

France 2072 : Lifestyles at the core of carbon neutrality challenges

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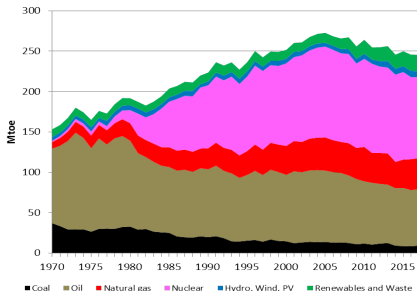
IPCC Side Event : Demand and Supply Side Policy
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Energy transition in France

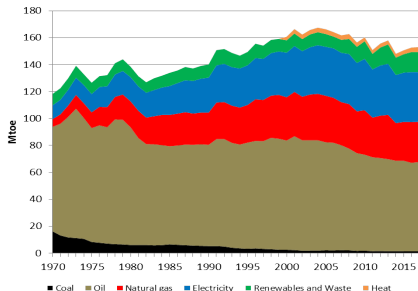
Past energy transition in France

- In the electricity sector: development of the electro-nuclear program following the oil crisis
- Main drivers: energy independence, cost competitiveness

Primary energy consumption



Final energy consumption

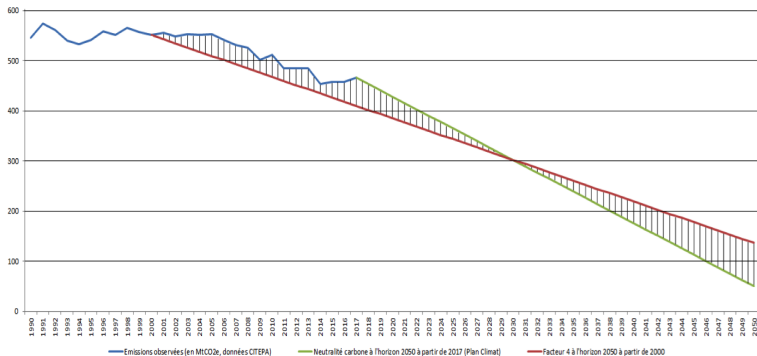


Source: SOEs, Ministry of Ecology, France

Towards an energy transition to a low-carbon economy

- 1980s: Gradual institutional integration of environmental problems
- 1990s: Rising concern about climate change → institutional traduction
- 2010s: Diffusion of the concept of "energy transition" in the public debate
- 2015: Energy transition for green growth + 2019: Energy-Climate laws
 - GHG emissions: reduction of 40% in 2030 and **net zero carbon** in 2050 compared to 1990
 - Final energy consumption: reduction of 50% in 2050 compared to 2012
 - Fossil fuel consumption: reduction of **40%** in 2030 compared to 2012
 - Renewable energy sources: increase in their share to 33% of the final energy consumption and 40% of the electricity production
 - Nuclear: reduction of the share of nuclear power in electricity production to 50% by **2035**

Achieving carbon neutrality in France



Reference B. Le Hir. France Stratégie 2018

- **National target 2050** : hold a **zero net emissions** by the second half of the 21st century
- Or more precisely contain **the level of gross emissions at carbon sinks** (anthropogenic, grassland, forest)
- Mandatory to consider **all sectors and all GHG**

The ingredients for a low carbon transition

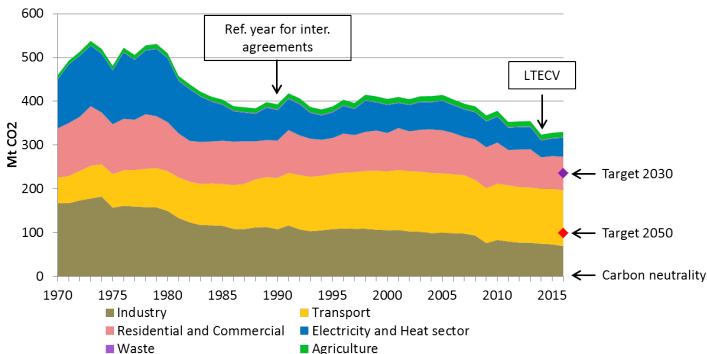
➤ **Many institutional tools** implemented in order to monitor the energy transition: national low-carbon strategy, multi-annual energy planning, CO₂ tax, subsidies, etc.



Result still uncertain

Result on CO₂ emissions:

- Increase of 4% from 2014 to 2017 since legislation
- Reduction not aligned with 2030 and 2050 targets



Source: CITEPA

→ Still a long way to carbon neutrality and ... to an energy transition?

lifestyle and behaviors

man in the center of the loop



Digital society : In this more individualistic and technological society, people are motivated by a desire for personal achievement and long life.

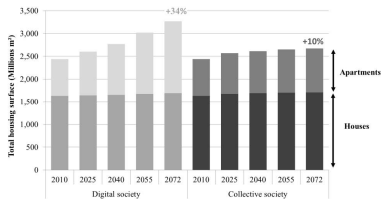
Collective society : In this society organized around social connections and cooperation, people are motivated by a desire to be – and do – with others.

A. Millot, R. Doudard, T. Le Gallic, F. Briens, E. Assoumou and N. Maïzi. France 2072: Lifestyles at the core of carbon neutrality challenges, In: Giannakidis G., Karlsson K., Labriet M., Gallachoir B. (eds) Limiting Global Warming to Well Below 2 C: Energy System Modelling and Policy Development. (2018). Lecture Notes in Energy, vol 64. Springer.

