitions.fr/

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V. Our recommendations to companies

Companies play a decisive role in the evolution of education. Business schools are sensitive to their expectations in terms of skills. They are represented on the boards of the establishments. They are involved in certain courses or student projects. They contribute to the financing of establishments by calling on them for the continuing education of their executives, by financing research chairs, and through the allocation of the apprenticeship tax. By funding research, they also contribute to developing the knowledge that fuels teaching. They can thus have a strong influence on the training courses that are developed, in several ways.

- **Integrate environmental issues in their strategy**, operations, and their recruitment (profiles in demand).
- **Make known their requirements for initial and continuing education that incorporates environmental issues**, so as to have the skills required for implementing ecological transition.
- **Be involved in the management boards** of education establishments in favour of taking into account environmental issues in their courses.
- **Make the attribution of the apprenticeship they pay depend on** whether environmental issues are integrated in the courses.
- **Finance or co-finance research chairs** on subjects linked to environmental issues (possibly involving researchers from several establishments and disciplines).
  For example, the mission of the "Multi-Capital Global performance" Chair[386] of Audencia is to propose an accounting model designed to help companies participate in a sustainable socio-environmental system and ensure the sustainability of their activities by monitoring their global performance according to two new forms of capital: social and the environment.
- **Offer training courses** on subjects linked to environmental issues.

[386] Audencia, "Chaire Performance Globale Multi-Capitaux", accessed on 15 September 2022, https://multi-capital-performance.audencia.com/.

VI. Our recommendations to academic associations

The role of academic associations is to stimulate, disseminate and make use of scientific knowhow in their field of activity. They have a large number of levers for encouraging the integration of environmental issues in education, such as:

- **Organise conferences and congresses on the links** between their area of activity and environmental issues.
- **Attribute prizes and grants** to research focusing on ecological concerns in their area of activity.
- **Promote the publication of articles** that integrate environmental issues in their journal.
- **Publish manuals** whose content aids teachers to incorporate environmental issues in their area of activity[387].
- **Make known to international institutions** the importance of integrating environmental issues in reflection on their area of activity.
- **Organise thematic workshops** between researchers and professionals on the impacts of environmental issues on their area of activity.

[387] Like for example, the French Marketing Association (AFM) that publishes a collective manual in wiki form: Association Française du Marketing, Ouvrage Wiki AFM : "Marketing pour une société responsible", accessed on 25 October 2022, https://marketingpourunesocieteresponsable.org/index.php/Ouvrage_Wiki_AFM_:_%22Marketing_pour_une_société_responsable%22.

VII. Our recommendations for accreditation and ranking bodies

A. The need for the accreditation of higher education business management to evolve

This chapter is meant for the different French, European and international accreditation organisations, both public and private. Its purpose is to highlight existing good practises and to propose recommendations for better inclusion of teaching environmental issues in the different accreditation procedures. It relies on the diagnostic presented above (see Part 2, p. 58).

This part focuses on the core occupation of higher education establishments. Although it is important to take a global approach on the scale of the establishment, as with the exemplariness of campus organisation, **attention here is deliberately focussed on the theme of teaching.** The environmental management of campuses and research are not specifically dealt with, except insofar as these dimensions are related to education. Furthermore, in view of the Shift Project's expertise, this note is conceived through the prism of environmental issues. Social issues are not developed, unless they are linked to the physical limits of the planet.

1. Methodological recommendations

Accreditation organisations could adopt several good practises to address these shortcomings, and to encourage institutions to develop an ambitious strategy to help confront environmental issues[388]**:**

1. **Give at least the same weight to teaching environmental issues as to other criteria.** Given the importance of educating people about environmental issues, firstly to understand them and secondly to play their part in tackling them, **it is important that accreditations give them high priority.**
2. **Clearly define the environmental issues, with a set of indicators** to enable establishments to understand what is expected in substance, and to avoid misinterpretation. **This definition should make clear the centrality of issues related to the physical limits of the planet**. For example, talk about **"issues related to the preservation of the environment and biological diversity and climate change within the framework of planetary boundaries", and make it clear that addressing strictly social issues cannot replace teaching issues related to the physical limits of the planet.**

[388] Recommendations largely inspired by the report "Recommendations for higher education rankings", published by Utopies in 2022, and produced with Impact Campus, Pour un Réveil écologique, Enseignants de la transition, RESES, ESSEC Transition, The Shift Project, Campus responsables. Utopies et al., "Recommandations aux classements de l'enseignement supérieur".

3. **Take into account training actions intended for the teaching staff so that they incorporate environmental issues in their classical courses,** not dedicated to transition**, or in courses that incorporate certain aspects of CSR but for which the teacher is not trained in the physical challenges of ecological transition.**

4. **Adopt a critical approach to existing criteria in terms of their impact on environmental issues.** It seems necessary to assess the ecological impact of all the indicators currently used by accreditations:

   - **International mobility**: the institution must demonstrate the internationalisation of its programme by various means, which often leads it to encourage long-distance travel for its students and researchers. However, the distances travelled, particularly by plane, have a significant and measurable carbon impact. In order to demonstrate the institution's efforts to reduce this impact, the establishment should be asked 1/ **if it measures the carbon footprint of these activities** (and if so, how much to do these activities emit?), 2/ if students and teachers carry out the carbon footprint of their academic activities, and 3/ **if a mechanism for mitigating the impact of these trips is planned** (e.g. incentives to travel more sparingly, partnerships with rail companies, etc.); and evaluate these efforts in the assessment.

   - **The number of students, researchers, publications or laboratories:** these data are too often evaluated in absolute volume, which encourages institutions to merge and relocate their campuses that have become too small outside the cities, with the artificialization of land and the additional travel that this entails. **It is essential to measure these elements in proportion to the size of the establishment, not in absolute terms**, so as not to encourage small establishments to grow larger

5. **Cross-checking the sources of the data collected for better representativeness.** When talking about quality education, it seems essential to cross-check the statements of the establishment's management with those of other stakeholders, in particular students and alumni, or to ask establishments to support their statements with student assessments, which they can easily adapt to this exercise.

