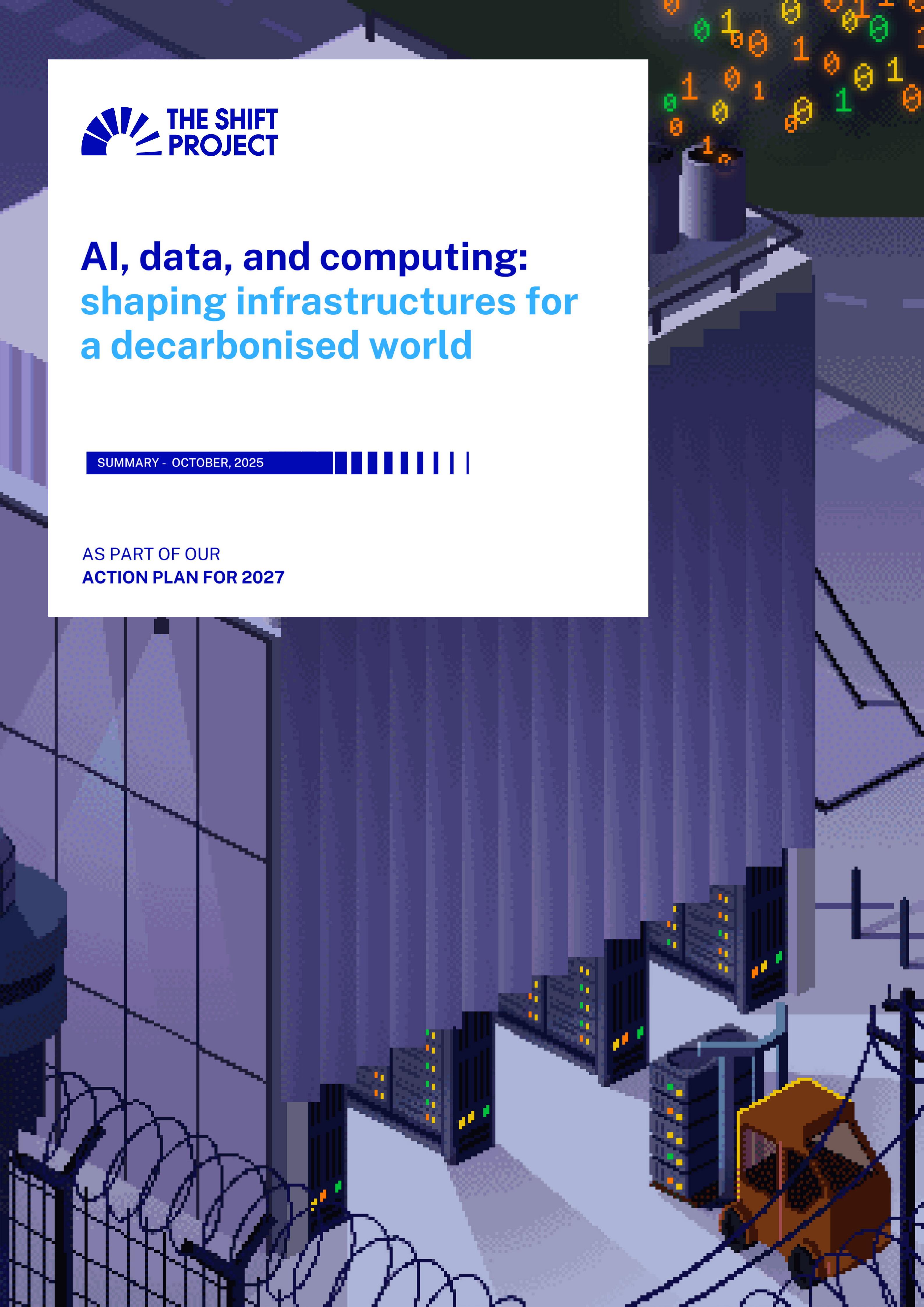


THE SHIFT PROJECT

AI, data, and computing: shaping infrastructures for a decarbonised world

SUMMARY - OCTOBER, 2025

AS PART OF OUR
ACTION PLAN FOR 2027

THE DATA CENTRE SECTOR

Global energy and climate trajectories

Historically, electricity use by data centres in the use phase has not capped*:

*« Energy and AI », IEA, 2025

it increased from 165 TWh in 2014 to 420 TWh in 2024, excluding cryptocurrencies

it increased from +7% per year over 2014-2019 to +13% per year over 2019-2024

By 2030, without major changes in current trends, **global electricity use by data centres could reach up to 1500 TWh per year.**

A **2.8-fold** increase in 7 years

In 2025, **15%** for AI

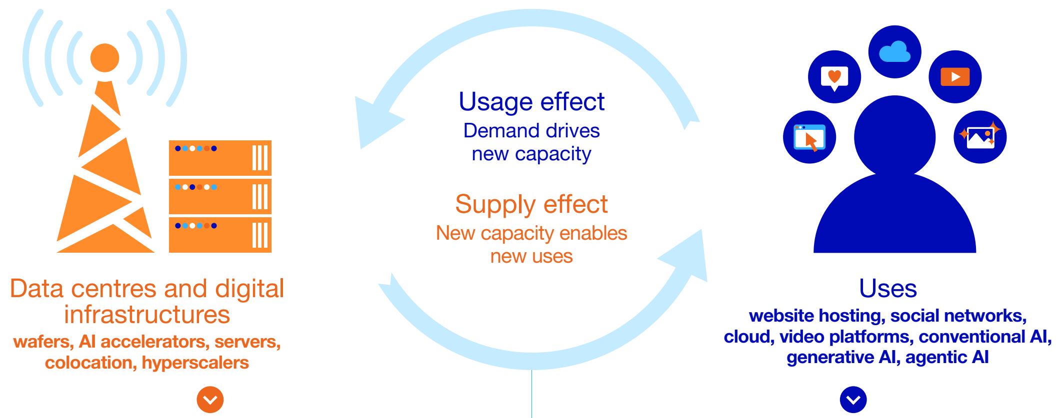
In 2030, at least **35%** for AI

Widespread increase in generative AI

Widespread increase in the use of conventional AI

Increase in cryptocurrency consumption

The unsustainable growth in supply and use



Increase in investment for new data centre capacities

Widespread integration of generative AI in services

Rising per-person use of AI services

Significant increase in the number of AI service users

In the US, the answer so far has been to rely on **fossil gas,** to address energy pressures linked to the growth of artificial intelligence. Energy scarcity? A constraint to be bypassed rather than an incentive to moderate supply, leaving energy systems to shoulder the responsibility for the transition towards decarbonisation.

By 2030, the trajectory projected for the data centre sector **is unsustainable:**

+9% GHG per year despite decarbonisation of the electricity mix

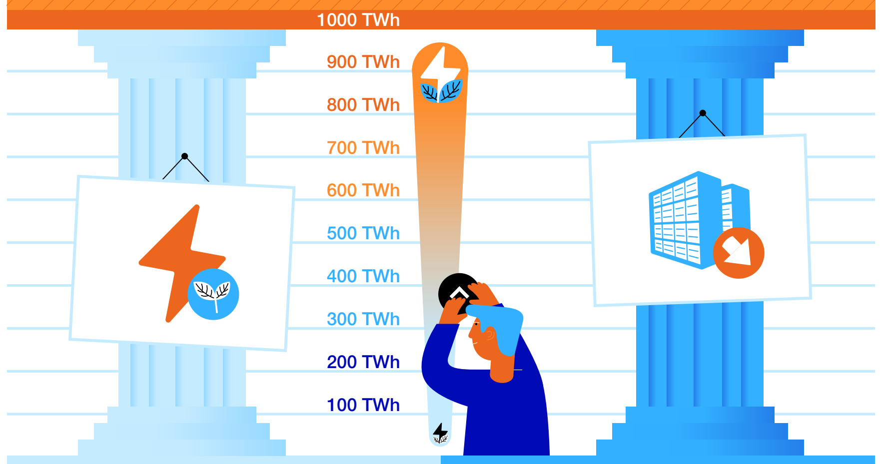
VS

-5% GHG per year required to reach the net-zero target

920 MtCO₂e per year, **up to twice France's annual emissions.**

Successfully decarbonising the global data centre sector means:

There is a cap on electricity consumption, with the level depending on:*



How effective the decarbonisation of electricity is

How effective the reduction of the embodied carbon footprint of manufacturing is

*By way of illustration, achieving 90% decarbonisation of the sector would require reaching:
- 200 TWh for 111 gCO₂e/kWh with a 90/10 split between use/manufacturing;
- 1000 TWh for 25 gCO₂e/kWh with a 95/5 split between use/manufacturing (illustrative calculations).

The European context: different situations but a common trend in the data centre sector

Electricity use by data centres in Europe could **double** between 2023 and 2030 **and quadruple** between 2023 and 2035*.

*Rising from 97 TWh in 2023 to 200 TWh in 2030 and 369 TWh in 2035

In Ireland, data centres already account for **over 20 %** **of available electricity,** surpassing urban residential demand.

This increase in electricity use is, **to our knowledge, not factored into energy planning scenarios.** It could therefore jeopardise Europe's ability to meet its climate targets.

THE DATA CENTRE SECTOR

Energy and climate trajectories in France : steer or endure?

1

Prepare for the consequences of today's structural choices.

Grid connections approved now will reach full capacity by around 2035 and could strain the electricity system and trigger conflicts of use.

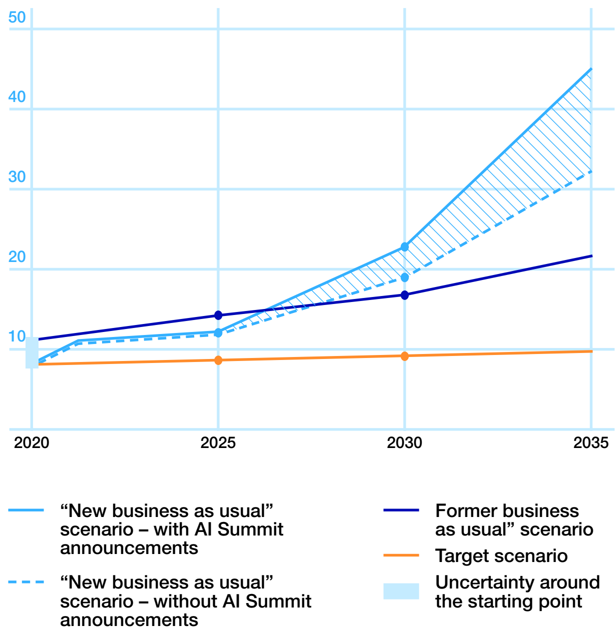
2

Planning the energy transition

The energy transition depends in particular on:

- **The electrification of major economic sectors**
- **Demand management (sobriety sufficiency and energy efficiency)**

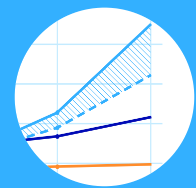
Total electricity consumption of data centres in France between 2020 and 2035 across the three scenarios
(TWh per year)



Maintaining the current trajectory would make it impossible to meet the sector's 2030 decarbonisation targets, in the national inventory as well as in its footprint.

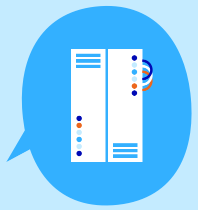
Map sites and measure consumption:
robust monitoring of digital infrastructures **is essential for energy-carbon planning.**

The shift from the "former business as usual" scenario to the "new business as usual" scenario shows how the sector's growth - and the risks it brings - **have been underestimated.**



7,5% vs **2%** current share

projected share of data centre electricity use in 2035 if recent announcements are implemented.



