French vision for a circular economy and associated research programs to measure the impacts of a more circular economy by 2050
Waste management in France and France’s Roadmap for a Circular Economy

ADEME’s missions to support circular economy

ADEME’s foresight exercises and research programs to model circular economy
Historical background and key milestones in France

1975: the first Law for waste management
- The polluter-payer principle
- The extended producer responsibility (EPR)

80’s: Household waste collection covers 98% of the population

1992:
- The first EPR chain is set up (packaging)
- Hierarchy of waste management modes and restriction of discharge to the ultimate waste

2009: The Grenelle Law emphasizes solid waste management policy
- Ambitious prevention and recycling goals
- Generalization of local prevention plans and programs

2015: The Law for energy transition and green growth defines an integrated approach to waste management that considers both "climate“ issues and “circular economy”

2018: Roadmap for a Circular Economy

2019: The anti-waste bill for a circular economy
2015: Energy transition law for green Growth

Keys objectives:

- By 2020: reduce by 10% all types of urban waste (compared to 2010)
- By 2020, recycle 55% of all non-dangerous and non-inert waste (increase to 65% by 2025)
- By 2022, all households will sort their plastic packaging waste
- By 2025, offer all households a solution to sort their bio-waste
- By 2025: Reduce the landfilling of non-dangerous & non-mineral waste by 50%
- By 2020, Pay-as-you-throw schemes for 15M inhabitants (increase to 25M by 2025)
- Gradually decoupling economic growth from raw material consumption
  → Ban on single-use plastic bags
  → Fight built-in obsolescence
  → Label product life
2018: A Roadmap for a Circular Economy

50 measures:
- To mobilize all actors (10)
- For better consumption (9)
- For better production (7)
- For better waste management (24)

Key objectives:
- Aim towards 100% of plastics recycled by 2025.
- Reduce greenhouse gas emissions: avoid the emission of 8 million additional tones of CO2 each year thanks to plastic recycling.
- A 50% reduction in the amount of non-hazardous waste landfilled by 2025, compared to 2010.
- Reduce natural resource use caused by French consumption: 30% reduction in resource consumption in relation to GDP between 2010 and 2030.
- Create up to 300,000 additional jobs, including new professions
2019 : The anti-waste bill for a circular economy

- Transposition of the new European waste directive
- Currently discussed in Parliament
- **Major features:**
  - Create several new Extended Producer Responsibility (EPR) scheme
  - Intensify fight against food waste and throwing away unsold stocks (for example in Fashion Industry) will be banned
  - Give consumers the means for more responsible consumption
  - Give citizens information to make the sorting of waste much easier
ADEME: Public Agency created in 1992 under the authority of:

- Ministry for an Ecological and Inclusive Transition
- Ministry for Higher Education, Research and Innovation

ADEME’s mandate:

- Foster Ecological and Energetic Transition dissemination
- Innovate and prepare the future of EET
- Contribute to collective expertise for EET

ADEME staff ~ 900:
- 3 central sites (~50%)
- 17 regional directions
- 3 representations in overseas territories
ADEME’s missions to support circular economy

- Providing financial support to the national policy for waste management and circular economy with the Waste and Circular Economy Fund
- Advising government on policies and measures
- Providing expertise for companies and local authorities
- Raising public awareness
- Funding Research and Innovation

Overall budget for activities 2018: 540 M€

- Renewable Heat 215 M€, 40%
- Waste & Circular Economy 163 M€, 30%
- Other, 28 M€, 5%
- R&D, 27 M€, 5%
- Communication / Training 10 M€, 2%
- Efficient Building 34 M€, 6%
- Polluted Sites, 22 M€, 4%
- Air and mobility, 20 M€, 4%
- Energy and climate Territorial approaches, 20 M€, 4%
ADEME’s Energy climate scenarios : 2012, updated in 2017

- An ambitious but realistic multi-energy scenario
- 2 time horizons : 2035 and 2050
- CO2 / 4 by 2050
- Energy consumption / 2 by 2050
- Technical analysis, completed by macro-economic analysis and sociological illustration

New exercise, to be published in 2021 : assessing the resource use impact of Energy climate scenarios

- Aiming for a net-zero carbon economy by 2050
- Various demand and supply energy scenarios, including a local level analysis
- Trajectories described from 2015 to 2050, with a midpoint in 2035
- Multi criterion comparison
- Quantified analyses will be complemented with "Storylines"
How to measure raw material needed by energy transition?

