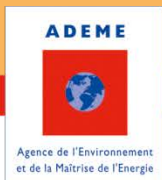
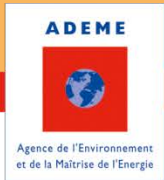


French vision for a circular economy and associated research programs to measure the impacts of a more circular economy by 2050

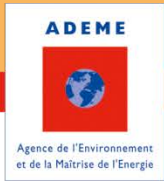
Parallel Session 2-1: National and sectoral strategies for combined material efficiency and GHG mitigation





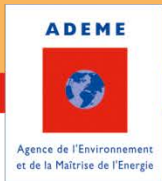
- Waste management in France and France's Roadmap for a Circular Economy
- ADEME's missions to support circular economy
- ADEME's foresight exercises and research programs to model circular economy

From waste management to a circular economy

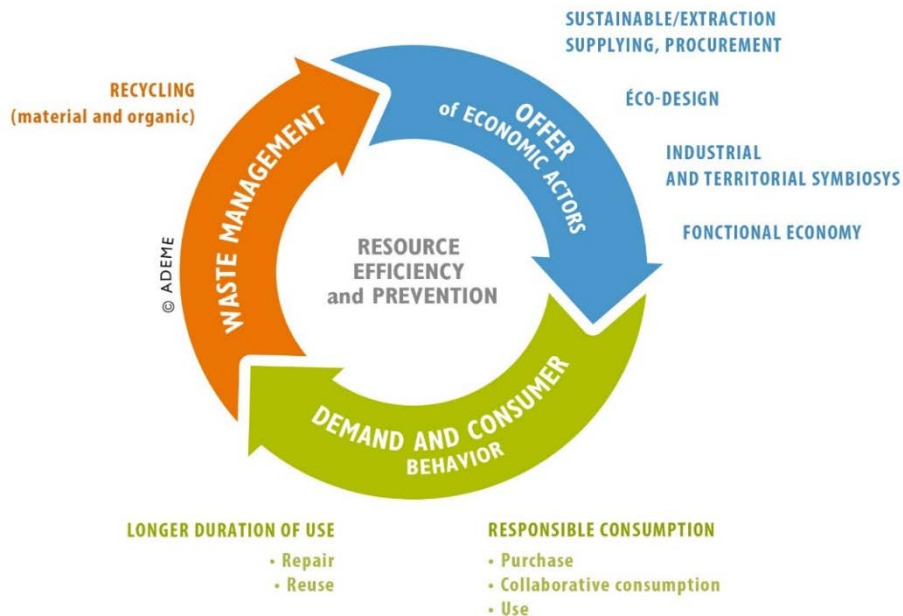


Historical background and key milestones in France

- **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**



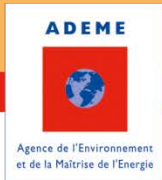
Circular economy 3 areas, 7 pillars



Keys objectives:

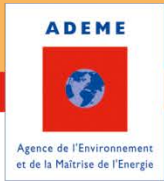
- By 2020: reduce by 10% all types of urban waste (compared to 2010)
 - By 2020, recycle 55% of all non-dangerous and non-inert waste (increase to 65% by 2025)
 - By 2022, all households will sort their plastic packaging waste
 - By 2025, offer all households a solution to sort their bio-waste
 - By 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





- 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's missions to support circular economy



A few words on ADEME

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:

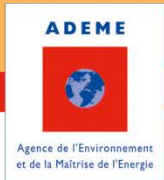
- Foster Ecological and Energetic Transition dissemination
- Innovate and prepare the future of EET
- Contribute to collective expertise for EET



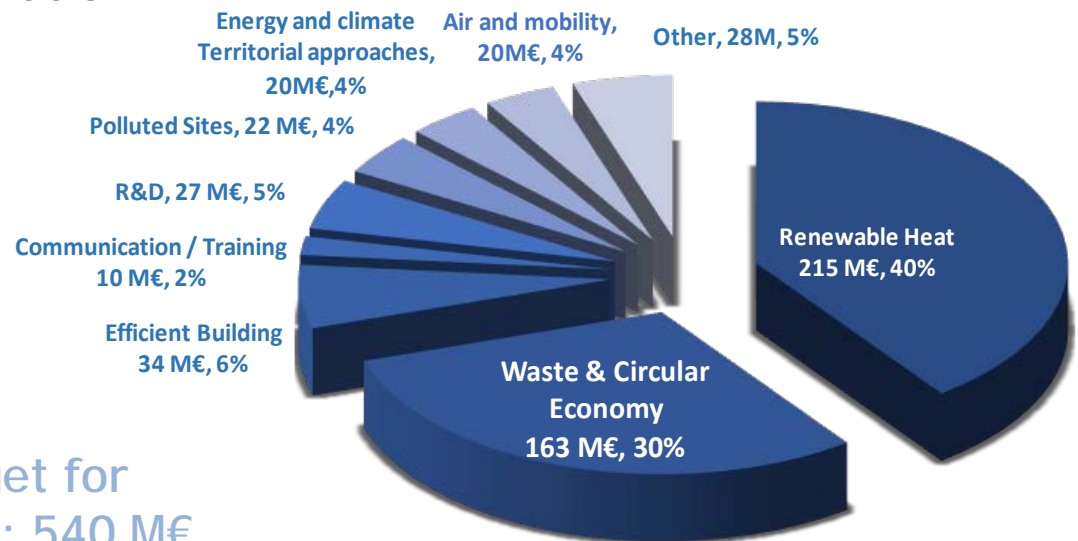
ADEME staff ~ 900 :

