

# Industrial & Research perspectives of Nuclear Energy in France within the Energetic Transition European context

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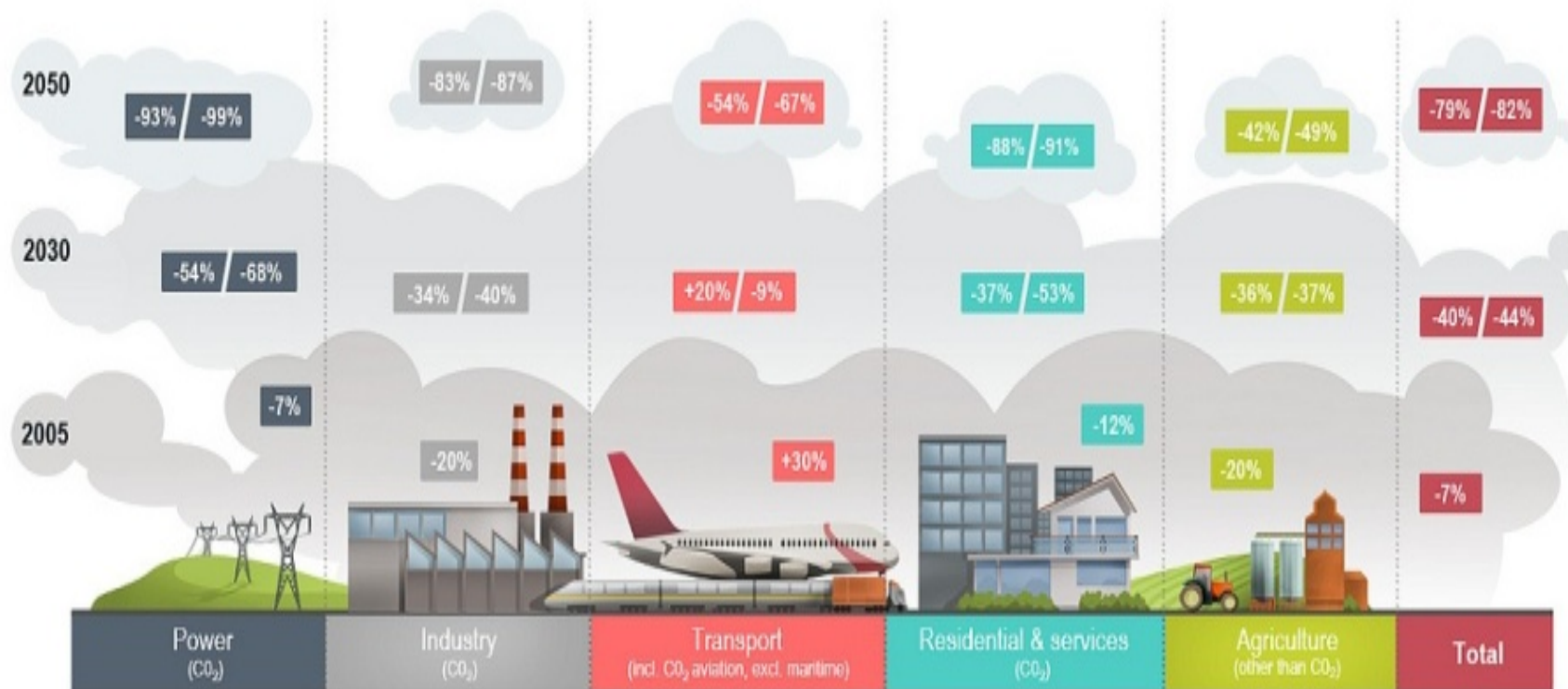
ICONE 23 - Plenary-1. Nuclear Power

Reliable Global Energy

May 18, 2015 - ICONE 23, Plenary- 2F Convention Hall  
GIF Symposium - Tokyo, May 2015