6. **Use more quantitative indicators** to complement qualitative ones. For example, it is interesting to ask whether courses take account of environmental issues, but a yes/no answer is not enough. It is important to quantify this effort in terms of hours of courses and dedicated ECTS, or the proportion of students concerned (and therefore whether or not they are compulsory). From a qualitative point of view, emphasis must be placed on the integration of transition issues in teaching in a systemic and transversal way (rather than only proposing a specific course or a Fresco during a climate change period).

7. **Be more transparent and improve access to information:** ask institutions to publish, as far as possible (except for confidential data), the information provided, so that it can be contested if necessary (e.g., number of hours of courses on environmental issues, so that students can see what has been declared)[389].

[389] The CEFDG has already made public the opinions expressed on the establishments targeted.

8. **Use existing documentation to transform accreditations**. There has been a wealth of resources available on this subject for some years. The following recommendations are not intended to "reinvent the wheel" but to rely on relevant, already existing and recognised indicators. The DD&RS Reference Framework[390] or the *Grand Baromètre*[391] of the *Pour un Réveil Ecologique* group, or the LabeL EDuC label are examples of resources that can be mobilised. Their increasing use by institutions also enables accreditation bodies to rely on the data they require (and which the establishments are therefore able to provide).
9. **Consult with students, businesses and other actors of civil society** to define indicators that both better respond to their aspirations and needs, and also help to promote a higher education and research sector that contributes positively to the general interest. This means collectively rethinking the definition of the notion of excellence.
10. **Award different levels of validation for the integration of environmental issues in establishments, following the example of the SD&RS Label**. Indeed, not all establishments start from the same point and do not have the same resources. Thus, it is necessary to both promote virtuous actions and encourage and monitor the efforts of less advanced establishments. In this respect, it is possible to imagine different levels or stages to be given to schools, the important thing being the trajectory of progress followed (a more advanced school that does not improve should be sanctioned, a less advanced school that has made promising efforts should be favoured, etc.).

[390] SD&SR: The sustainable development label for higher education institutions. CPU and CGE, Label SD&SR, accessed on 31 October 2022, https://www.label-ddrs.org/.
[391] Pour un Réveil Ecologique, « L'écologie aux rattrapages ».

2. Examples of desirable indicators

Based on these methodological recommendations and existing good practice, the following are several indicators that should be included in the accreditation assessment frameworks, together with the evidence that should be sought to measure them. Some indicators are taken directly from the sources cited; others are simply inspired by them.

Dimension highlighted	Proof required	Source
Education		
The establishment demonstrates its willingness to engage itself and its activities in ecological transition.	The establishment has developed an in-depth, systemic and concerted (with its stakeholders) vision of ecological transition).	The Shift Project
	The establishment has initiated strategic prospective reflection on the evolution of the professions and skills for which it trains its students, and has consequently developed its skills frameworks.	The Shift Project
The establishment ensures that its professors integrate environmental issues into their activities.	The recruitment of teachers and/or researchers in the programme takes into account their experience or expertise in the field of ecological transition.	EDuC LabeL
	Existence of a training plan for the teaching staff and doctoral students on environmental issues (with a target of 100% of teachers trained), at a rate of at least 48 hours per teacher (not previously an expert on these subjects).	The Shift Project
	The framework of the course descriptions provided to the teachers of the programme requires making explicit the links between the issues of ecological transition and the content of the course, the methods and the educational objectives.	EDuC LabeL
The establishment ensures that all its students are effectively trained in environmental issues in a systemic and cross-disciplinary manner.	The knowledge of ecological transition of all the students in the programme is specifically assessed.	EDuC LabeL
	Internal stakeholders are invited to give annual feedback on how the ecological transition issues are addressed in the programme: students, teaching staff, programme team, alumni, others	EDuC, LabeL "Awareness and training in ecological transition", Jean Jouzel, MESR, 2022

	At least 48 hours of compulsory training for all students, dedicated to the physical consequences of human activity (climate change, collapse of biodiversity, social, health and humanitarian crises, etc.).	"Recommendations regarding ranking in higher education", Coalition of actors, 2022[392]
	At least 6 compulsory ECTS devoted to the teaching of environmental issues in all the teaching modules	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
	Proportion of non-dedicated courses that have integrated environmental issues into their teaching (information based on consultation with internal stakeholders, students and teachers).	The Shift Project
	Existence of teaching methods adapted to the acquisition of skills related to environmental issues (role playing, projects, internships, workshops, serious games, etc.).	"Awareness and training in issues of ecological transition", Jean Jouzel, MESR, 2022
Governance		
The institution ensures rigorous management and monitoring of the integration of environmental issues into its activities.	Presence of an SDSR (or other name) contact attached to the management/presidency of the establishment, with the task of monitoring the evolution of teaching, and with sufficient means to perform their mission	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
	Existence of a green action plan, or equivalent, presenting a global and ambitious strategy, with adequate resources, to implement its ecological transition, and which is integrated into the institution's strategy.	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
	[For French establishments] Existence (Y/N) of SD&SR self-assessment no older than two years or the award of the Label DD&RS, and identified level of commitment.	Label DD&RS
	Number of supervised practical courses dedicated to environmental issues.	The Shift Project
	Existence (or not) of a specific steering committee on environmental issues and its representativeness vis-à-vis all stakeholders (establishment, students, teachers and partner companies).	The Shift Project

[392] Utopies et al., "Recommendations on ranking in higher education".

The establishment has adopted a coherent, ambitious and concerted strategy for ecological transition.	Partnerships and exchange programmes are chosen taking into account the establishment's commitment to the challenges of ecological transition.	The Shift Project
	The institution's stakeholders (students, faculty, programme staff, alumni, others) are required to sign an ethical charter when they join the programme, committing them to work towards addressing the physical limits of the planet and the ecological transition.	EDuC LabeL
	Stakeholders are consulted on the updating of the courses provided and other educational activities (check all relevant stakeholders: researchers, experts, professionals, students, associations, etc.).	EDuC LabeL
	% of the operating budget dedicated to teaching environmental issues [393]	The Shift Project
Research		
The institution puts to the fore integrating environmental issues in all its research activities.	Presence of one or more chairs and research institutes dealing with (and integrating) the challenges of ecological transition, with an interdisciplinary dimension.	Label DD&RS

These recommendations concern only the development of teaching to take better account of environmental issues.

