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AGENCE DE LA TRANSITION ÉCOLOGIQUE

What are the scenarios for Carbon Neutrality in France?

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Plan

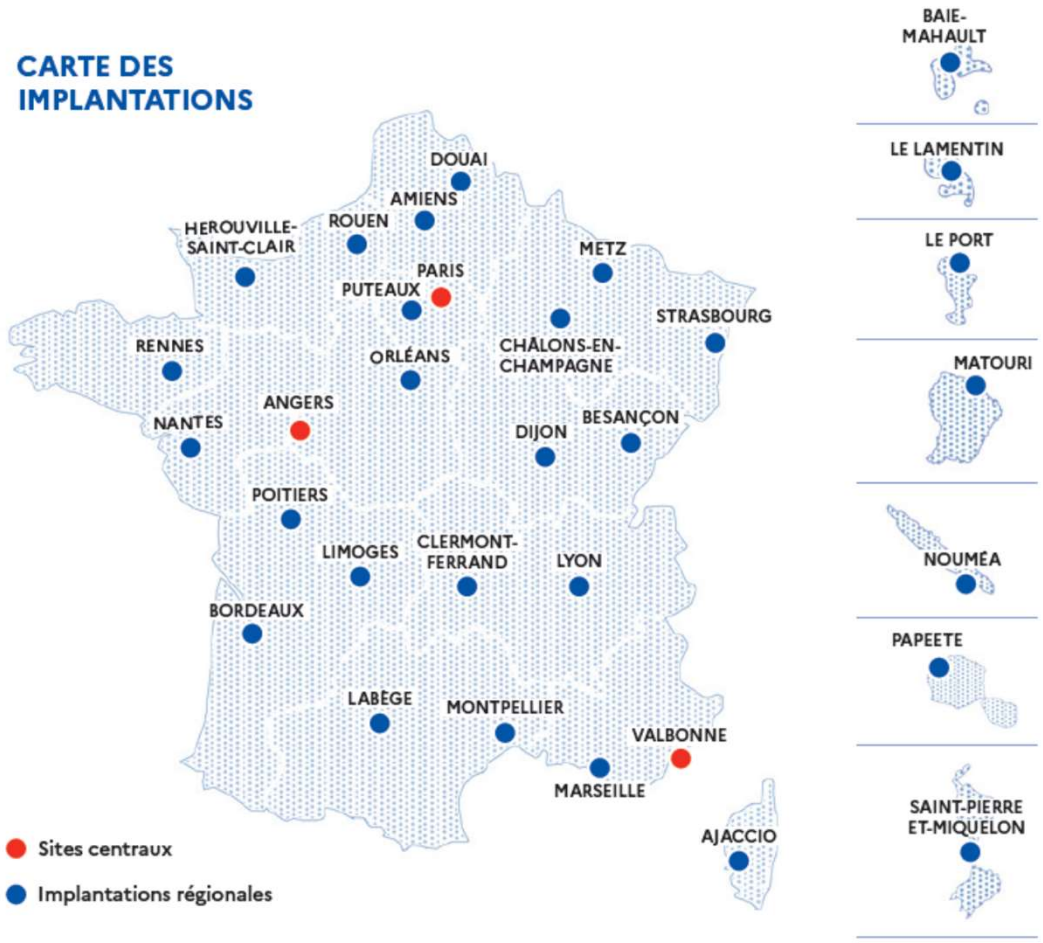
1. What is ADEME?
2. Carbon neutrality in 2050 ? The ADEME scenarios Transition(s) 2050
3. Focus on carbon sinks

1. What is ADEME?

ADEME
French Public Agency for the Ecological Transition

Areas of intervention

Climate change, Air quality, Energy management and renewables,
Circular economy and waste management,
Eco-conception and reduction of environmental impacts,
Bioeconomy and bio-based products,
Sustainable soil management and polluted sites, … but not Biodiversity (OFB) and water resources (Agences de l'eau)