# Low-carbon strategy for 2050

Targets compared to 1990 levels



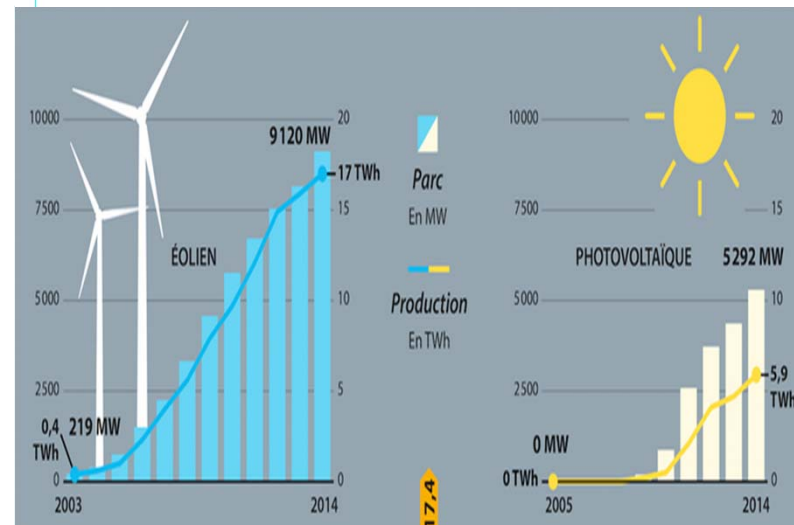
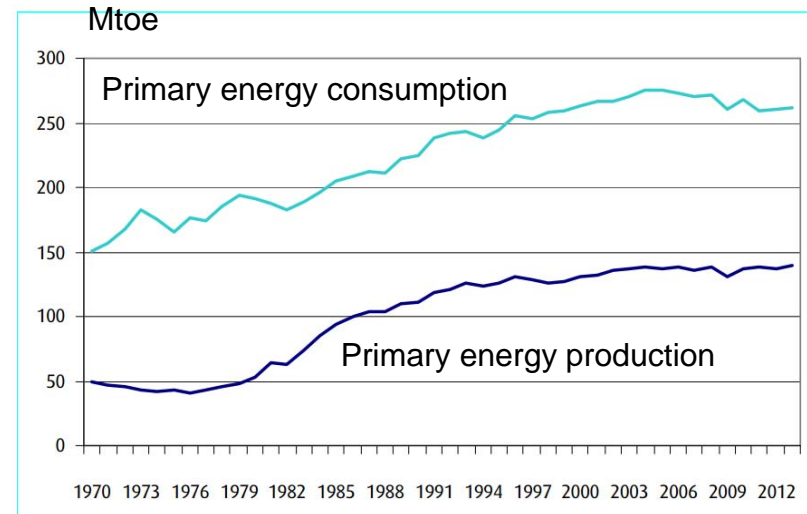
Source: European Commission

# SOME BASIC FACTS ABOUT ENERGY IN FRANCE

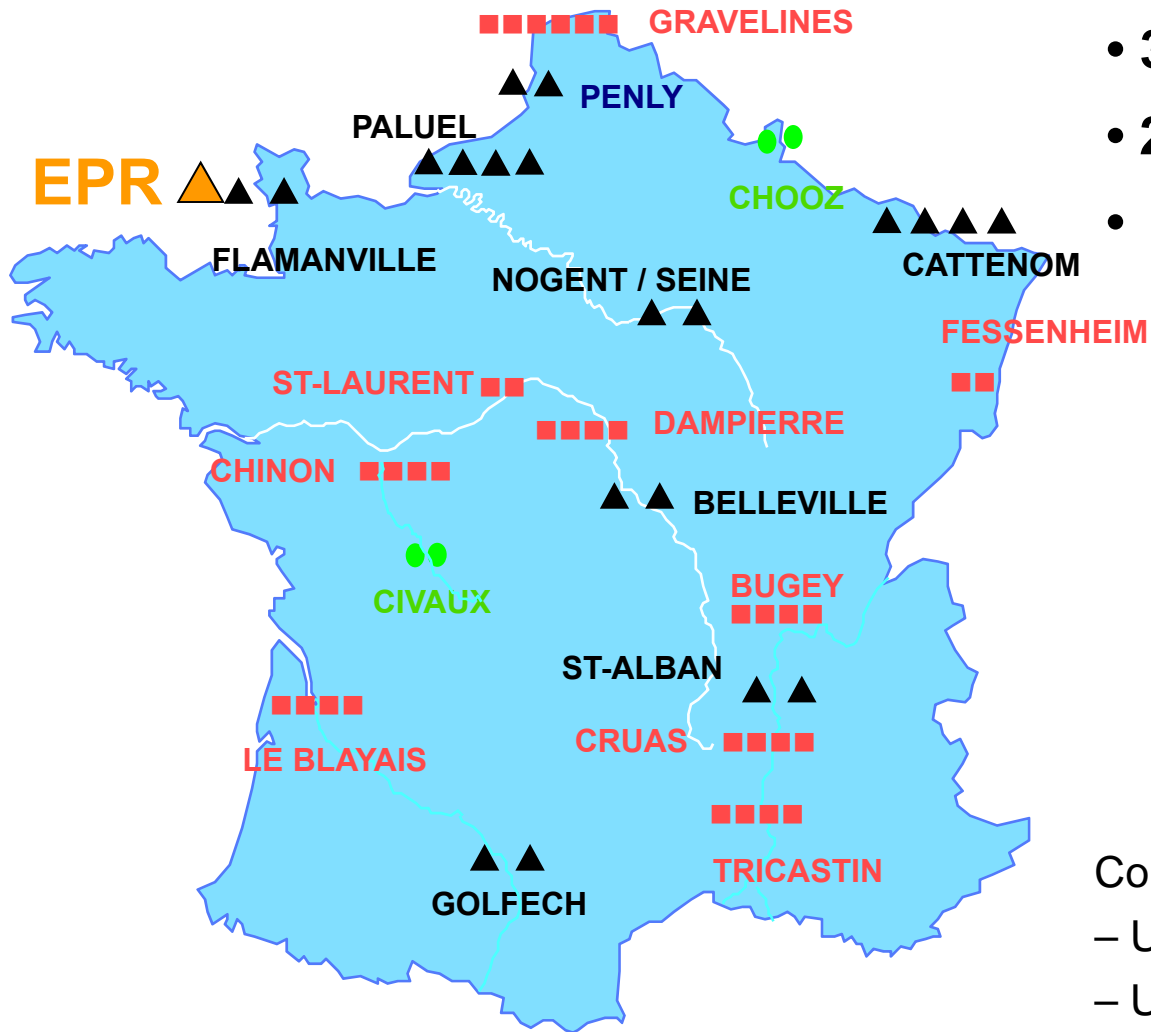
- Primary energy consumption is almost stable in France since 2000.
- Energy independence is around 50%.
- Around 75% of electricity is nuclear.
- > 90% of electricity in France is CO2 free.
- The development of renewables :