However, in order to ensure the overall consistency of the establishment's strategy, it is important that accreditations also include indicators concerning the establishment's exemplary ecological impact:

- The completion and publication of the campus greenhouse gas emissions report,
- Developing a strategy to reduce its emissions,
- Implementing a responsible purchasing policy,
- The implementation of a policy of sobriety and energy efficiency in buildings,
- The implementation of a mobility plan for staff and students,
- The implementation of a policy to limit the impact of long-distance travel for staff and students, in order to limit the use of air travel as much as possible,
- The implementation of a sustainable food plan favouring local, seasonal, organic products, rich in vegetable proteins and limiting food waste.

[393] The Shift Project estimates that a minimum of 3% of an institution's operating budget is required over a three-year period in order to initiate a change in education and teaching. To this must be added the costs of transforming research and the campus.

B. The necessary evolution of ranking business schools

This note is addressed to the various bodies that produce rankings of business schools. It proposes recommendations for seriously integrating the teaching of environmental issues into these rankings. It aims to report on good practices and to develop the criteria so that the ecological transition can be taken into account in a way that is commensurate with the challenge. It is based on the diagnosis presented above (see Part 2, p. 61).

This section focuses on the core business of higher education institutions. Although a holistic approach at the institutional level is important, as is exemplary campus organisation**, the focus here is deliberately on teaching**. The environmental management of campuses and research is not specifically addressed, except insofar as these dimensions are linked to teaching. Furthermore, in view of the Shift Project's expertise, this section is intended to focus on environmental issues. Social issues are not developed, unless they are linked to the physical limits of the planet.

1. Methodological recommendations

There are some good practices that ranking organisations could adopt to address these shortcomings, and encourage establishments to develop an ambitious strategy to help face environmental challenges[394]:

1. **First, ensure that the ranking activity has adequate financial resources**: indeed, the recommendations that follow show the importance of time when collecting and analysing complex data in order to produce quality ranking. In view of the importance of these rankings for institutional strategies, and thus for the dynamics of higher education as a whole, this work must be beyond reproach and the resources required must not be underestimated.
2. **Clearly define the environmental issues, with a set of indicators** to enable schools to understand what is expected in substance, and to avoid misinterpretation. **This definition should make clear the centrality of issues related to the physical limits of the planet.** For example, **speak of "issues related to the preservation of the environment and biological diversity and climate change within the framework of planetary boundaries",** and make it clear **that addressing strictly social issues cannot replace teaching issues related to the physical limits of the planet**
3. **Give education in environmental issues at least equal weight to other criteria. It is important that the rankings make this a priority criterion** in view of the importance of educating the population about environmental issues, firstly in order to have good understanding of them, and secondly to ensure they play a role in tackling them.
4. **Take into account training actions for the teaching staff in order to integrate environmental issues in conventional courses** (not dedicated to the transition)**, or in courses integrating certain aspects of CSR but where the teacher is not trained in the physical issues of the ecological transition.**

[394] Recommendations largely inspired by the report "Recommendations on higher education rankings", published by Utopies in 2022, and produced with Impact Campus, Pour un Réveil écologique, Enseignants de la transition, RESES, ESSEC Transition, The Shift Project, Campus responsables. Utopies et al, "Recommendations for higher education rankings".

5. **Adopt a critical approach to existing indicators in terms of their impact on environmental issues.** It seems necessary to assess the ecological impact of all the indicators currently used by accreditations:

   - **International mobility**: the institution often has to demonstrate its international reputation in various ways, which often leads it to encourage its students and researchers to travel - especially far away. However, the distances travelled by plane in particular have a massive and measurable carbon impact. In order to demonstrate the establishment's efforts to reduce this impact, the establishment should be asked 1/ if it measures the carbon footprint of these activities (and if so, what the amount of their emissions is), 2/ if students and teachers calculate the carbon footprint of their university activities, and 3/ if a mechanism for mitigating the impact of the journeys made by its staff and students is planned (e.g., incentives to travel more sparingly, partnerships with rail companies, etc.). These efforts should stand out in the ranking.

   - **The number of students, researchers, publications or laboratories:** these data are too often evaluated in absolute volume, which encourages institutions to merge and relocate their campuses that have become too small outside the cities, with the artificialization of land and the additional travel that this entails. It is essential to measure these elements in proportion to the size of the establishment, not in absolute terms, so as not to encourage small establishments to grow larger.

   - **Graduate salary**: high salaries at graduation are often valued in rankings. However, as jobs in the environment and the social and solidarity economy are notoriously less remunerative, this criterion can lead institutions to encourage their students to turn away from environmental issues in order to ensure that they aim for better-paid jobs, which can often mean jobs in positions that are less guided by 'ethical' issues. Furthermore, as an individual's carbon impact is often proportional to their income level, this aspect is doubly problematic[395]. As students increasingly prefer the search for meaning to salary, it is important to give a fairer place to this criterion.

6. **Cross-matching the sources of the data collected for better representativeness.** When talking about quality education, it seems essential to cross-match the statements of the establishment's management with those of other stakeholders, in particular students and alumni, or to ask establishments to support their statements with student assessments that they can easily adapt to this exercise.

7. **Use more qualitative indicators** in addition to quantitative ones. For example, it is interesting to ask for the number of ECTS dedicated to environmental issues or their compulsory nature, but it is also important to know the substance of the subjects taught (make sure that the subject is addressed in a complete and relevant way, and that the course concerned does not only deal with a specific subject while forgetting the others). In particular, insist on the integration of transition issues in the teaching in a systemic and cross-disciplinary way (in addition to proposing only a specific course or a Fresco at the beginning of a climate year).

8. **Be more transparent** regarding the goals and method used:

   - **Clearly state the philosophy of the ranking**: indicate from the outset the nature of the criteria on which the ranking focuses its attention (the heavily weighted aspects), and

[395] See the World Inequality Report: "On average, humans emit 6.6 tonnes of carbon dioxide equivalent (CO2) per capita per year. But our new data highlights large disparities in the world's population: the top 10% of emitters are responsible for almost 50% of emissions, while the bottom 50% produce only 12%. Chancel et al, "World Inequality Report 2022

specify the aspects that are therefore set aside. This is so that the users of these rankings know to what extent the proposed ranking corresponds to their own interests.