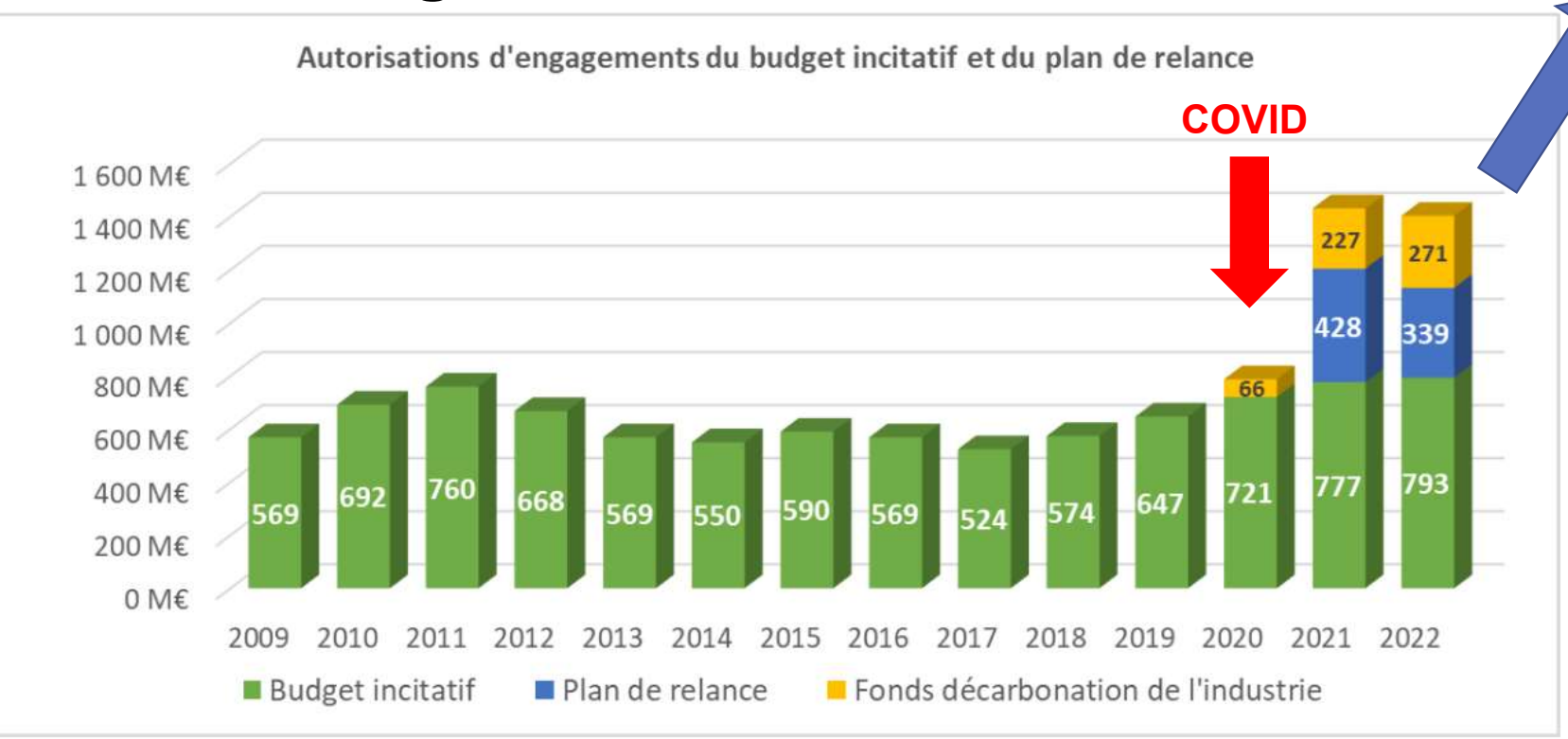


ADEME missions

- **Accelerate the transition** to a more sober and supportive society that creates **jobs** and is more humane and harmonious
- Mobilise all players, **companies**, **local authorities** and **citizens** to act:
  - To commit society to a logic of sobriety and control energy and resource consumption at levels compatible with **planetary limits**
  - To accelerate the reduction of greenhouse gas emissions in line with the **carbon neutrality** trajectory
- 3 axes for the ecological transition:
  - expand **deployment**
  - develop knowledge (R&D) and contribute to **collective expertise**
  - **innovate** and **prepare the future**

ADEME budget

4 billions of euros in 2023



2. Carbon neutrality in 2050?
The ADEME scenarios
Transition(s)

Transition(s) 2050

| 2013 : first **VISIONS ADEME**

| 2015 :
PLURIANNUAL ENERGY PROGRAMMING (PPE)
& NATIONAL LOW CARBON STRATEGY (SNBC)

| 2017 : révision

| 2019 : PPE 2 & SNBC 2

| 2021 : Transition(s) 2050

| 2023-2024 : CLIMATE-ENERGY STRATEGY SFEC = SNBC + PPE + CLIMATE CHANGE ADAPTATION NATIONAL PLAN

➢ **Objectives**

- ❑ To illustrate the range of long-term possibilities for achieving "carbon neutrality" and explore the various implications
- ❑ To shed light on the decisions that must be taken in the short and medium term through an educational exercise

➢ **Overall framework**

- ❑ 4 contrasting scenarios for carbon neutrality in France by 2050
- ❑ Energy, climate (emissions, CO2 capture, adaptation), resources and pollution (materials, biomass, biodiversity, soils, air pollution), economy (modelling, investments, employment), lifestyles
- ❑ Contrasting views on the economic context, technological developments, territories, lifestyles and governance. These are stories of societies as much as technical prospects.…

TRANSITIONS 2050

DECIDE NOW TO ACT FOR THE CLIMATE

https://www.hautconseilclimat.fr/wp-content/uploads/2022/06/Rapport-annuel-Haut-conseil-pour-le-climat-29062022.pdf

4 Narratives

S1 FRUGAL GENERATION

Forced Frugality

3x less meat

Local based

Medium sized towns and rural areas

Massive renovation

Low-tech

New indicators of prosperity

S2 REGIONAL COOPERATION

Sustainable lifestyles

Managed Mobility

Cooperation between regions

Sharing economy

Open Governance

Targeted Reindustrialisation

S3 GREEN TECHNOLOGIES

Decarbonisation Technologies

Demolition/reconstruction

Metropolitan Areas

Exploited Biomass

Hydrogen

Green Consumption

Minimum regulation

S4 RESTORATION GAMBLE

Mass Consumption

Urban sprawl

Intensive Agriculture

Artificial Intelligence

Uncertain Technologies

CO_2 capture from the air

Globalised Economy

Main levers for decarbonation

S1 FRUGAL GENERATION

S2 REGIONAL COOPERATION

S3 GREEN TECHNOLOGIES

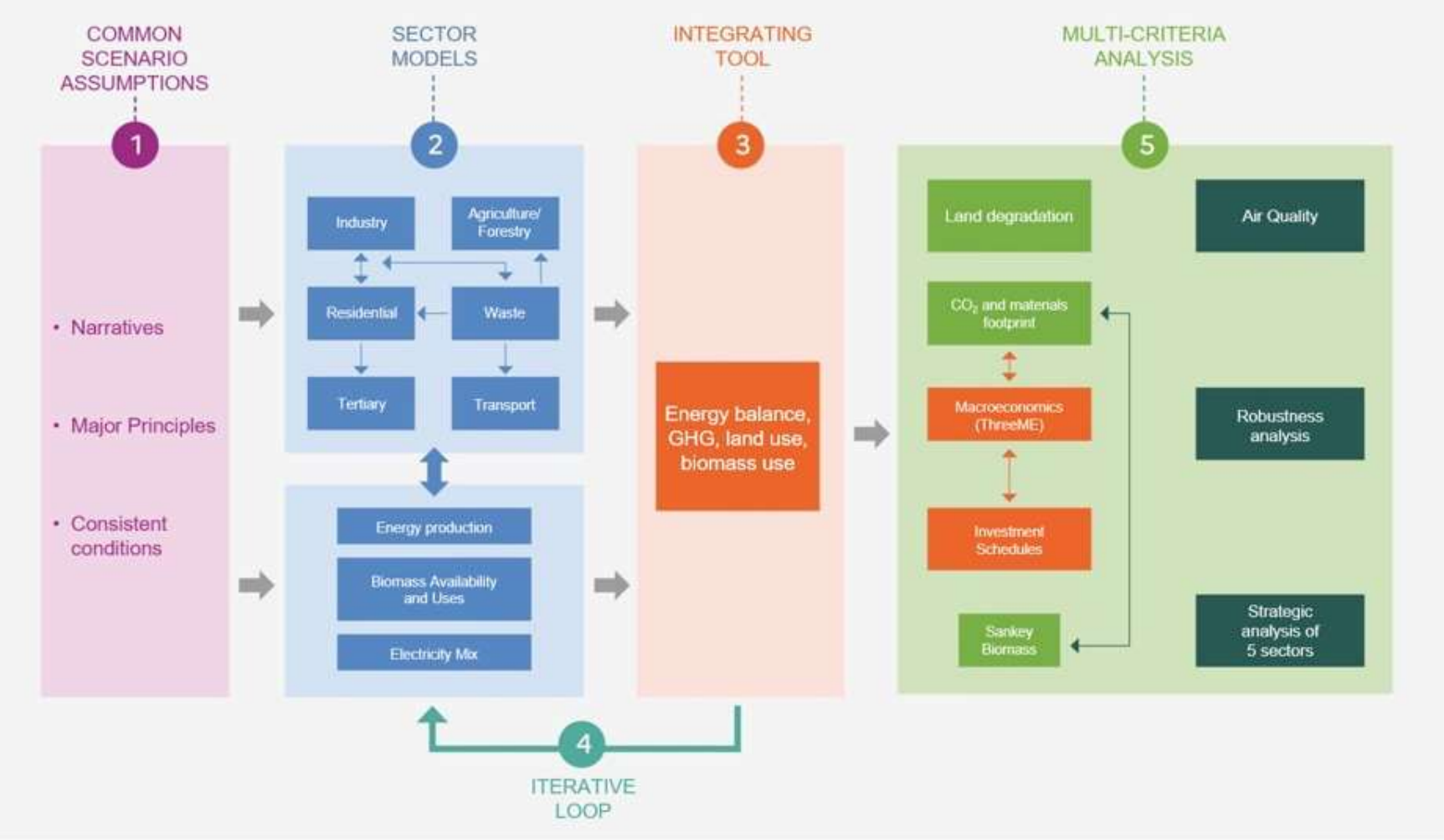
S4 RESTORATION GAMBLE

	S1 FRUGAL GENERATION	S2 REGIONAL COOPERATION	S3 GREEN TECHNOLOGIES	S4 RESTORATION GAMBLE
Sobriety	+++	++	+	
Efficiency	+	++	+++	+++
Energy decarbonation (incl. Renewables)	+++	+++	+++	++

