

# Energy efficiency through Long term planning

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# Actions to respond to climate change

**Institutions, government** caring for the awareness of

- 1 depletion of earth resources (water, energy, ...)
- 2 hints to the environment
- 3 globalisation of exchanges and markets

propose to mitigate GHG emissions.

☞ *How to derive this goal in terms of **energy efficiency and renewable energies**.*

☞ *How long term planning gives a **global prospective insights**.*

# EU main goal for climate protection

- ➡ **A firm independent commitment to achieve at least a 20% reduction of GHG emissions by 2020 compared to 1990**

*“the European Council is confident that a substantive development of energy efficiency and renewable energies will . . . reduce GHG emissions”:*

- **stress the need to increase energy efficiency** in the EU so as to achieve the objective of saving 20% of the EU's energy consumption compared to projections for 2020
- **put a binding target** of a 20% share of renewable energies in overall EU energy consumption by 2020

Presidency Conclusions of the Brussels European Council (8/9 March 2007)

# What is behind energy efficiency

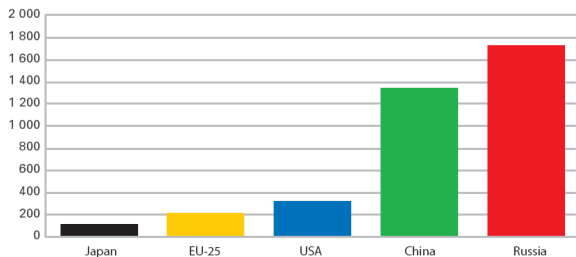
*There are different definitions of energy efficiency*

- 1 energy intensity
- 2 primary energy consumption
- 3 final energy consumption
- 4 useful energy ??
- 5 energy quality ???

# Dealing with the ambiguity behind these definitions

- *In terms of energy efficiency as energy intensity :*
  - *Is China prior than US ?*
  - *Is Japan almost equal or better than EU ?*

Figure 5. Energy intensity in 2003 (in toe/million EUR of GDP at 1995 market prices)

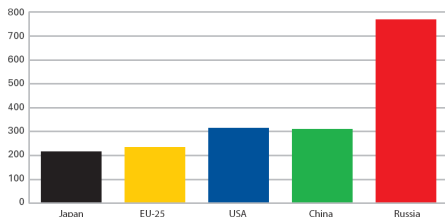


Source: Enerdata (calculations based on Eurostat data).

# Dealing with the ambiguity behind these definitions

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  - *Is China prior than US ?*
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Figure 6. Energy intensity in 2003 (in toe/million EUR of GDP at 1995 market prices)  
GDP adjusted for purchasing power parity



Source: Enerdata (calculations based on Eurostat data).

*The results are definition dependant : the place depends wether there is an adjustment of purchasing power parity or not.*

# Burden sharing 3x20 among EU countries

- 1 **20% reduction of GHG emissions by 2020 compared to 1990**
- 2 increase energy efficiency so as to achieve the objective of **saving 20% of the EU's energy consumption** compared to projections for 2020
- 3 **20% share of renewable energies in overall EU energy consumption** by 2020

*The endorsement must take into account national circumstances*

➡ Prospective and Long term Energy planning models

# Long term Energy planning models

- ➡ *A technological energy-sector model: MARKAL-Times (MARKet ALlocation)*
- ➡ *which solves a linear optimization model driven by demand*

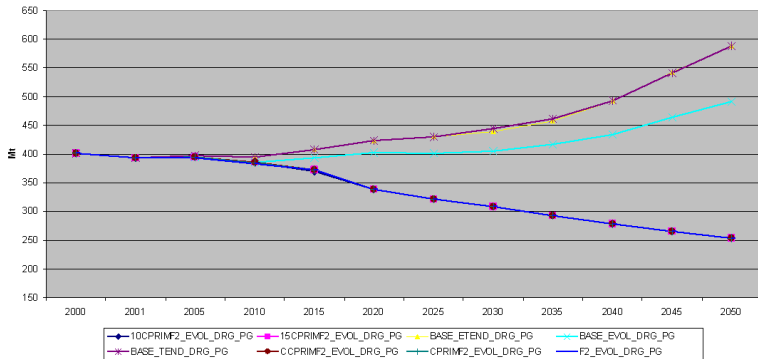
Energy planning modelling approach through MARKAL-Times will answer the questions raised by energy decision makers :

- **future investments** for the mix?
- **measures** for the environmental impact?
- what **substitution** between energies?
- how to handle the **huge losses**?
- ...