- **Ensure the transparency of the methodology** used and your process for collecting, scoring and evaluating data, so that stakeholders can confirm or refute it if necessary[396].
- **Improve access to information:** ask establishments to publish, as far as possible (apart from confidential data), the information provided on the establishment's website, so that it can be challenged if necessary (e.g., number of hours of lectures on environmental issues, so that students can see what has been declared). This is to discourage establishments from embellishing their actions.

7. **Review existing literature to transform rankings.** There has been a wealth of resources available on this subject for some years. The following recommendations are not intended to "reinvent the wheel" but to build on relevant, existing and recognised indicators. The SD&SR Reference Framework[397] or the “Grand Baromètre”[398] of the “Pour un Réveil Ecologique” group, as well as the LabeL EDuC label are examples of resources that can be mobilised. Their increasing use by establishments also enables rankings to rely on the data they require (and which establishments are therefore able to provide).
8. **Consult students, companies and other civil society actors in order to define indicators** that better respond to both their aspirations and needs, and which also help to promote a higher education sector that contributes positively to the general interest. This means collectively rethinking the definition of the notion of excellence.

[396] Higher Education Sustainability Initiative, « Assessments of Higher Education’s progress towards the UN Sustainable Development Goals, Volume 1 ».
[397] CPU et CGE.
[398] For an Ecological Awakening, "L’écologie aux rattrapages".

2. Examples of desirable criteria

Based on these methodological recommendations and existing good practices, the following are criteria that should be included in the rankings (new criteria or changes to existing criteria).

Recommended criterion	Source or inspiration
Education	
At least 48 hours of compulsory training for all students, dedicated to the physical consequences of human activity (climate change, collapse of biodiversity, social, health and humanitarian crises, etc.).	"Recommendations regarding ranking in higher education", Coalition of actors, 2022[399]
At least 6 ECTS devoted to the teaching of environmental issues, which are compulsory in all the teaching modules.	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
Existence of a training plan for the teaching staff and doctoral students on environmental issues (with a target of 100% of teachers trained), at a rate of at least 48 hours per teacher (not previously an expert on these subjects).	The Shift Project
Existence of teaching methods adapted to the acquisition of skills related to environmental issues (role playing, projects, internships, workshops, serious games, etc.).	Report "Awareness and training in issues of ecological transition", Jean Jouzel, MESR, 2022
Number of internships, tutored projects and/or simulations offered by the establishment contributing to ecological transition	Report "Awareness and training in issues of ecological transition", Jean Jouzel, MESR, 2022
Governance	
[For French establishments] Existence (Y/N) of SD&SR self-assessment no older than two years or the award of the Label DD&RS, and identified level of commitment.	Label DD&RS
Number of departments/directorates within the institution with serious environmental objectives.	Label DD&RS
Number of partnerships with organisations with diverse economic models and statuses (SSE, B-Corp / LUCIE type certifications, companies with a mission, etc.).	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
Existence (or not) of a green action plan, or equivalent, presenting a global and ambitious strategy, with adequate means, to implement the establishment's ecological transition, and which is integrated into its strategy.	"Recommendations regarding ranking in higher education", Coalition of actors, 2022

[399] Utopies et al., "Recommendations on ranking in higher education".

Presence of an SDSR (or other name) contact person attached to the management/presidency of the establishment, with the task of monitoring the evolution of teaching. [400]	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
Number of supervised practical lessons dedicated to environmental issues.	The Shift Project
Existence (or not) of a steering committee specific to environmental issues and its representativeness vis-à-vis all all stakeholders (institution, students, teachers and partner companies).	"Recommendations regarding ranking in higher education", Coalition of actors, 2022
% of the operating budget dedicated to environmental issues. [401]	The Shift Project
Research	
% of research projects that include an assessment of how environmental issues are taken into account in carrying out research.	SDSR reference framework
On graduation	
The share of graduates working in a field, in a company and/or having a job in phase with ecological transition.	"Recommendations regarding ranking in higher education", Coalition of actors, 2022

These recommendations concern only the development of teaching to take better account of environmental issues.
However, in order to ensure the overall coherence of the establishment's strategy, it is important that the rankings also include indicators concerning the institution's exemplary ecological impact:

- The completion and publication of the campus greenhouse gas emissions report,
- Developing a strategy to reduce its emissions,
- Implementing a responsible purchasing policy,
- Implementing a policy of sobriety and energy efficiency in buildings,
- The implementation of a mobility plan for staff and students,
- The implementation of a policy to limit the impact of long-distance travel for staff and students, in order to limit the use of air travel as much as possible,
- The implementation of a sustainable food plan favouring local, seasonal, organic products, rich in vegetable proteins and limiting food waste.

[400] The Shift Project believes that a minimum of one full-time equivalent on SDSR issues is essential to be able to contribute to the transition of the institution. Caution: the existence of a person in charge of coordinating the actions is the marker of a real desire to steer transition, but if all the departments fail to appropriate the approach and do not see specific transition objectives integrated into their action plans, then the effect will be superficial.
[401] The Shift Project estimates that a minimum of 3% of an institution's operating budget is required over a three-year period in order to bring about a change in education and teaching. To this must be added the costs of transforming research and the campus.

PART 5. FEEDBACK FROM EXPERIENCE RELATING TO THE TRANSFORMATION OF EDUCATION

aimed at business school managements and programme supervisors

I. The inventory of the inclusion of environmental issues in courses: feedback from experience of Audencia

A. Draw up an inventory of the inclusion of environmental issues in courses: methodological recommendations

The aim of the inventory of the consideration of environmental issues is to identify the strong points and the challenges to be met in order to transform the courses of an establishment. It should reinforce the identification of internal resources: advanced courses on environmental issues, teachers who are pioneers in these subjects. It will also help to identify the gaps that need to be filled, by showing the integration of these issues at the level of a student course. Finally, it provides a reference point for monitoring progress over time.

We recommend a method here that is based on the synergy of three elements: the analysis of course syllabi, the perceptions of teachers and lecturers, and the perceptions of students (Figure 13).