- ✓ 3 central sites (~50%)
- ✓ 17 regional directions
- ✓ 3 representations in overseas territories

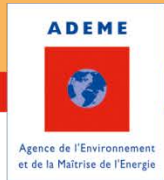
ADEME's missions to support circular economy



- 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



Energy-Climate scenario 2035 - 2050



ADEME's Energy climate scenarios : 2012, updated in 2017

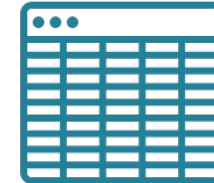
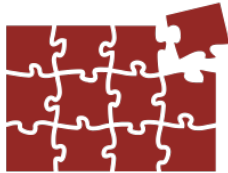
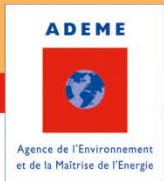
- ➔ An ambitious but realistic multi-energy scenario
- ➔ 2 time horizons : 2035 and 2050
- ➔ CO₂ / 4 by 2050
- ➔ Energy consumption / 2 by 2050
- ➔ Technical analysis, completed by macro-economic analysis and sociological illustration



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

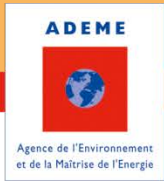
Estimating the environmental impacts for primary and secondary materials production

Representing key aspects of circular economy policies

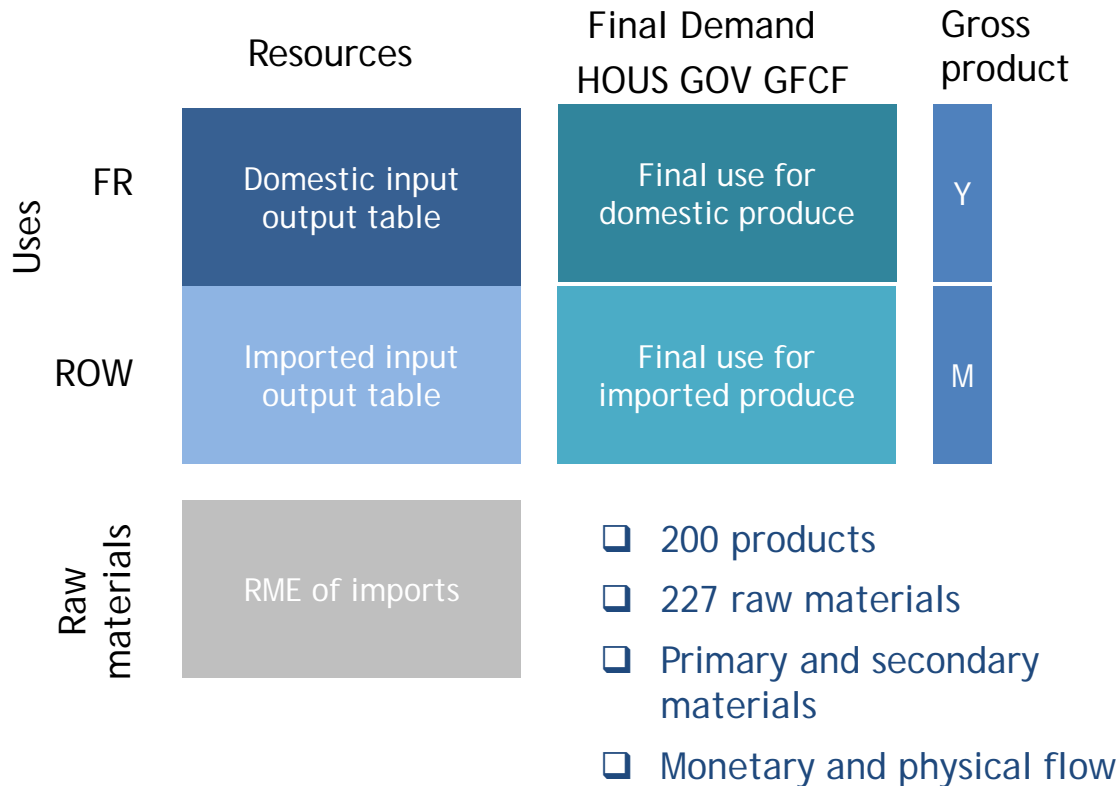
2 impacts assessment models under development:

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

The « MatMat » Tool



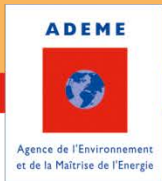
- An integrative tool, developed by the ADEME and the CIRED, to ensure the interface between foresight analyses and material footprint assessments
- Calibrated with the EXIOBASE dataset (EE MRIO)



Parameters for projections:

- (i) Resource efficiency (technologic change)
- (ii) Market Share between primary and secondary industry
- (iii) Increase or decrease in final demand (economic growth, energy transition, repair, reuse, share)
- (iv) Market share between domestic production and imports

Towards a multi-sectoral macroeconomic model, with hybrid economy-energy-materials features



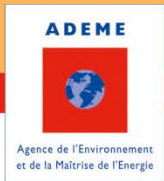
The potential benefits of macroeconomic modeling to analyze the transition to a circular economy:

- ➔ 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...

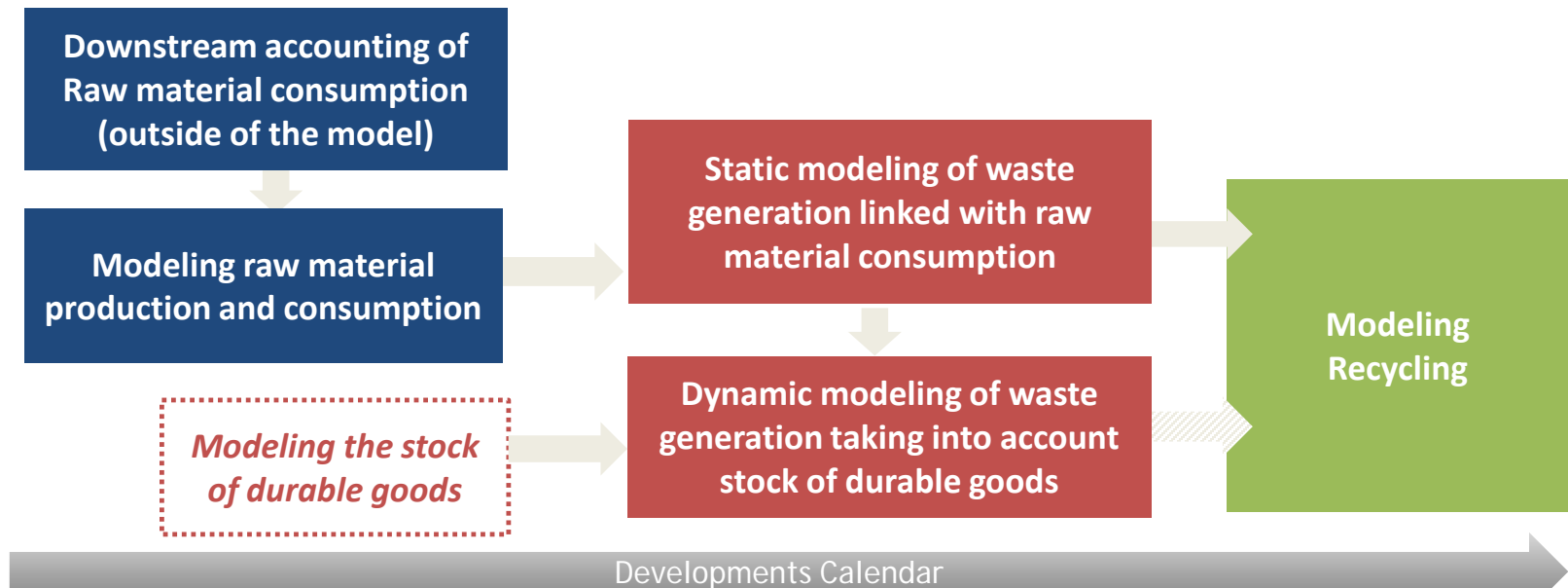
ADEME has been developing the ThreeME model with OFCE since 2008 to evaluate the **medium + long term economic impact of environmental and energy policies**

- ➔ 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

Review of research on multi-sectoral macroeconomic modeling for the assessment of circular economy policies



- 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



Thank you for your attention

Fanny Vicard

fanny.vicard@ademe.fr

ADEME - Prospective and Research Division