Governance: **Local** → **Global**

Env. impacts: **Avoiding** → **Repairing**

Working method

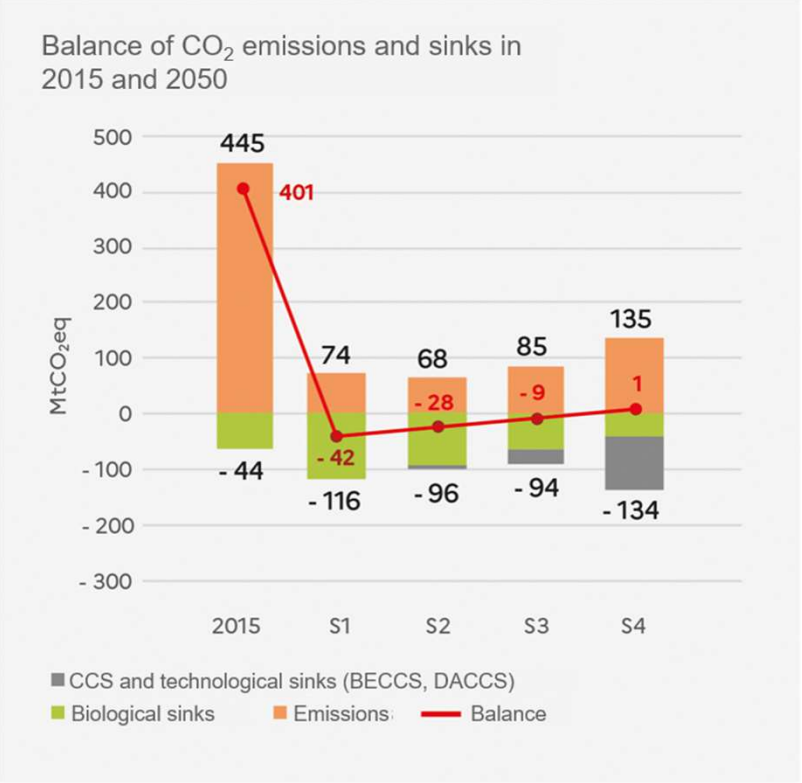


Carbon neutrality, a difficult road

- **We must act immediately** because the social and technological transformations to be carried out are far-reaching.

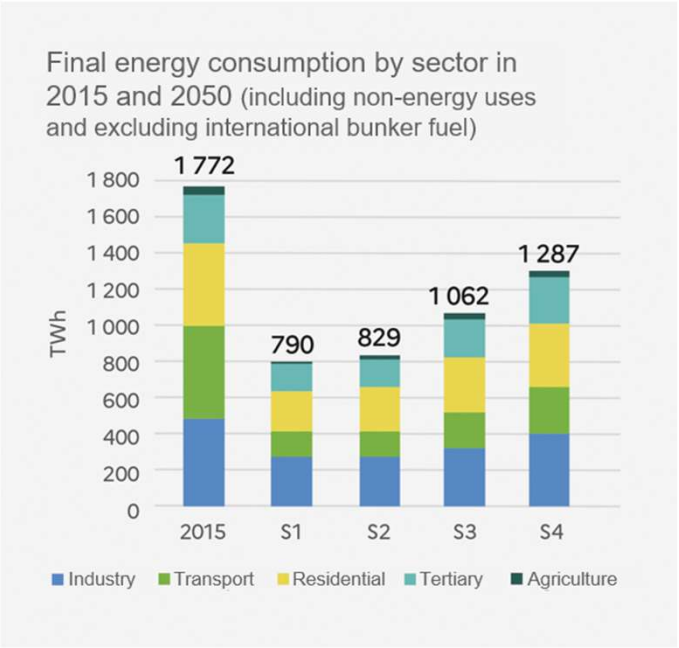
- **Achieving neutrality depends on major human or technological gambles** that differ depending on the scenario.

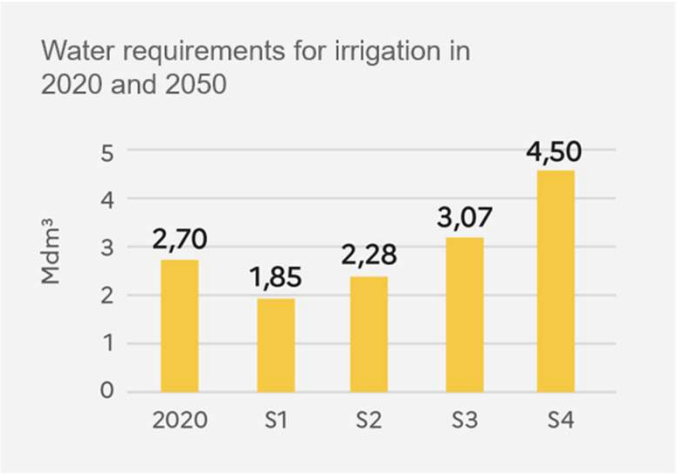
- **Two scenarios appear higher risk**:
  - Scenario S1: Frugal Generation:
    highly socially divisive regarding its desirability (sobriety)
  - Scenario S4: Restoration Gamble: high
    risk of technological feasibility (ex: direct carbon capture and CSC)



Reducing energy demand and controlling consumption of resources

- **Reducing demand** is the key factor for achieving carbon neutrality through:
  - Moderate consumption.
  - Energy efficiency.
- **Need for radical change** in lifestyles and productive systems.
- **Circular Economy** → saves resources → reduces energy demand.
- **Pressure on natural resources** varies considerably from scenario to scenario.