## Prospective exercises

Various exercises based on a **low carbon society** scenario (including hypotheses on *demand side management*) have been assessed :

- All exercises respect the **constraint** on  $CO_2$  emission levels : reduction by 20 % by 2020 compared to 1990 level



# Prospective exercises

Various exercises based on a **low carbon society** scenario (including hypotheses on *demand side management*) have been assessed :

- 1 Energy efficiency improvement as **primary consumption reduction**  $\Rightarrow$  reduction by 20% of primary consumption by 2020
- 2 Energy efficiency improvement as **final consumption reduction**  $\Rightarrow$  reduction by 20% of final consumption by 2020

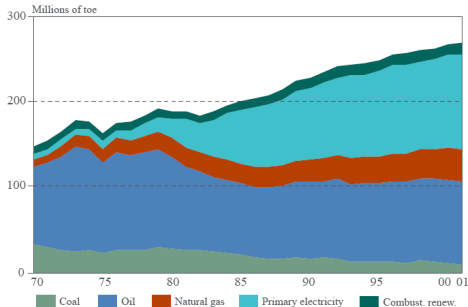
 Consequences on GHG emissions and renewable energies

# The specificities of France

## *The weight of primary electricity supply*

- French electricity production is dominated by nuclear power (79%)

Consumption of primary energy <sup>1</sup> by energy source

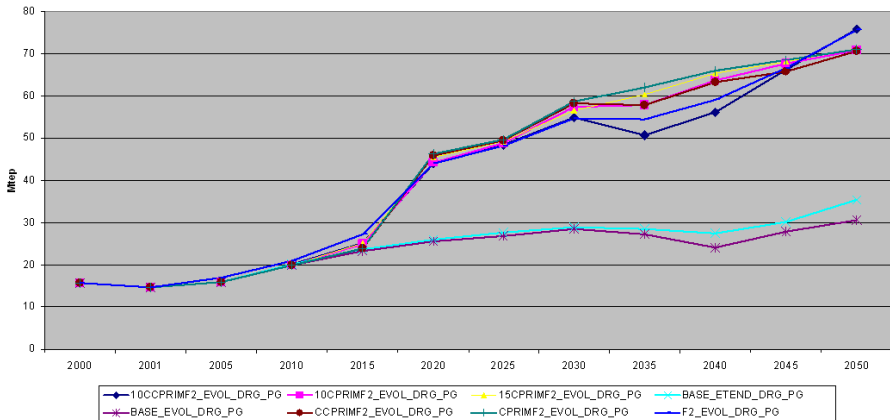


1: Corrected for climate.

Primary energy consumption by energy source (DGEMP 2004)

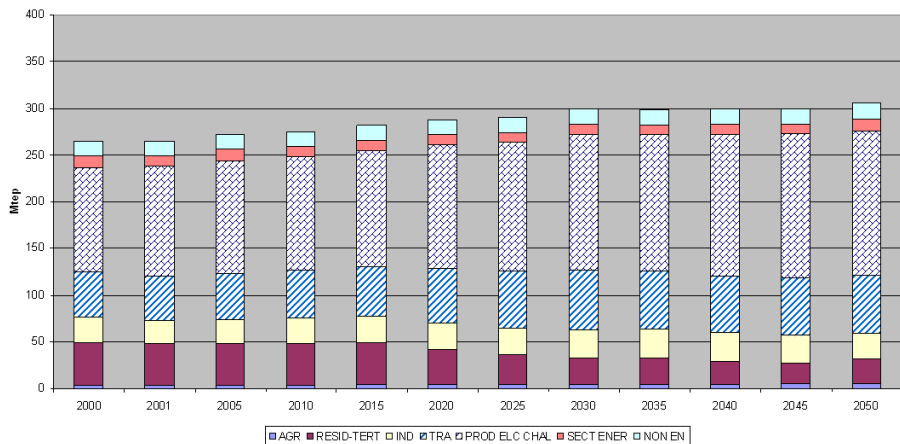
# Low Carbon scenario with carbon target