**2014 electricity production**  
 Hydro ≈ 10%  
 Wind power : 4%  
 PV : 1%

GIF Symposium – Tokyo, May 2015



# THE CURRENT NUCLEAR POWER FLEET



- 34 900 MWe units ■
- 20 1300 MWe units ▲
- 4 1500 MWe units ●

**58 PWR units**  
**63130 MWe installed**

416 TWh produced in 2014

energy independence rate :

**53 % in 2013**

Connection to the grid :

- Unit 1 (Fessenheim 1) : April 1977
- Unit 58 (Civaux 2) : December 1999

**French nuclear fleet (2015): 58 reactors in operation - 63,1 Gwe, 30 years in average**

- Fleet Long time Operation (LTO) requires  $\approx 55$  B€ , from 40 up to 60 years ?
- Authorization delivered by ASN every 10 years

**2017 EPR Flamanville startup**

**$\geq 2025$ , GEN III new builds are foreseen**

***R&D: GEN IV SFR prototype: ASTRID***

- 2030 Reduction of the use of fossil resources by 30% and 40% GHG  
2050 halve the overall energy consumption (2012 level.)
- **Capping the installed nuclear capacity to the current level (63 or 65 Gwe?\*), - Decrease the share of nuclear electricity from 75% to 50% by 2025? (date in discussion \*)**
- Increase renewable energies share of final consumption to 23% by 2020 and 32% by 2030.
- Multi Annual Energy Plan (MEP), revised every 5 years,

*\*still in discussion*

- ↗ *Declaration from Manuel VALLS,  
Prime Minister :*
- ↗ « **Nuclear is an energy of the  
future. It is essential  
for our sovereignty and to fight  
global warming »**
- ↗ « **...Gen IV reactors will allow to  
multirecycle the fuel and  
strengthen our supply security.  
These reactors of tomorrow must  
be a priority for R&D works,  
especially in CEA.»**





The way towards:

# The Energy Union

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Where we want to go:

A secure, sustainable, competitive, affordable energy for every European

What this means:

Energy security, solidarity and trust

A fully integrated internal energy market

Energy efficiency first

Transition to a long-lasting low-carbon society

An Energy Union for Research, Innovation and Competiveness



## ***Result of formal consultation of the Member States (MS) in the Atomic Questions Group of the Council (as of 31 July 2013):***