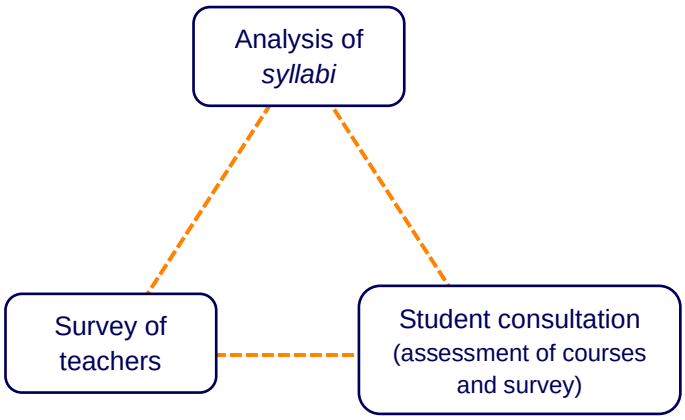

Figure 13 – The three elements of the inventory of the inclusion of of environmental issues in courses.

1. Analysis of course syllabi

The analysis of syllabi provides an overview of the integration of environmental issues into courses at the institutional or programme level. It aims to identify courses that address skills and knowledge related to environmental issues. It therefore makes it possible to identify the elements already present in the curricula and to estimate the number of students concerned and at what point in their course they are concerned.

Syllabus analysis is valuable but incomplete: it is based on elements that are as objective as possible, but which do not necessarily reflect the reality of the classroom or lecture hall. A succinct syllabus that mentions environmental issues only briefly may conceal a course that integrates these issues into all the sessions; conversely, a syllabus that mentions them as central to the course may well correspond to a course in which they are dealt with on the margins.

More importantly, while it is often clear from a course syllabus whether environmental issues are addressed, it is more difficult to determine to what extent, or with what degree of relevance. Does a course that addresses CSR in every session deal with physical limits, or is it mainly about the governance of organisations? Does a session on solutions to environmental emergencies, whether organisational or technical, also point to the limits of these approaches, or does it treat them as miracle solutions?

These limitations highlight the need to combine syllabus analysis with other diagnostic elements.

The analysis grid must include:

- **The list of courses** and information about them: programme, number of hours and ECTS credits, number of students who have taken the course, whether the course is optional or compulsory, semester, department, teachers;
- **Keywords** to look for in the syllabi to identify those that evoke or could evoke environmental issues;
- **A column devoted to the analysis of the syllabi identified,** indicating the extent to which the course appears to address environmental issues.

A syllabus analysis exercise was carried out on the case of Audencia. The main results of this analysis are presented below (see p. 222). The analysis grid used can be downloaded online[402].

2. Teacher survey

Surveying teachers allows understanding teachers' perceptions of environmental issues and their integration of these issues into their courses, and to learn about their perceived needs. The proposed survey measures the importance teachers attach to environmental issues, how well they relate their subject to these issues, how well they integrate them into their courses, and what they would need to do to do so or to go further. It also allows them to self-assess their knowledge of the various environmental issues. Finally, through the communication that accompanies it, the survey contributes to mobilising the faculty on the integration of environmental issues into teaching.

Since the survey is declarative, it obviously has its limitations (desirability bias in particular), hence the interest in comparing the results with the other elements of the inventory: analysis of the syllabi

[402] On the webpage of ClimatSup Business: https://theshiftproject.org/former-acteurs-economie-de-demain/

and students' perceptions.

The survey conducted as part of this project was carried out at Audencia and then extended to other institutions. In this report we present the analysis of the overall results (see above p. 45 for the summary analysis note).

The questionnaire is available in French and in English in the appendix[403].

3. Student consultation

Consulting students makes it possible to find out how they perceive the way they have been trained in environmental issues. It is an opportunity to compare their perceptions with those of their teachers and to identify their expectations and needs.

We recommend that this consultation be conducted at several points in time:

- A time for broad consultation, taking into account the different aspects mentioned above, via a questionnaire that can be supplemented by focus groups;
- Continuing student feedback through the inclusion of questions on environmental issues in the course assessments carried out by the students at the end of the course.

No student consultations were carried out for the project within any establishment [404]. This report therefore does not propose a structured questionnaire that could be used as the basis for carrying out a student consultation. However, sample questions are available in the appendix.

B. Results of Audencia's syllabi analysis

1. Course classification

To carry out this analysis, the syllabi identified previously according to the occurrence of keywords related to environmental issues were classified into four categories.

A course is considered "**dedicated to environmental issues**" if it is entirely or mostly dedicated to at least one of these topics:

- knowledge of physical limits,
- understanding the links between physical limits and societal goals,
- understanding the links between physical limits and traditional management disciplines,
- the development of skills from the ClimatSup Business base applied to environmental issues.

A course is considered to "integrate environmental issues" if it is not dedicated to these issues but addresses them in a structured manner, by devoting a significant amount of time either to the

[403] All the annexes will be published during November 2022: https://theshiftproject.org/former-acteurs-economie-de-demain/

[404] In contrast, a workshop with students from various institutions was organised as part of the publication event for the interim version of this report. These discussions cannot be considered as a student consultation as they were held with students who were particularly interested in environmental issues and are not necessarily representative of business students. The minutes of this workshop are available on the Shift Project website: https://theshiftproject.org/wp-content/uploads/2022/10/CR-Atelier-6-Le-point-de-vue-des-etudiants-ClimatSup-Business.pdf

development of good general knowledge of environmental issues related to the discipline of the course, or to the deepening of one or several environmental issues.

If a course " **addresses environmental issues marginally** ", this means that environmental issues are briefly mentioned in the course syllabus, in a non-structural way, often as an illustration or an opening.

Courses that do not fit into any of these categories are classified as "**not addressing environmental issues**".

Classification was not always easy. For example, for some course syllabi mentioning "CSR" without further clarification, it was sometimes difficult to determine whether environmental issues are addressed in a structured manner or are barely mentioned at all, depending on the components of CSR that are addressed. Some courses were thus over- or under-classified.

2. Two programmes with one out of three core courses have a compulsory course dedicated to environmental issues

Among the three Audencia programmes that include a core curriculum, two have a obligatory course dedicated to environmental issues (Table 7).

Programme	Obligatory course dedicated to environmental issues	Course content
Bachelor	Geopolitics and climatic challenges *(1st year)*	This course is primarily a geopolitics course. It addresses the impact of climate change on international relations.
Grande Ecole Programme (PGE)	Economics and energy transition *(1st year)*	Half of the course (i.e. 12 hours) is dedicated to the tensions between the physical limits and the current economic model, as well as to sectoral solutions and their limits.
Science Com	-	-

Table 7 – Obligatory courses dedicated to environmental issues in Audencia's core curriculum

The presence of these compulsory courses from the first year is to be welcomed. In 2019, only 6% of the programmes of the six business schools included in the Shift Project study[405] included a compulsory course on energy and climate issues. The fact that these two courses are taught in the first year of school (in the first and third years of study respectively) is also positive, as students are confronted with these issues at an early stage.