1/3

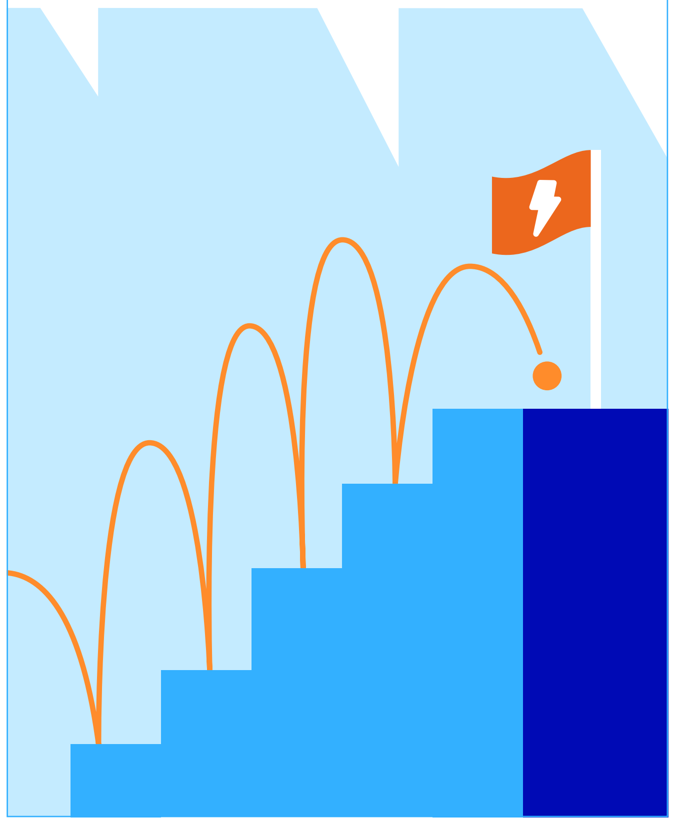
the share that data centre electricity use could take in total industrial electricity demand in 2035 – a development not previously foreseen.

3

Establish sector targets to secure a resilient transition,

preventing data centres from taking up the electricity required to decarbonise the wider French economy.

The measurable impacts of data centres' positive and negative side-effects (attractiveness, jobs, air pollution, limited resources such as water, land, energy, climate, environment, etc.) can vary and may even cross critical thresholds. An effect that seemed minor yesterday could become significant tomorrow.



Redirecting our technological choices towards carbon and energy viability

Assessing the carbon and energy impacts of AI

There is still too much uncertainty around the unit carbon and energy impacts of AI applications to establish generic figures, but it is possible to identify the main drivers.

The unit impacts of training and inference phases depend on the size of the model (number of parameters, level of versatility), **the type of tasks performed** (generation more intensive than classification, **image generation** more intensive than text) and **the way the computation steps are organised**.

Despite strategies by AI actors to make models more carbon and energy efficient, the carbon footprint of **the training phase has increased exponentially over the past ten years.**

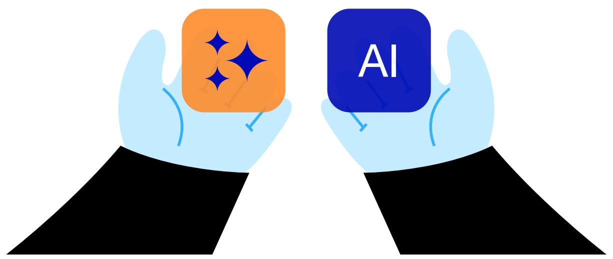
The impact of the inference phase, proportional to the number of uses, can outweigh that of training within just a few weeks for large-scale deployments such as today's most popular chatbots.

Steering our technological choices

Design lever of action: optimise (lightweight models, hardware impacts, etc.) and act on functionalities (transform, alter or drop certain features).

Deployment lever of action: adjust how widely solutions are rolled out (targeted or generalised) to match the need and the conditions for compatibility with the carbon budget.

If these tools do not make the AI solution compatible with the reference carbon budget, it must be abandoned or replaced with a non-AI solution.