Scenarii reflecting alternative lifestyles

<i>DIMENSIONS</i>	DIGITAL SOCIETY	COLLECTIVE SOCIETY
Demography	+18% Higher life expectancy, lower birth rate	+18% Continuation of current trends (inc. aging of the population)
Cohabitation practices	More single households	Development of shared forms of habitat
Relationship with technologies	Higher equipment level	Maintenance of current practices
Mobility practices and relationship to space	More virtual activities (e.g. teleworking)	Contraction of activity area
Work attitude	Greater place of work in society	Reduced place of work in time organization
Location of dwelling	Preference for urban centers in cities	Reduction in semi-urban areas to the benefit of urban areas
Living standard, income and distribution	Higher living standard	Drop in the number of households with high and low incomes
Tourism and leisure travel practices	Development of long-distance destinations	Development of local destinations

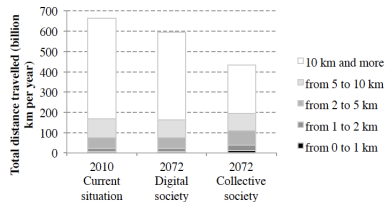
The influence of lifestyles on demands



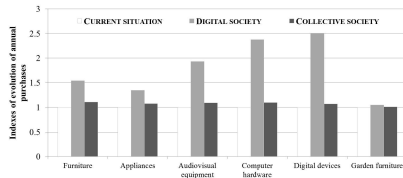
on housing demand

with a common assumption of 18% population growth

- the housing surface area slightly increases (+10% compared to currently) and increases much more (+34%)
- from 35% to 11% drop in distances covered annually for daily journeys
- long distance mobility : from -34% to +115% compared to the current situation)
- depending on the type of good between +4% and +134% for the "digital society" scenario compared to the "collective society" scenario



on mobility: short distance

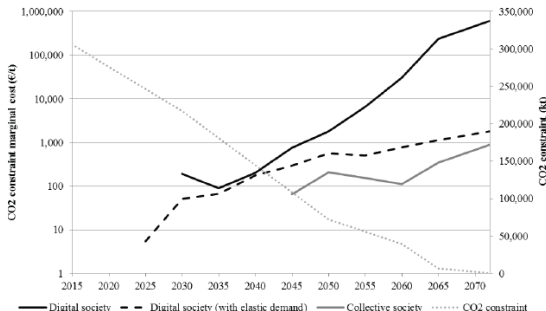


on equipments

Feasibility of 2072 neutrality

A difficulty to reach the goal :

- a non-linearity of the effort made to decarbonate in both scenarios : after 2035, there is a strong upward effect due to the zero-emission target especially in the digital society scenario
- lifestyles appear to be crucial for the transition towards an energy system that has less of an impact on the environment of



Evolution of the marginal cost of the constraint
in 2072 the marginal cost of "digital society" is

700 times higher than for "collective society" scenario

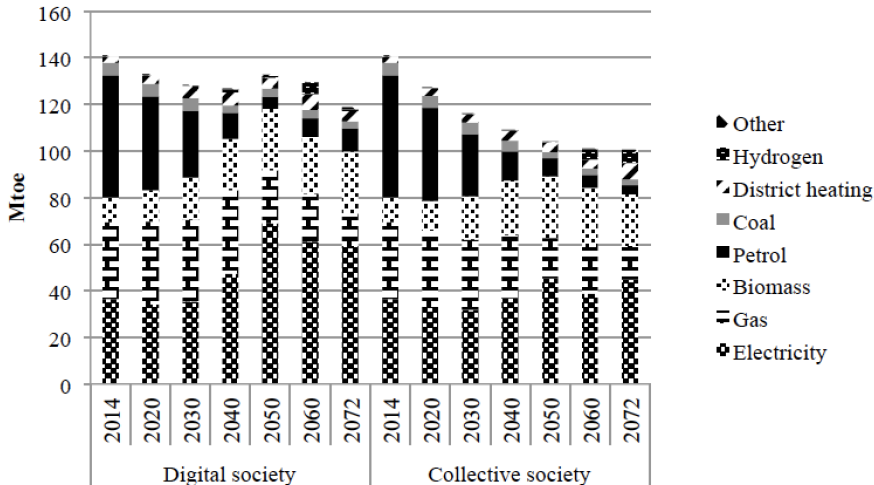
Decarbonation levers include:

Modification of the demand:

- Planned (lifestyles)
- Forced (elasticity)

Evolution of the final energy mix for neutrality scenario

Final energy mix with elastic demand and neutrality target in 2072



Feasibility of the energy mix for neutrality scenari

A shift towards more sober lifestyles seems to be crucial:

- collective society:
 - significant reduction of final energy consumption (-29% between 2014 and 2072)
 - a multi-energy configuration is fostered: electricity and biomass increase in all sectors; gas diminishes, except in industry: used in 2050 in transportation as a means of transition, and then replaced by hydrogen.
- both scenarii:
 - technical feasibility and social acceptability issues: CCS is used on a wide scale in the industrial and power sector up to 50'000 kt/year in the “collective society” scenario and up to 60'000 kt/year in the “digital society”

Supply policy only won't be enough



Laura Bastian Aguilar (12years old), Arica y Parinacota, Chile