However, these encouraging elements could be strengthened - which is already underway in the PGE (programme of elite business school).

The absence of a compulsory course dedicated to these issues at Sciences Com, Audencia's communication school, is regrettable. Even among the optional courses, only one environmental communication course is dedicated to environmental issues. The rest of the

[405] Audencia did not participate in this panel. The Shift Project, "Mobilising higher education for the climate".

courses do not seem to deal with environmental issues, except for two courses that address them only marginally.

The geopolitical approach to climate change in the Bachelor's degree is interesting and to be encouraged, but is still insufficient. It is likely that the course does not provide understanding of all the mechanisms (physical and social) of climate change, nor does it address the other physical limits. It is positive to make the link between climate change and international relations, but it would be desirable for this analysis to be extended to the management sciences, which are at the heart of the Bachelor programme. This is the case in a compulsory course on consumer marketing and responsible business, which deals with CSR and eco-innovation, or an optional course on design and the circular economy: this type of course could be developed in other disciplines.

The Economics and Energy Transition course in the PGE seems to be a comprehensive introduction to environmental issues: it addresses the full range of physical limits, their social consequences, and makes the link to economic systems. Ten other courses in the PGE appear to be dedicated to linking environmental issues to management disciplines (these courses are classified as Marketing, Finance and CSR); however, all of these courses are optional. Nine courses, also all optional, seem to integrate environmental issues, i.e. to address them in a structural way (for the most part, through one or two class sessions dedicated to these issues or to a case that integrates them, or through projects submitted by companies). It is regrettable that the compulsory courses in each of the disciplines do not seem to integrate environmental issues in a structuring way - only one seems to address them marginally.

Since the start of the 2022 academic year, the PGE has been supplemented by an optional semester at Gaïa[406], Audencia's school of ecological transition. This semester is not included in the analysis of course syllabi, which was carried out for the year 2021. This change, which offers PGE students who so choose a significant number of courses dedicated to environmental issues, considerably strengthens the presence of these issues in the programme[407].

3. Specialised programmes do not include environmental issues on an equal basis

If we extend the analysis to all of Audencia's initial training programmes, i.e. including Specialised Masters (MS) and Masters of Science (MSc), 5 out of 15 programmes have a compulsory course dedicated to environmental issues (including the Bachelor's degree, the PGE and Sciences Com - Figure 14). One of these programmes, the MS APTE[408] is dedicated to these issues, the other two specialisation programmes link the specialisation cursus with environmental issues (either climate or CSR).

[406] "Semester M1 – Managing ecological and social transition", Audencia, 1, accessed on September 2022, https://grande-ecole.audencia.com/programme/gaia-semester/.
[407] The Gaïa semester is presented in Audencia's feedback, within the dedicated Compendium, available on the ClimatSup Business project webpage: https://theshiftproject.org/former-acteurs-economie-de-demain/
[408] Specialised Master in Action for Energy Transition.

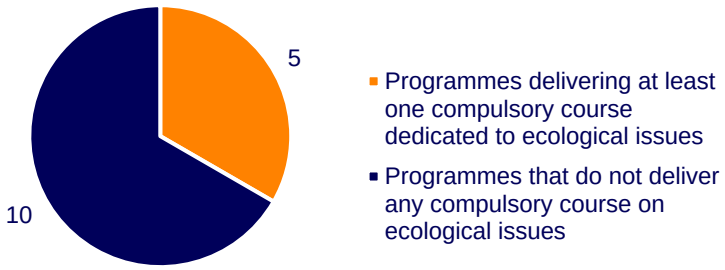

Figure 14 – Distribution of programmes according to the presence or absence of obligatory courses dedicated to environmental issues.

4. The integration of environmental issues in all the courses remains limited

The vast majority (90%) of courses do not address environmental issues, even marginally. This refers to all the courses given in the school in initial training, all programmes combined (Figure 15).

However, in order to educate students about environmental issues, all courses should contribute to understanding the links between the disciplines taught and these subjects.

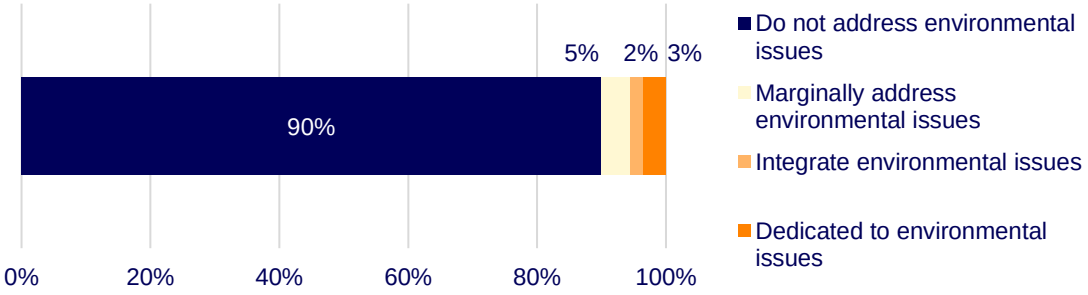

Figure 15 – Distribution of Audencia's courses according to their level of integrating environmental issues.

It should be remembered that this analysis is based solely on the course syllabi, which are not intended to highlight the integration of environmental issues, and in particular physical limits. This lack is highlighted by the discrepancy between this analysis and the teachers' survey (see the analysis of the survey in Part 2, p. 45). **Despite this, the total absence of even marginal mention of these issues in the courses clearly indicates that an effort remains to be made to integrate these issues in greater volume into the fundamentals of management.**

II. Lessons from the Shift Project's experience at Audencia

A. Audencia has shown a strong ambition and called on resources to change teaching

Audencia has shown ambition in its strategy by including the creation of Gaïa, an internal school of ecological and social transition, in its major strategic orientations [409]. Interdisciplinarity lies at the heart of Gaïa and in particular the integration of natural sciences, which is essential to provide good understanding of environmental issues and their implications for organisations.