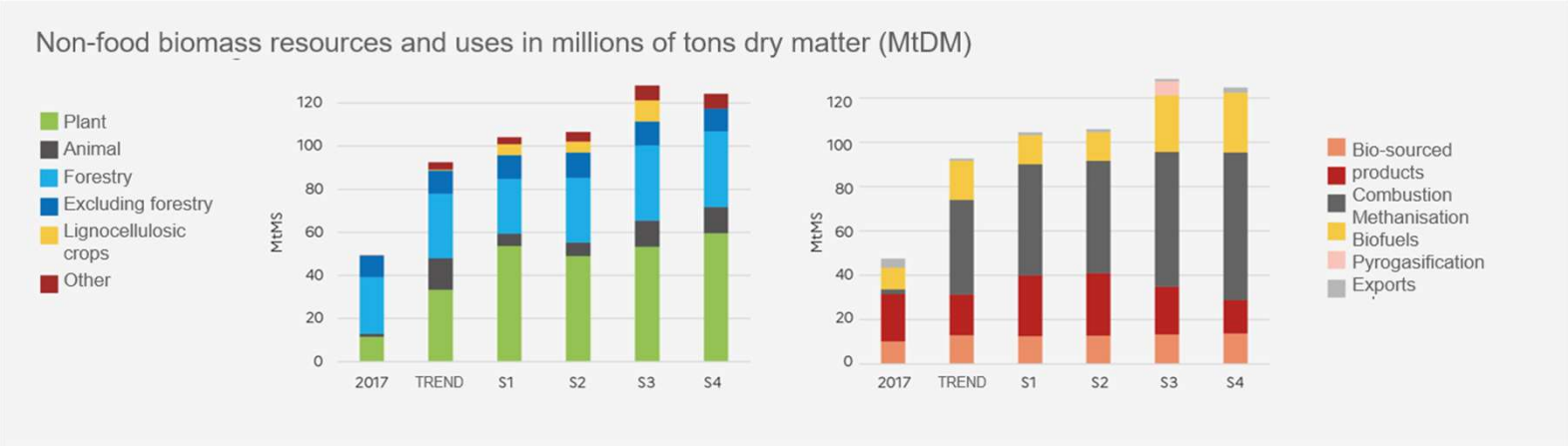


Increasing biomass mobilization in all scenarios

- **Maintain a balance between food and energy use** of biomass and preserve ecological functions. Although an increase of biomass mobilization in all scenarios for materials and energy uses (factor 2 to 2,5)

- **S1 and S2 :** additional biomass, largely derived from plant biomass: intermediate crops, crop residues (straws) and surplus grassland/limited forest timber removal to favour carbon storage in ecosystems.

- **S3 et S4 : h**igh levels of biomass mobilization (including wood harvesting in forests) aimed at maximising the substitution effects of fossil resources/ new crops: lignocellulosic crops and micro-algae for the production of bioenergy.



- **Methanisation:** important sector regardless of the considered scenario for the use of agricultural biomasses (plants and livestock manure) and waste (IAA, bio waste, etc.)
- **Biofuel and pyrogasification use**: vary depending on the availability of resources, particularly lignocellulosic (forest, non-forest, lignocellulosic crops), which are not otherwise valued

Can we rely only on natural carbon sinks to achieve neutrality?

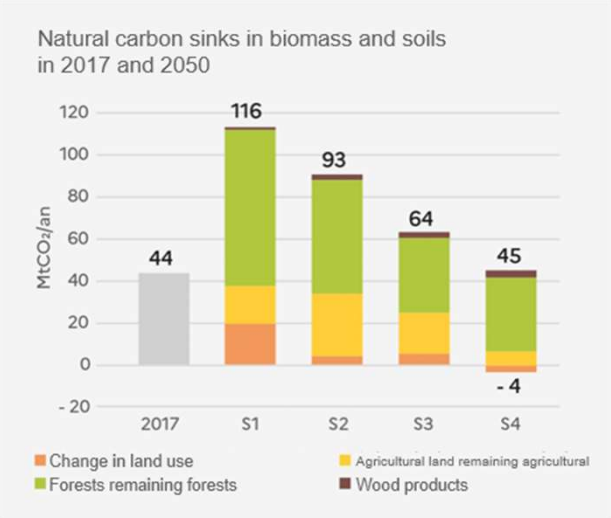
- **In S1 and S2, biological sinks are sufficient**.
  - Limitation of biomass harvesting
  - Preservation of services provided by nature (biodiversity, water quality, etc.)
  - Very low land degradation.

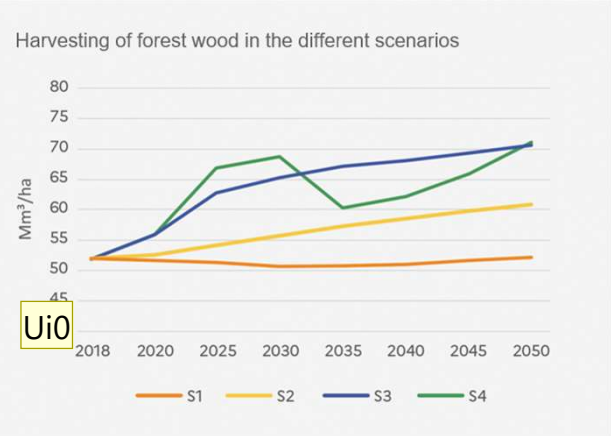
... But it requires changes in our lifestyles.

- **S3 achieves a satisfactory balance** between natural and technological sinks.
- **S4** deploys **technologies to capture CO_2 from the air** that...
  - Consume a lot of energy;
  - Are not mature today and it is not known if they will be mature in time;
  - Raise questions are to their cost over the next 30 years.

... But the CO_2 captured must be stored underground, which raises questions of faisability and acceptance.

Key message: adaptation of forests and agriculture is therefore becoming an absolute priority in the fight against climate change.