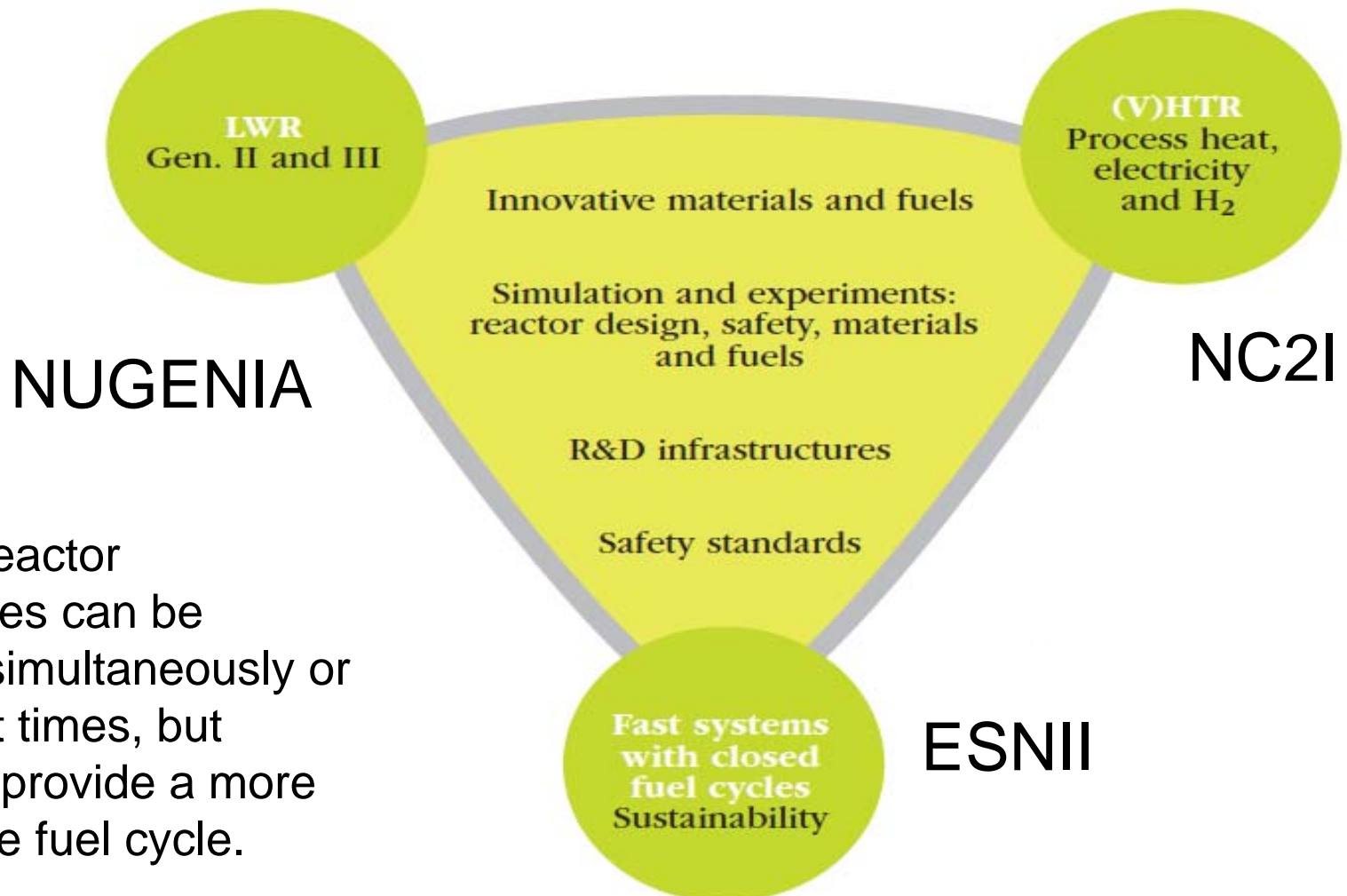
**Long Term Operation (LTO): 14 MS concerned; 12 +; 2 phase out (BE and DE).**