It has deployed the human and financial resources necessary to launch a full semester course within Gaïa at the start of the 2022 academic year, which has led to the creation of numerous courses reinventing management teaching in the light of environmental issues. This new course, which business management students can choose to follow in the first year of the Master's programme, continues a dynamic that was initiated a few years ago with a compulsory core course for first-year business management students.

Through its partnership with the Shift Project, which led to the publication of this report**, the school has also contributed to a collective and open reflection on the teaching of environmental issues in management**. It has been joined in this approach by many institutions.

This collaboration contributed to adjusting the teaching transformation methodology developed with the INSA Group by the Shift Project the previous year [410], by adapting it to the context of higher education institutions in management. The inventory of the consideration of environmental issues in Audencia's training programmes was completed on the basis of an inventory of syllabi and a survey of Audencia's teachers. Professors, students and alumni were involved in the definition of the knowledge and skills base via a small workgroup and workshops in the departments of the faculty.

[409] More details on the teaching transformations carried out at Audencia are provided in the "Collection of institutional experiences", available for download on the Shift Project website.
[410] The Shift Project, "Training the engineer of the 21st century - Volume 2, Guide", March 2022.

B. There is still a great deal of work to be done to transform all the courses

However, training 100% of the students in environmental issues requires the intuition to make considerable efforts. This entails getting all faculty members to become aware of the implications of environmental issues for their teaching and to modify their courses in a coordinated manner by including new knowledge and skills. This involves revising the content of most core management courses. Such a transformation project must be considered by the management as a priority if it is to have any chance of succeeding, which means doing the following at least[411] by:

- **The school management taking control of the project**. It must be involved in defining and implementing the project and appoint a leader who is a member of the management board.
- **Limiting peripheral projects** which can lead to overload and confusion among teachers.
- **Allocating adequate human resources**, through recruitment and release from teaching duties, so that all professors can become involved in the project in their working time, in addition to personal involvement.

As is the case with many institutions, Audencia underestimated the magnitude of the task at hand, and the conditions for success presented below could not be satisfied. The success of the transformation of the teaching process depends on the next steps that will be taken.

[411] All the efforts to be made by the institution are detailed in the Guide for institutions: see Part II. 4, p. 145.

III. Synthesis of feedback from experience of establishments

Several higher education business schools have communicated feedback to the Shift Project on the integration of environmental issues in education, based on a framework of open questions.

This synthesis summarises some of the key points of this feedback, which are presented in the **Feedback Collection**, available on the Shift Project website[413].

Reading the Collection of Feedback from Experience will undoubtedly be invaluable to several actors in higher education in finding inspiration and putting into practice their desire to transform management education.

Resources

UVED, "Higher education and ecological transition: institutional initiatives"[412]

A. A definition of challenges that is not always clear

The terms used by the institutions to refer to what is called in the report "environmental issues" vary greatly from one institution to another. When asked to write feedback on the integration of environmental issues into their teaching, the institutions logically used their own words. Among the terms used: "environmental transition", "planetary limits", "ecological and social transition", "social and environmental issues" or "ecological redirection", "sustainable development", "SDG" or "SD&CR", or "CSR".

This profusion of terms is not problematic in itself. What is problematic is the polysemy of these terms and the fact that they are poorly defined, which sometimes makes it impossible to name precisely what is being discussed. For example, several institutions initially referred to the creation of new courses as well as to their disability policy or waste management on the campus. It is not a question of saying that one of these actions should be carried out to the detriment of the other: **it is simply necessary to differentiate between the issues that require the profound rethinking of management education, i.e. the core activity of an institution, and those that are related to the internal organisation of the institution.**

The use of very broad terms such as "SD&SR" (sustainable development and social responsibility[414]) sometimes makes it difficult to understand what is really being covered in the course. If courses include SD&SR issues, does this mean that voluntary CSR approaches are discussed in an example at the end of the course, or that companies are studied from the physical perspective of their material dependencies and impacts on climate change? If the issues of access to healthy food and clean water are mentioned, which are present in the SDGs, is the link made with the physical limits (climate, biodiversity) that condition access to these basic services? This confusion complicates the interpretation of the following feedback.

It would be desirable for institutions to define the terms they use (in their programme brochures, strategic objectives, etc.), **in order to give a clear picture of what is taught and**

[412] The UVED lists existing initiatives for ecological transition education which can be consulted for further feedback. UVED, "Higher Education and Ecological Transition: Institutional Initiatives".
[413] In French only. Available on the web page of the ClimatSup Business project: https://theshiftproject.org/former-acteurs-economie-de-demain/
[414] *DD&RS* in French

what is not. This would enable future students in particular to make an informed choice when choosing their business school.

B. Several establishments have recently redefined their strategy and adapted their organisation

Several institutions have evolved their strategies to integrate environmental issues (often coupled with social issues) into teaching, research and the campus. For example:

- TBS Education details the process that enabled it to adopt the status of a company with a mission; a status that was also adopted by EMLyon.
- ESSEC specifies the governance that has been put in place to follow its strategy on environmental and social issues. In particular, it indicates the number of full-time equivalent (FTE) staff in each team dedicated to these issues, and mentions the creation of a consultation body.
- The ISG presents the consultations that were carried out to structure its CSR policy, and details the policy in question.

Several organisational innovations aim to create spaces for exchange for professors who wish to work on subjects related to environmental issues. Thus, at ESSEC, the Sustainability Guild was created, which brings together professors from all departments interested in these subjects. At ESCP, the creation of a Sustainability academic department was favoured, with "academic links" who link up with the rest of the faculty.

C. Obligatory courses dedicated to environmental issues are being developed, though they remain to be created in most establishments

Obligatory courses dedicated to environmental issues have been created in several establishments.

- ESCP is an exception, offering a compulsory course dedicated to these issues in every degree programme of at least one year. Detailed **feedback on experience** on the creation of these courses is provided in a dedicated box.
- The feedback from EMLyon **details the content of a compulsory course** for the Grande École programme (PGE), titled "Acting for climate".
- Other institutions offer compulsory courses in the PGE: this is the case of Audencia ("Economy and energy transition"), HEC Paris (course on planetary limits) and ESSEC. Likewise, the University of Paris Dauphine has created a compulsory course on environmental issues in the first and second years of the degree[415].