Diapositive 16

Ui0 mettre en conclusion adaptation pour foret et agriculture

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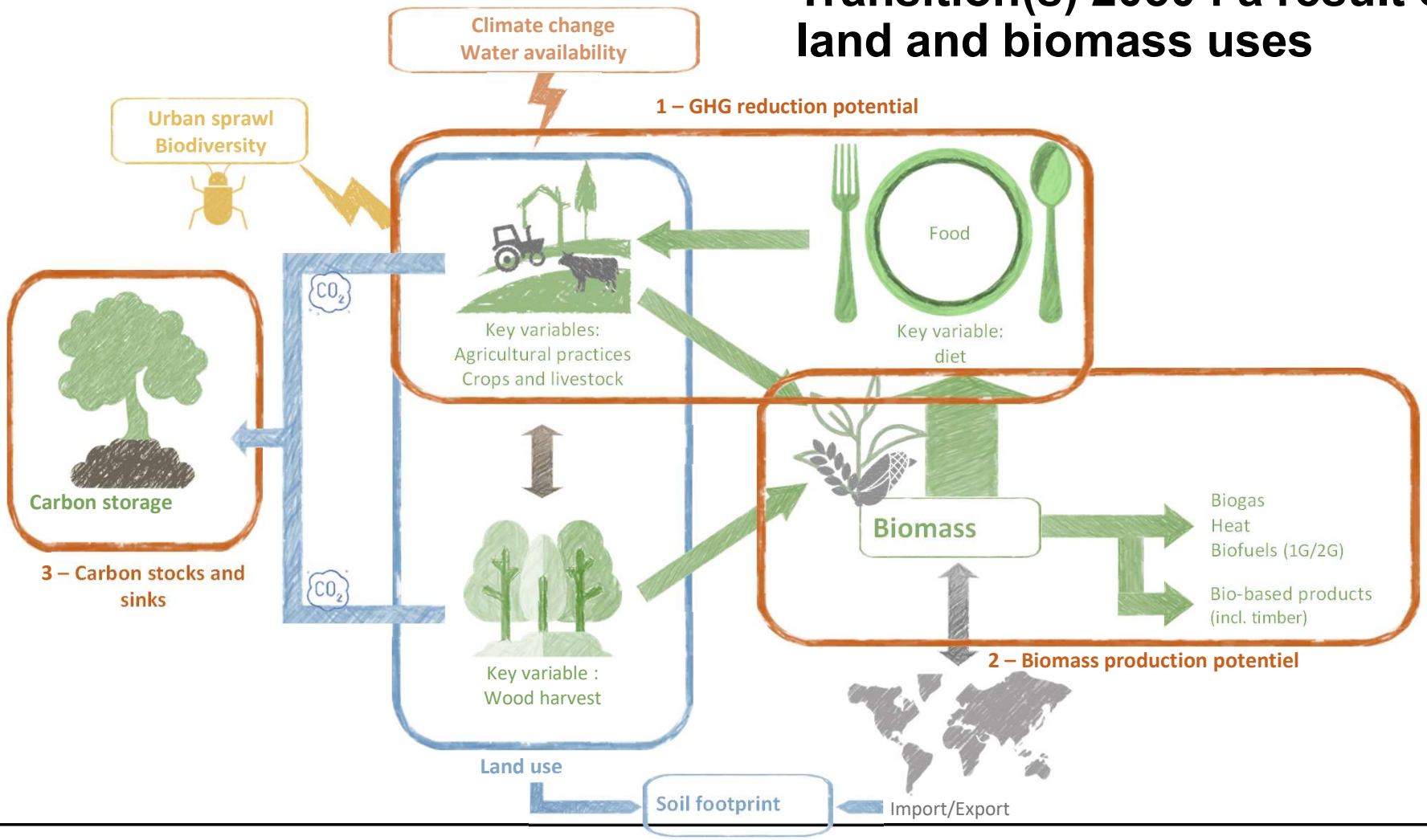
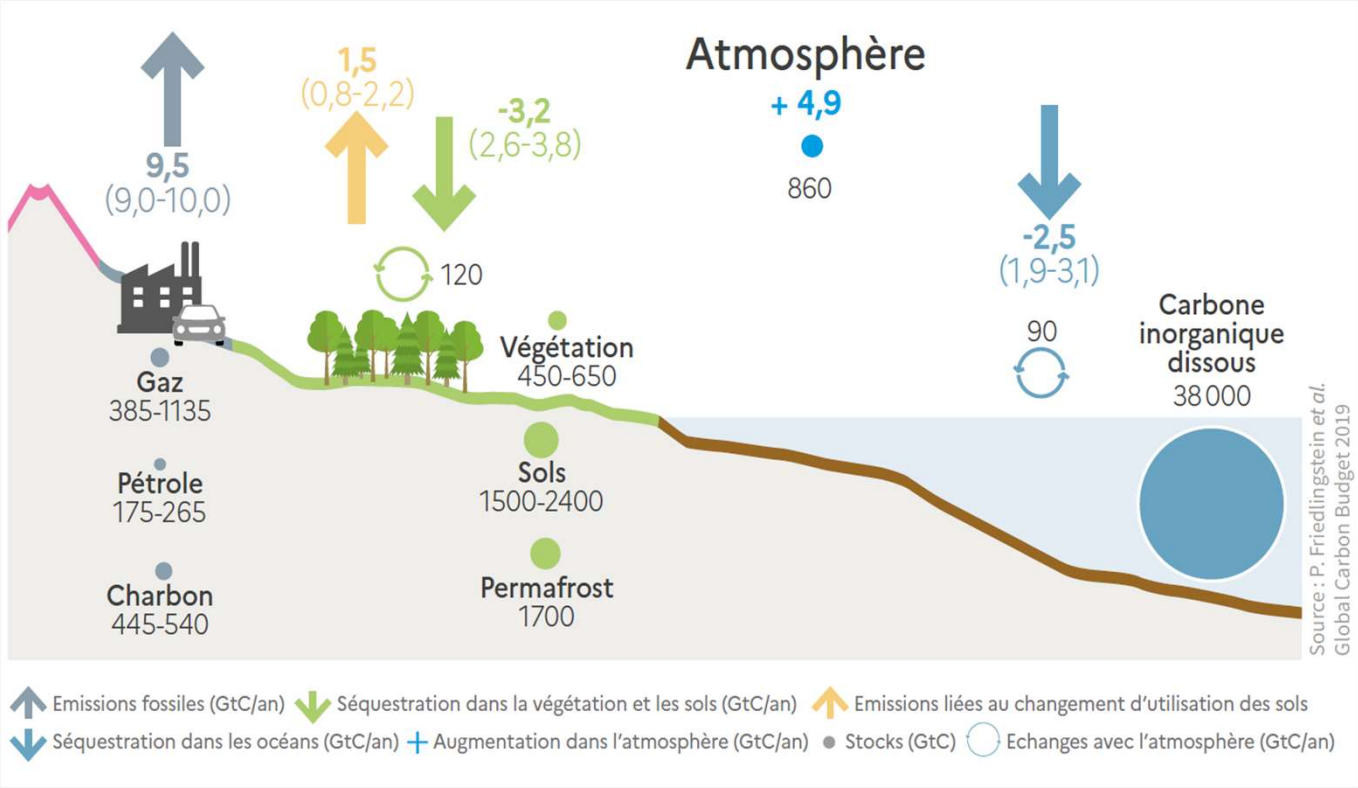
3. Focus on carbon sinks

Natural carbon sinks in Transition(s) 2050 : a result of land and biomass uses



Natural carbon sinks : what it's all about?

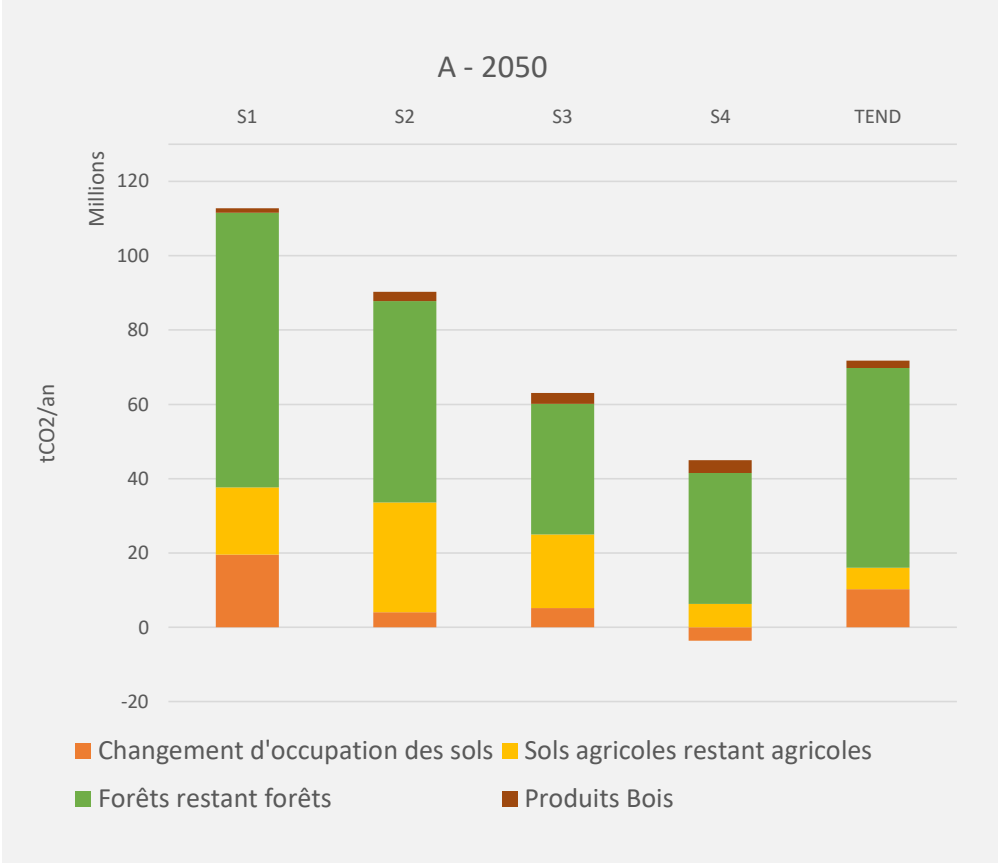
- Carbon exchanges between ecosystems and the atmosphere
- Soil, vegetation...
- Land use, management of natural areas, forest management, agriculture, ...