**New Built: 16 MS concerned; 12 +, 4 negative**

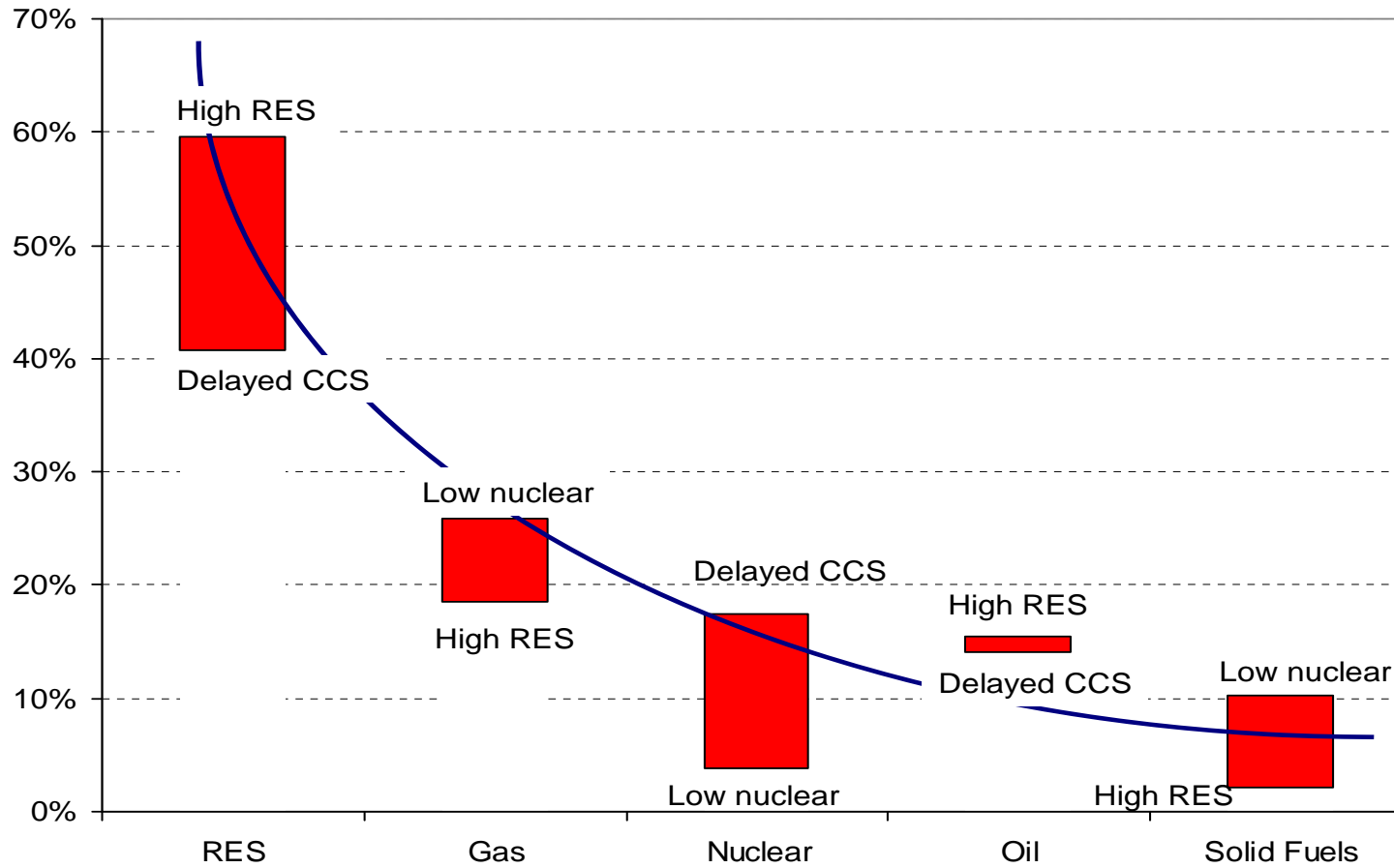
**Reprocessing: 14 MS concerned – 3 + , 11 negative**

**Out of this, one can say that a large majority of MS having power plants in operation will go for Long Term Operation and new built. Only 2 have phase out policies (BE and DE). Reprocessing is limited to FR, NL and UK.**