PROSPECTIVE ANALYSIS

Identifying raw materials needed to support the energy transition

Identifying the drivers (technological development, socio-economic drivers) of raw materials use in the future

Several studies by the ADEME focus on:

- **Biomass**: energy, food, biomaterials
- **Heavy industrial energy consumers**: clinker, steel, aluminium, glass, paper, sugar, ethylene, ammoniac, dichlor
- **Metals** (SURFER project)

MODELS

Estimating the amounts of raw materials required by ADEME’s energy-climate scenarios

Estimating the material footprint of the French economy

Estimating the environmental impacts for primary and secondary materials production

Representing key aspects of circular economy policies

2 impacts assessment models under development:

- **The « MatMat » Tool**, based on an Environmentally Extended Input-Output Analysis
- **A multi-sectoral macroeconomic model**
The « MatMat » Tool

An integrative tool, developed by the ADEME and the CIRED, to ensure the interface between foresight analyses and material footprint assessments

Calibrated with the EXIOBASE dataset (EE MRIO)

- Parameters for projections:
  1. Resource efficiency (technologic change)
  2. Market Share between primary and secondary industry
  3. Increase or decrease in final demand (economic growth, energy transition, repair, reuse, share)
  4. Market share between domestic production and imports

- Resources
  - Domestic input output table
  - Imported input output table

- Final Demand
  - Final use for domestic produce
  - Final use for imported produce

- Gross product
  - Y
  - M

- Raw materials
  - RME of imports

- Uses
  - FR
  - ROW

- 200 products
- 227 raw materials
- Primary and secondary materials
- Monetary and physical flow
Towards a multi-sectoral macroeconomic model, with hybrid economy-energy-materials features

The potential benefits of macroeconomic modeling to analyze the transition to a circular economy:

- Analyzing the effect (and rebound effects) of activity transfers from one sector to another: employment, investment, trade balance, energy consumption, raw material consumption

- Studying the existence of a possible double dividend
  - Reduction of GHG emissions and of consumption of raw materials
  - Economic and social benefits: GDP, employment, households’ purchasing power, competitiveness...

ADEME has been developing the ThreeME model with OFCE since 2008 to evaluate the medium + long term economic impact of environmental and energy policies

- A Computable General Equilibrium (CGE) model of neo-Keynesian inspiration
- A multi-sectoral representation of the economy, with a particular emphasis on the energy sectors
- Several hybrid modeling for different sectors/uses
  - Representation of the housing stock across seven energy classes (A through G)
    - Linked with energy consumption per m²
  - Representation of private vehicles across seven energy classes
    - Linked with energy use per km
  - Representation of energy production across several energy technologies (e.g. renewables)
    - Linked with energy production in MWh
A recent field of research: very few models deal with circular economy topics

Significant developments to be carried out:

- An incomplete representation of the levers of the transition to a circular economy
- A challenge around data and quantification: material flows, stock of durable goods, but also substitution between materials and capital, between primary and secondary production, etc.

Potential Developments: our action plan

- Downstream accounting of Raw material consumption (outside of the model)
- Modeling raw material production and consumption
- Modeling the stock of durable goods
- Static modeling of waste generation linked with raw material consumption
- Dynamic modeling of waste generation taking into account stock of durable goods
- Modeling Recycling

Developments Calendar
Thank you for your attention

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