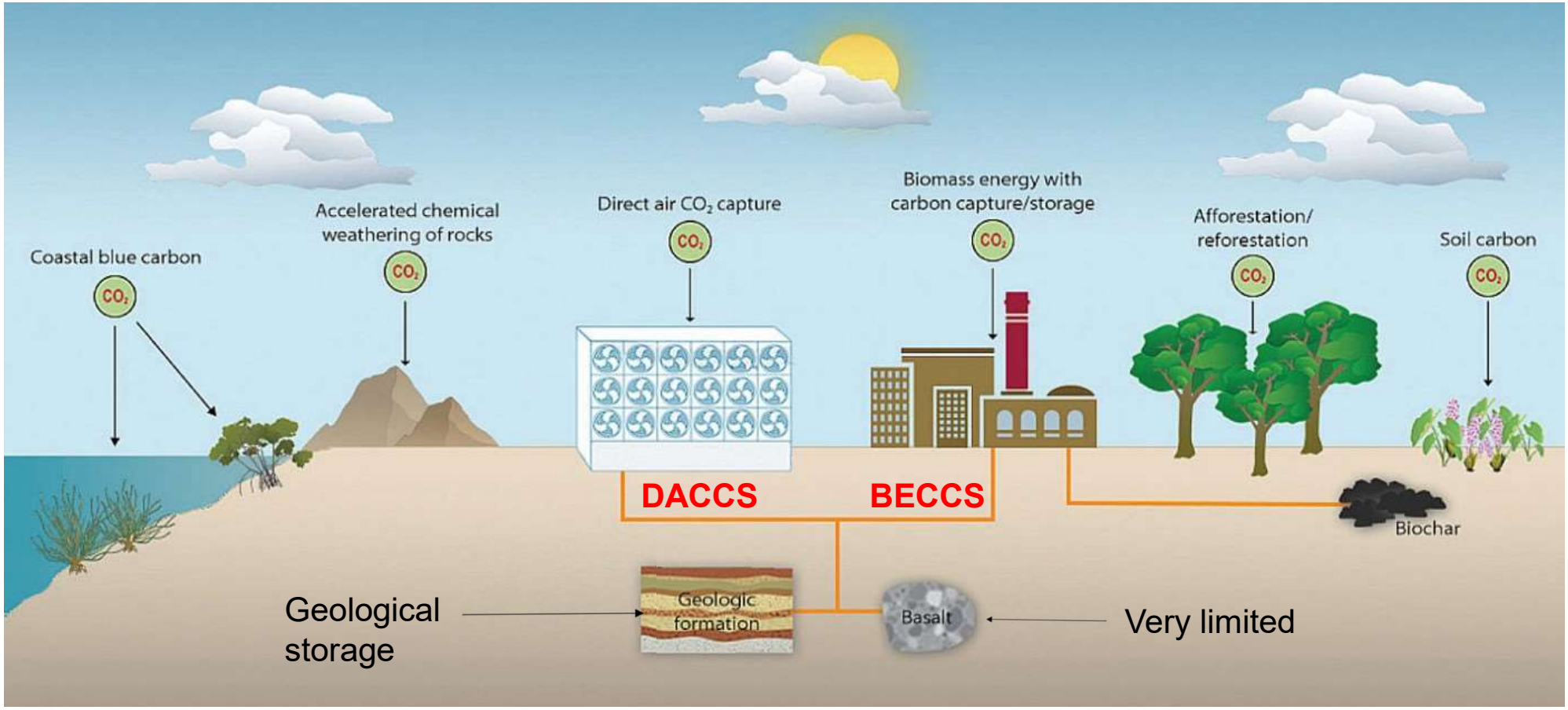
Global carbon stocks and carbon fluxes between 2009 and 2018 in GtC (from Friedlingstein et al. 2019)