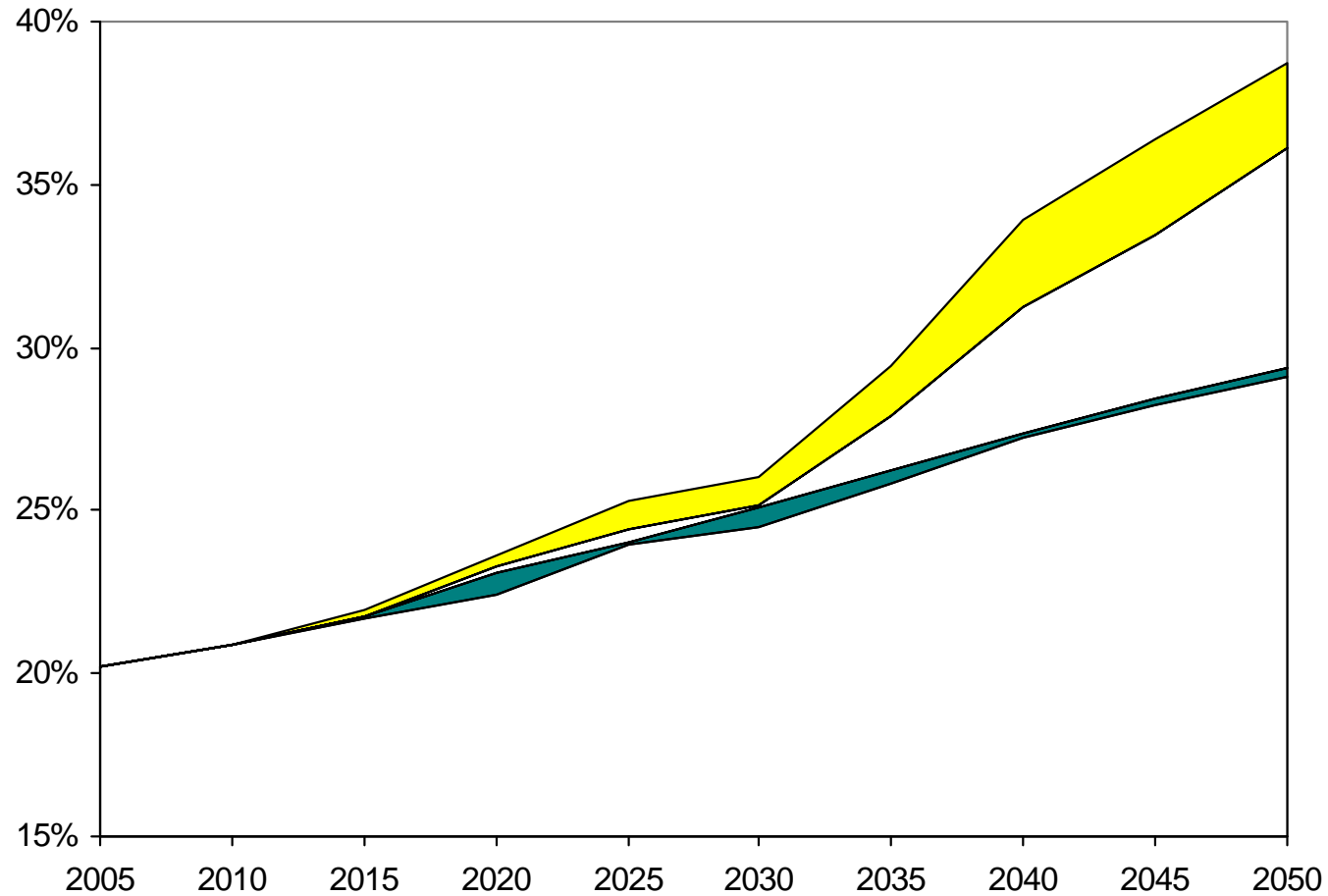
## The SNETP vision of nuclear sustainability



2050 - range of fuel shares in primary energy across scenarios





# DECARBONISATION SCENARIOS INCREASE ELECTRICITY NEEDS



Range regarding  
decarbonisation  
scenarios  
**FROM 3100 to**  
**4800 TWh p.a.**

Range for current  
trends scenarios:

EU Roadmap 2050	up to 20% Nuclear Electricity
4800 TWh per year	 ~100 Units of 1400 MWe avg 140 Gwe (for 7000 hour per year)
Today	28% Nuclear Electricity = 125 Gwe – 135 Units - Closing DE+BE+UK AGRs  rest 100 Units – LTO (12 Member States on 14!)
Average age of NPPs	30 years (today in EU) => start of renewing the reactor fleet at horizon 2030

## CONCLUSIONS

**Europe is somehow adjusting its strategy to underline more the importance of security and economic questions as main drivers of its energy politics**

**In a pro-active european decarbonisation strategy as revendicated by Europe, Nuclear energy will continue to play an important role in the european enrgy mix since Europe is quite poor in natural resources and because RES are intermittent.**

**In a close future, Nuclear energy sector will require very important investments in France & in Europe to realize first LTO then to start Nucllear fleet renewal. This situation should contribute along with RES deployment to boost significantly Europe economy .**