[415] The University of Paris Dauphine did not communicate feedback for this report, but a presentation of the course was given for The Shift Project by Ivar Ekeland and Aïcha Ben Dhia: Les défis environnementaux du XXIème siècle. The content of the course is freely available: Ekeland, Ben Dhia, and Treiner, Environmental Challenges of the 21st Century.

However, most of the establishments that wrote a feedback report did not mention a compulsory course dedicated to these issues.

D. Approaches to transform all management courses remain hesitant

Some institutions report a willingness to transform core management courses to incorporate environmental issues. However, the present feedback provides relatively little detail on these approaches and on the content of the courses that have evolved.

- ESSEC reports a process of evolution of the core courses of the PGE, and about ten teachers have undergone training at the Transition Campus.
- At MBS, 15 professors have taken a four-day training course at the Transition Campus, which has initiated a process of transformation of existing courses; but this does not yet concern the entire teaching staff.
- The feedback from Kedge offers an example of a fundamental course in economics, compulsory in the first year of the PGE, which has been completely rethought in the light of ecological issues. Similarly, the school's MSc Sustainable Finance offers an example of a finance programme designed in light of ecological issues[416].
- IMT Business School and HEC both mention a current revision of their respective PGE, notably to integrate "SD&SR skills" (IMT BS) or "sustainable development" (HEC).

Teacher training in environmental issues, which is a prerequisite for the development of all courses, appears to be very limited to date. Only a few schools announce a training programme for their teachers. MBS gave details of the training already carried out: in addition to the 4-day training course, which concerned only 15 teachers, a climatologist gave a half-day talk to the entire teaching staff, and workshops were organised and will continue. A few other institutions announced that training sessions were planned, such as TBS, which has formed a partnership with UVED for this purpose, but without many details: will the training sessions be compulsory for all teachers? What will be the content, what will be the duration? These questions remain pending.

E. Examples of innovative courses and programmes that can be a source of inspiration

Feedback from experience provides a glimpse of innovative courses and programmes dedicated to environmental issues.

For example, Audencia's feedback presents the M1 semester of Gaïa, Audencia's school of ecological transition: an entire (optional) semester dedicated to ecological issues and the link between these issues and management. ESC Clermont presents the MSc Strategy & Design for the Anthropocene Era, for which a dedicated website[417] also presents the programme, examples

[416] The MSc is not presented in the feedback; it is based on the approach presented in the following working paper: Revelli and Lagoarde-Segot, "Finance and Economics Education in the Anthropocene Era: Embedding through Sustainable Ontology - Working Paper".
[417] https://strategy-design-anthropocene.org/fr (ESC Clermont BS and Strate Ecole de Design Lyon.)

of theses, publications, etc. TBS mentions the Climate Action Program, an optional program composed of several modules from L3 to M2.

As far as the courses are concerned, the sheets below show the compulsory EMLyon course "Acting for the climate", with examples of case studies. IGR-IAE Rennes details the course of a creativity seminar (hackaton) on topics related to sustainable development. IMT BS also presents an innovation seminar, the "Social Innovation Game". ESCP cites the "Energy, Business, Climate & Geopolitics" course, the content of which has been published on a dedicated platform[418].

[418] ESCP Business School, "Commons For Future".

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List of abbreviations

AASCB: *Association to Advance Collegiate Schools of Business*

AMBA: *Association of Masters of Business Administration*

IEA: International Energy Agency

AMF: Financial Market Authority

BTS: Higher Technician Degree

BUT: Technical University Bachelor

C3D: Collège of directors of sustainable development

CA: Management Board

CCI: Chambre of commerce and industry

Cdefi: Conference of directors of French engineering schools

CDEFM: Conference of directors of French business schools

CEFDG: Commission on the evaluation of management education and degrees

CGE: *Conférence des grandes écoles*

CNF: National education framework

COP: Conference of the parties

Comité de pilotage: Steering Committee:

CSE: Social and economic committee

CTES: Convention for the transition of higher education establishments

DSN: Sustainable Development Solutions Network

DUT: Technical university degree

EESC: Consular Higher Education Establishment

EQUIS: European Quality Improvement System

ESG (criteria): Environmental, social and governance criteria

ESR: Higher education and research

ESS: Social and solidary economy

FDR: Sustainable Finance Disclosure Regulation

FNEGE: National Foundation for Business Education

FT: Financial Times

GDP: Gross domestic product

GHG: Greenhouse gas

HRM: Human resource management

Hcéres: High Council for the Evaluation of Research and Higher Education

HESI: Higher Education Sustainability Initiative

IAE: Institute of company administration

IEP: Institutes of political studies

IMT-BS: *Institut Mines-Télécom* Business School

IPBES: Intergovernemental Science-Policy Platform on Biodiversity and Ecosystem Services

IPCC: *Intergouvernemental Panel on Climat Change*

ISSB: *International Sustainability Standards Board*

IUT: Technology University Institutes

LMD: Degree-Master's-PhD

MESR: Ministry of higher education and research

MIFID: Markets in Financial Instruments Directive

MS APTE: Specialised Master's Actor for energy Transition (courses given by Audencia)

NGFS: Network of Central Banks and Supervisors for Greening the Financial System

NGO: Non-governmental organisation

PGE: Grande école programme

PIA: Investments for the future plan

PRME: Principles for Responsible Management Education

QS: Quacquarelli Symonds

RESES: Student network for an ecological and solidary society

HR: Human resources

RNCP: National directory of professional certifications

SER: Social and environmental responsibility

SA: Joint stock company

SAS: Simplified stock company

SDG: Sustainable development goals

SD&SR: Sustainable development and social responsibility (higher education label)

SRO: Social responsibility of organisations

SNB: National strategy for biodiversity

STS: Higher technical section

TCFD: Task Force on Climate Related Financial Disclosures

THE: Times Higher Education

TNFD: Taskforce on Nature-related Financial Disclosures

TRI: Internal rate of return

UEED: Universities of tomorrow's economy

UFR: Training and research unit

VAN: Net present value

VAR: Value At Risk

WG: Workgroup

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The Shift Project is a think tank working towards a post-carbon economy. As a non-profit organization recognized as being in the public interest and guided by the demands of scientific rigor, our mission is to enlighten and influence the debate on the energy transition in Europe. Our members are large companies that want to make the energy transition their priority.
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