Natural carbon sinks in Transition(s) 2050

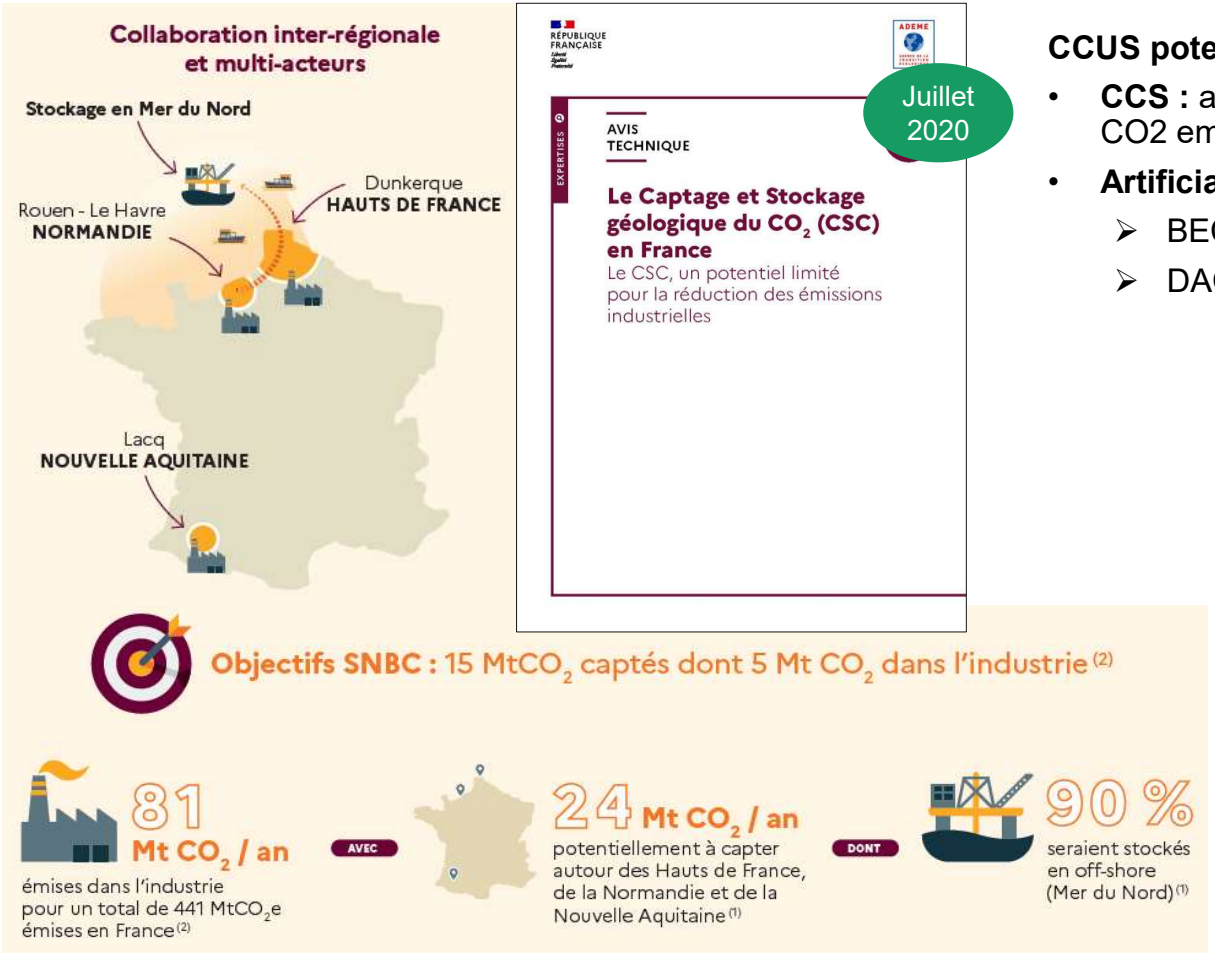
- **Existing forests** are the main sink (and stock of C) today and in 2050 => issue of sustainability of forest management. This sink varies greatly with harvesting intensity and is sensitive to climate change.
- The control of **land use changes** is an important determinant of carbon stock changes => issue of limiting artificialization (Zero Net Artificialisation) and land clearing.
- **Agro-ecological transition** can play a significant role => issue of a strong development of trees outside forests and cover crop in S1,S2,S3)
- **Wood products** have a marginal role => difficulty in increasing the share of sawn timber/panels in the harvest vs energy needs.



Artificial sinks : what is all about ?

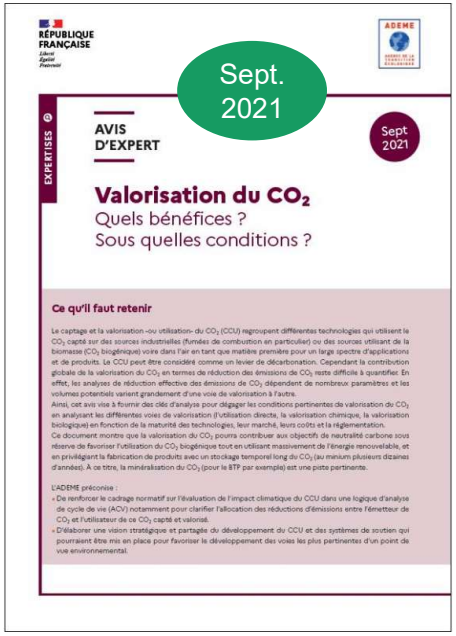


The artificial sinks: DACCS and BECCS



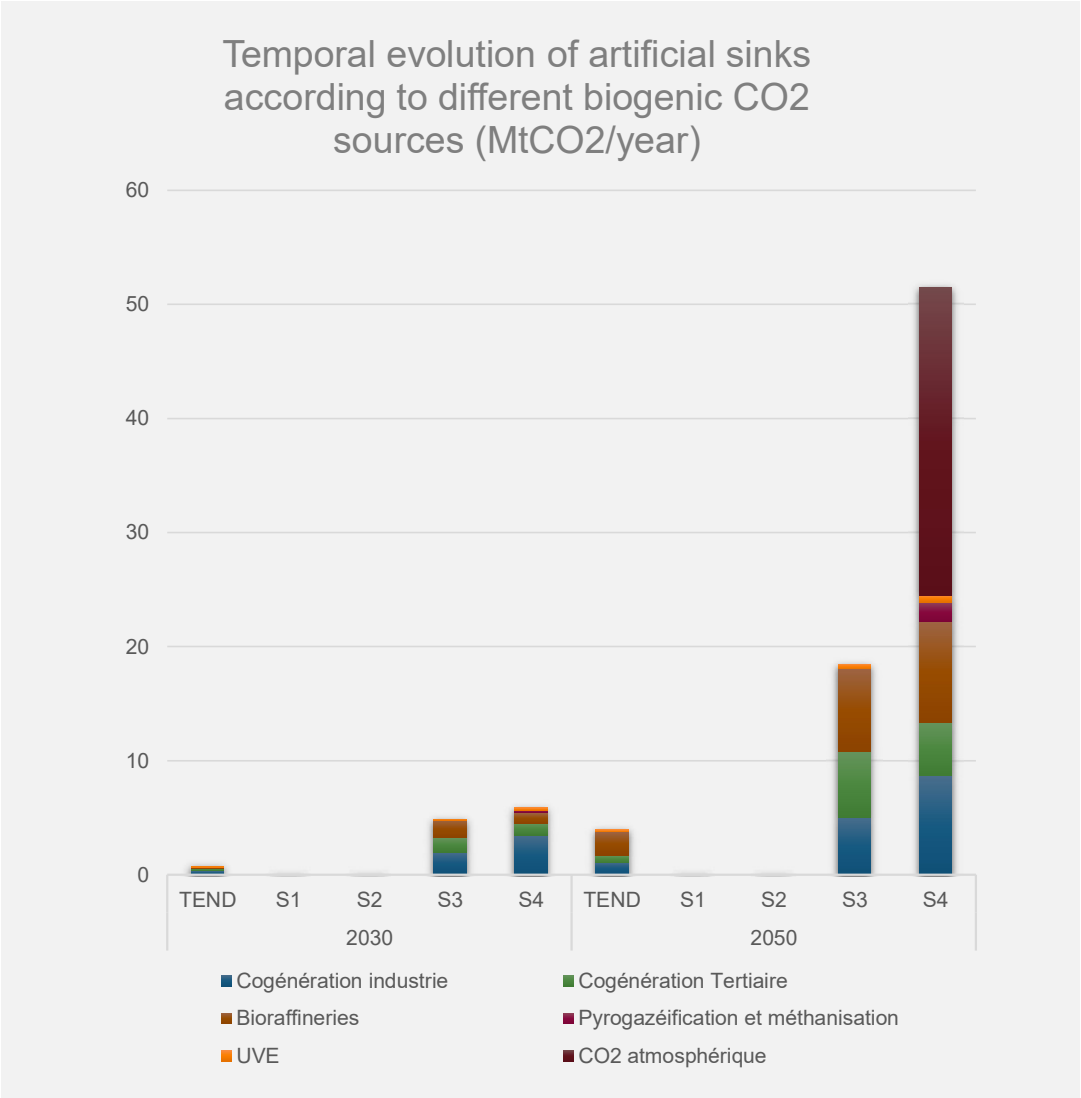
CCUS potential in the Transition(s) 2050:

- **CCS :** as mitigation solution for CO2 emissions reduction in industry (S2, S3 and S4)
- **Artificial sinks:**
  - BECCS: in S2 (minority), S3 and S4
  - DACCS: only in S4



The artificial sinks

- **CCS** is a technology that can be implemented as early as 2030 for industry to reduce its incompressible emissions.
- **BECCS** could also be implemented quickly, based on CCS infrastructure, subject to the availability and sustainability of the biomass resource.
- **DACCS**, widely developed in 2050 in S4, is characterised by high energy and resource consumption. It is likely to be more energy and capital intensive than efficient CO2 reduction solutions..



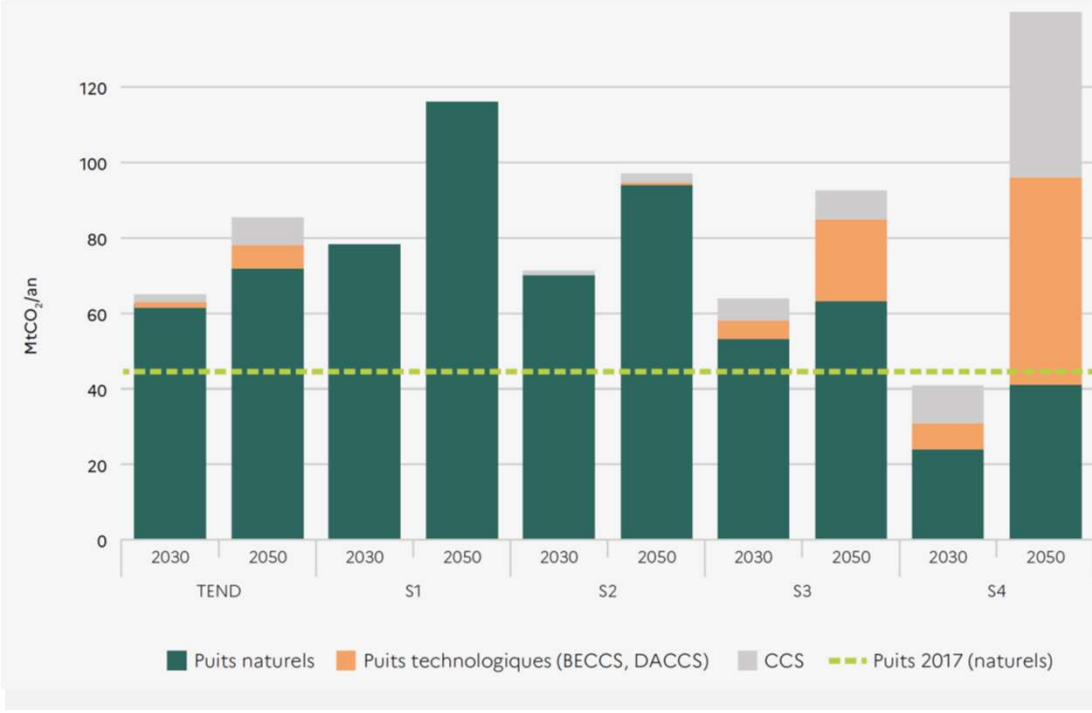
Total carbon sinks in Transition(s) 2050

Increase of the sink by a factor of 2 to 3 by 2050 but with contrasting strategies according to the scenarios :

- **Natural sinks in S1/S2 :**
  - Maintenance of stocks (zero net artificialization, limitation of forest clearing and cultivation of grasslands)
  - Maintenance of current sinks (extensive forestry)
  - Creation of new natural sinks (agroecology and afforestation)

- **Artificial sinks in S3/S4 :**
  - Limited but not zero stock losses (reduced artificialization, removal of hedges)
  - Reduction of current sinks (intensification of forestry)
  - Limited creation of agricultural/afforestation sinks (cover crops mainly)
  - Strong development of artificial sinks

Carbon sinks (artificial and natural)



Main limitations

- Impacts of climate change on natural stocks and sinks (existing or to be developed) => promote ecosystem resilience
- Societal acceptability of geological storage in France.
- No consideration of anthropogenic effects on "blue carbon" (coastal marine ecosystems) and forest soil carbon
- No consideration of other capture technologie (i.e biochars)

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If you want more…

https://transitions2050.ademe.fr/documents

- Reports, synthesis, abstract, infographies...
- But also thematic reports:
- Protein sectors
- Adaptation to climate change
- Soils…

Save the date

Workshop

Bioenergy in a Net Zero Future

Thursday 19 October 2023
8h45 – 17h15
Hôtel Mercure Lyon Centre Charpennes,
Place Hernu, 69100 LYON, FRANCE

This workshop, organised by **IEA Bioenergy** in collaboration with **ADEME**, aims to discuss the role of bioenergy in the transition to a carbon neutral energy system.
In the morning sessions, the focus will be on policies and strategies to support the role of bioenergy in the energy transition. The afternoon sessions will consider the flexibility of bioenergy in the energy system, the use of biogenic CO2 and promising developments in bioenergy concepts.

For more information and registration (free): https://www.ieabioenergy.com/blog/ieaevent/ws30-bioenergy-in-a-net-zero-future/

Programme: https://www.ieabioenergy.com/wp-content/uploads/2023/07/Programme_ExCo92-workshop_v20230712.pdf

NEGEM project: an european project on quantifying and deploying Negative Emissions technologies

Main goal: Assessing the realistic potential of Carbon Dioxide Removal and its contribution to achieving climate neutrality

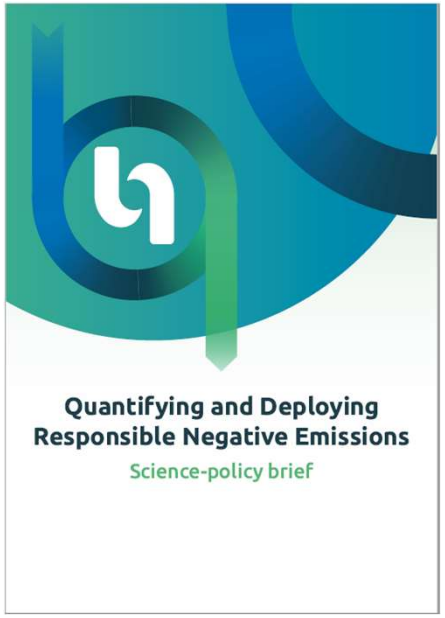
Coordinator: VTT

Partners:

Latest publication: science-policy brief : https://zenodo.org/record/8307958

Website : https://www.negemproject.eu/

NEGEM results page: https://www.negemproject.eu/results/



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Questions ?

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