How to achieve carbon neutrality in 2050?

ADEME has developed 4 “typical” pathways to feed the debate. The author’s analysis of their potential implications is presented below. The development of these pathways is carried out with a double objective: to suggest solutions for a carbon neutral society for 2050, and to ensure that reality is not without impact.

The 4 scenarios show that achieving carbon neutrality cannot be achieved without natural CO₂ sinks, which are already weak, but whose potential is very high compared with the energy that is necessary to capture and store CO₂.

Significant changes in the way we travel, keep warm, eat, buy and use equipment will occur. The resilience of ecosystems is all the more necessary for debate.

### 4 SCENARIOS for a carbon neutral society

**FRUGAL GENERATION**

- Focus on changes in behavior and习惯, tempering new technologies and innovations, to achieve carbon neutrality particularly through behavioral changes, ensuring the abandonment of anthropogenic uses.
- The competitiveness of industry will be sufficiency harmful for French territorial resilience, to the extent that regional economies have a strong tendency to decarbonize their production and consumption.
- The biosphere is one of the main assets on which we depend to maintain a liveable world. Carbon capture and storage technologies, which are essential, will consist of using material and financial resources to ensure a reduction in atmospheric CO₂, carbon capture and storage technologies, which are essential, will consist of using material and financial resources to ensure a reduction in atmospheric CO₂.

**GREEN TECHNOLOGIES**

- Renewable energy: energy both safe and sustainable, with an annual production capacity of 200 Terawatt hours (TWh).
- The 4 scenarios are all difficult to implement, but not all to the same extent depending on the developed using two levers: carbon storage, biomass production, and economic models.
- The scenario with the highest cost is S4, the scenario with the lowest cost is S1.

**RESTORATION GAMBLE**

- By necessity, and more, the Scenario with the highest cost is S4, the scenario with the lowest cost is S1.
- The biosphere is one of the main assets on which we depend to maintain a liveable world.

### 5 ISSUES for debate

1. Energy - how far should it go?

   - The 4 scenarios show that achieving carbon neutrality cannot be achieved without natural CO₂ sinks, which are already weak, but whose potential is very high compared with the energy that is necessary to capture and store CO₂.

2. The competitiveness of industry will be sufficiency harmful for French territorial resilience, to the extent that regional economies have a strong tendency to decarbonize their production and consumption.

3. The scenario with the highest cost is S4, the scenario with the lowest cost is S1.

4. Renewable energy: energy both safe and sustainable, with an annual production capacity of 200 Terawatt hours (TWh).

5. The biosphere is one of the main assets on which we depend to maintain a liveable world.

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<th>Energy Source</th>
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<td>Renewable</td>
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### 9 KEY MESSAGES

1. **A difficult but necessary transformation!** The energy transition is to be a question of adaptation with a good adaptation and for a change for a change in the energy model towards a sustainable and efficient one that will not happen by itself in a globalized world and will not be without impact.

2. **Formulating the 4 scenarios is sufficient, but not all of them have the same degree of risk:** the four scenarios each require a degree of risk, each with different environmental, social and economic consequences.

3. **Tomorrow is decided today:** the 4 scenarios are all difficult to implement, but not all to the same extent depending on the extent in which they can be implemented.

4. **The biosphere is one of the main assets on which we depend to maintain a liveable world.** Carbon capture and storage technologies, which are essential, will consist of using material and financial resources to ensure a reduction in atmospheric CO₂.

5. **Land degradation, fuel poverty, renovation: can the construction economic model?** Can we rely on natural carbon sinks to achieve neutrality? The transition shows that achieving carbon neutrality cannot be achieved without natural CO₂ sinks, which are already weak, but whose potential is very high compared with the energy that is necessary to capture and store CO₂.

### 5 SCENARIOS for a carbon neutral society

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### 38 GREEN TECHNOLOGIES

- Renewable energy: energy both safe and sustainable, with an annual production capacity of 200 Terawatt hours (TWh).
- The 4 scenarios show that achieving carbon neutrality cannot be achieved without natural CO₂ sinks, which are already weak, but whose potential is very high compared with the energy that is necessary to capture and store CO₂.

### 32 REGIONAL COOPERATION

- The 4 scenarios are all difficult to implement, but not all to the same extent depending on the extent in which they can be implemented.
- Overcoming some major challenges, the biosphere is one of the main assets on which we depend to maintain a liveable world. Carbon capture and storage technologies, which are essential, will consist of using material and financial resources to ensure a reduction in atmospheric CO₂.