Presenting a method

1 Define **a reference energy and carbon trajectory**

2 **Specify the needs** to be addressed with the AI service and its functionalities

3 **Link one or more technical** solutions to each function

4 **Assess the energy and carbon impacts** of each technological choice **and map the effects that each technical solution.**

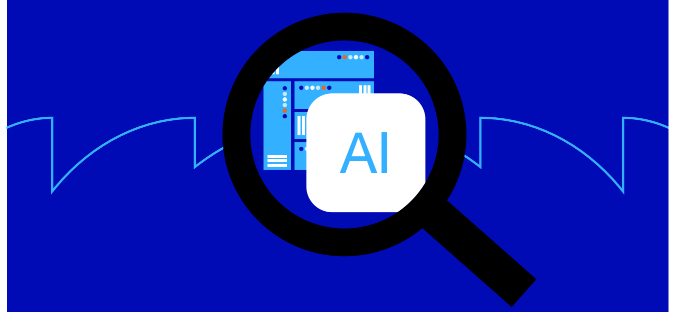
5 **Reduce the impact of solutions to make their deployment compatible with the reference trajectory,** by activating design measures and deployment tools

Recommandations

Steering the decarbonisation of the data centre sector requires decisions that are not only technical but also societal and political.

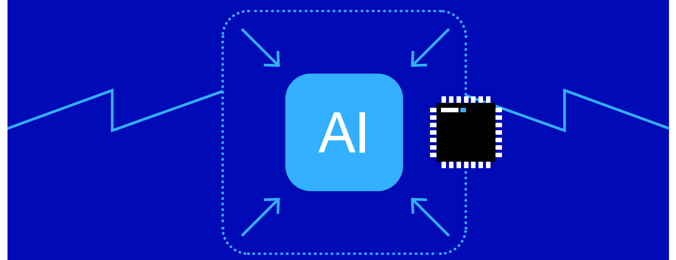
1 Measurement and transparency

Ensure public monitoring of the data centre sector and transparency in AI services.



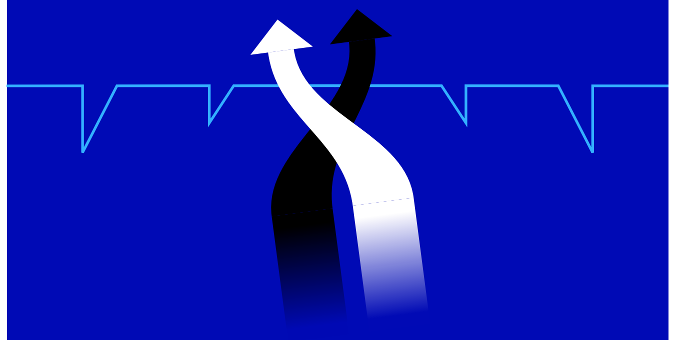
2 Optimisation

Design frugal AI and models, and reduce the impacts of hardware manufacturing (processors,etc.).



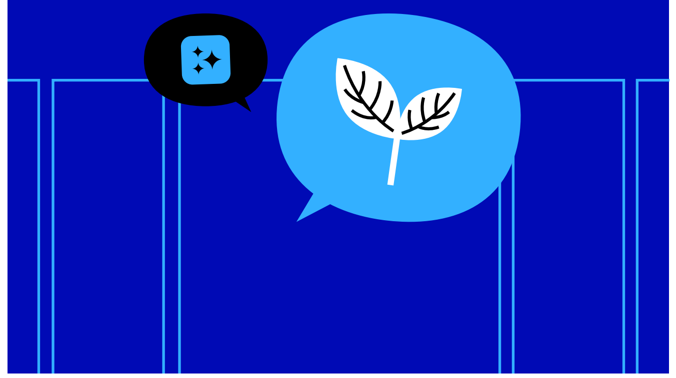
3 Collective shift towards sobriety

Define and enforce an upper-limit trajectory for the electricity consumption of data centres.



4 Knowledge, training, and skills

Do not redirect training resources and public debate towards AI at the expense of the transition.



The Shift Project is a French think tank advocating the shift to a post-carbon economy. As a non-profit organisation committed to serving the general interest through scientific objectivity, we are dedicated to informing and influencing the debate on energy transition in Europe.

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THE SHIFT PROJECT

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