## Level of renewable energies



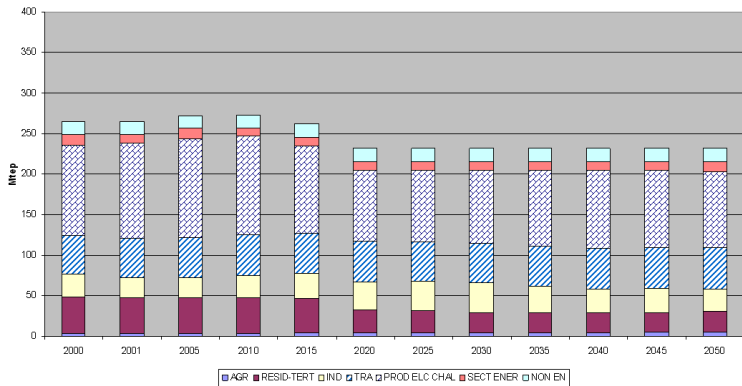
# Low Carbon scenario with carbon target

## Primary consumption by sector



# A 20% reduction of Primary consumption

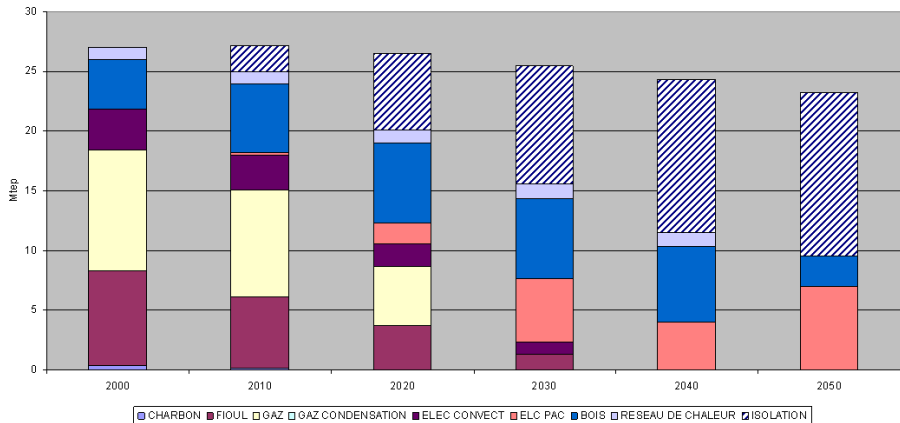
## Primary consumption by sector



*A shift from nuclear to gas and biomass  
the constraint on primary consumption penalizes nuclear electricity*

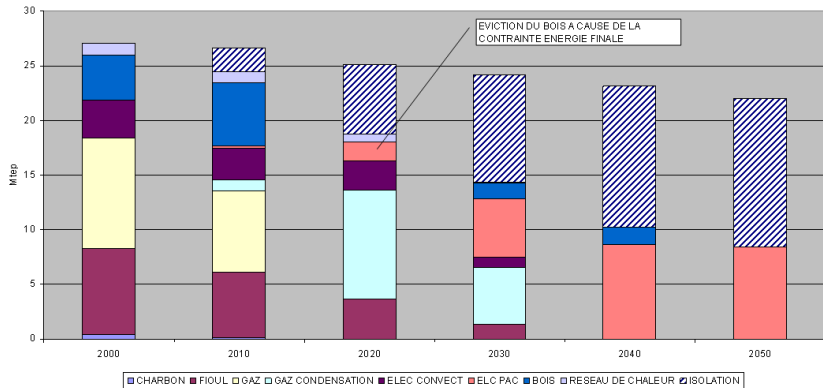
# Low Carbon scenario with carbon target

*Useful heat energy by technology in the residential sector*



# A 20% reduction of Final consumption

*Useful heat energy by technology in the residential sector*  
*A shift from biomass to gas*



The constraint on final consumption puts penalties on renewable energies

## Questions raised by assessed scenarios for France

*The endorsement of the EU statements rises different questions:*

- A constraint on primary consumption penalizes 0 emission technologies (the current mix)
- A constraint on final consumption penalizes renewable energies

☞ *Lack of consistency of three concurrent criteria in order to respond to climate change :*

- mitigation of GHG emission
- improvement of energy efficiency
- targets on renewable energies

**More generally, long term planning allows to assess the good use of targets when dealing with climate change**

*Think globally, Act locally,  
But carefully and with clear transparent criteria*