

AGEING LOW CARBON CAPACITY: REGULATORY AND MARKET CHALLENGES

IEA, Paris

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23rd June 2016

Introduction

I. Introduction

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II. Highlight on the current situation

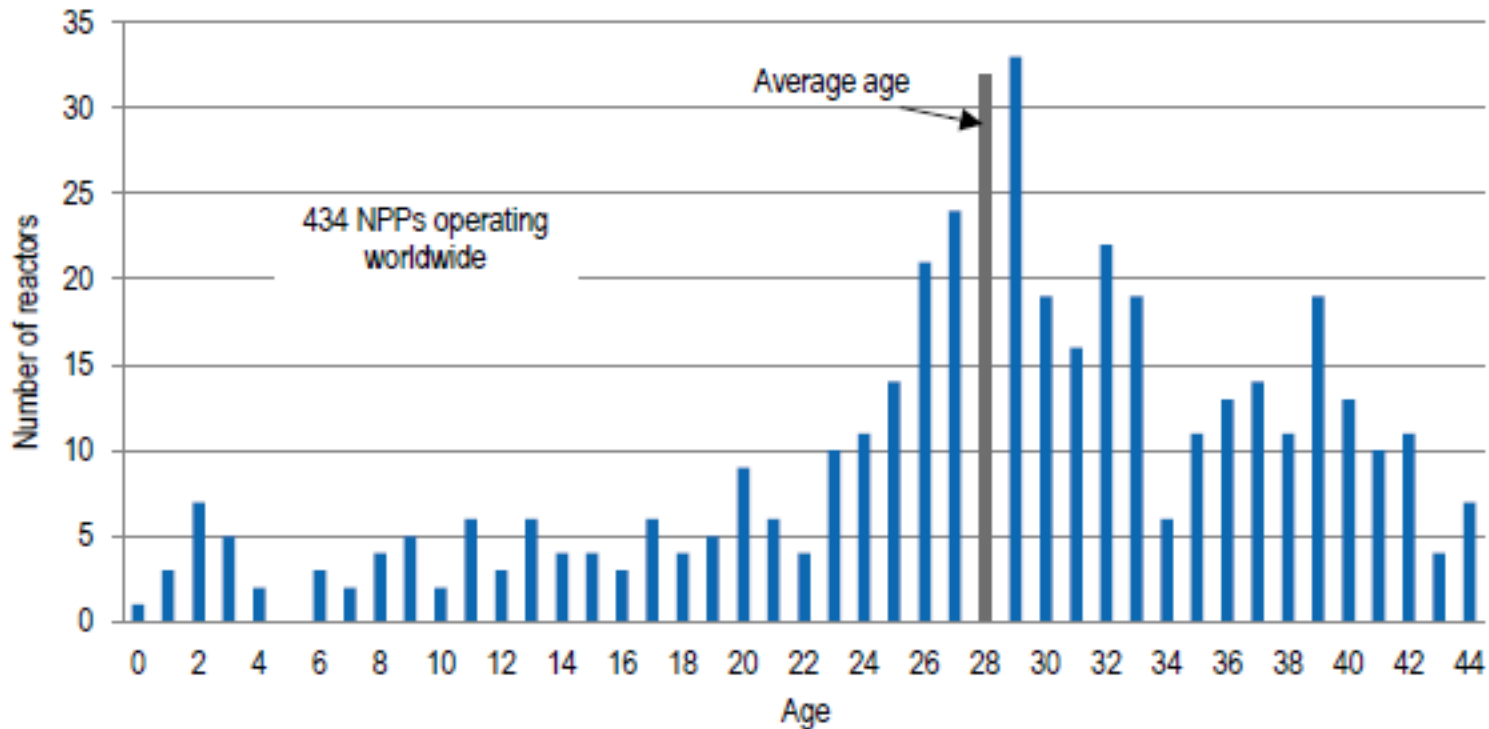
- **In the European Union**
 - **129 nuclear power plants in operation in 14 Member States**
 - **Total capacity = 120GWe**
 - **Average age = 30 years**
 - **4 new reactors are under construction (FIN, FR, SVK), others are under licensing process (UK, HU, FIN) and some are at preparatory stage (BUL, CZ, LIT, PL, RO)**

(Source: European Commission, Nuclear Illustrative Programme, COM(2016)177 final, 4/4/2016, p. 2)

Worldwide the situation is similar:

II. Highlight on the current situation

Figure 1.1: Age distribution of operating nuclear reactors worldwide
(as of August 2013)



Source: Derived from IAEA, 2013.

II. Highlight on the current situation

- **Strategy is different in the EU from other parts of the world:**
 - **Nuclear power plants see long lifetime extensions in the USA (up to 60 Y) ≠ EU**
 - **Strategies with regard to nuclear power plants depends on national strategies in the EU:**
 - **DE: post Fukushima decision to phase-out of nuclear**
 - **BE: phase-out by 2025**
 - //
 - **FR, UK + Eastern and Central European Countries building new capacities**
 - **Asia is massively going to use nuclear as a future technology for low carbon ≠ EU**

II. Highlight on the current situation

▪ BELGIUM

7 nuclear power plants

- Doel 3 : 1st October 2022;
- Tihange 2 : 1st February 2023;
- Doel 1: 15th February 2025 (Lifetime extended of 10Y);
- Doel 4 : 1st July 2025;
- Tihange 3 : 1st September 2025;
- Tihange 1 : 1st October 2025 (Lifetime extended of 10Y) ;
- Doel 2 : 1st December 2025 (Lifetime extended of 10Y).

At the latest, phasing-out of nuclear is fixed by Law in 2025

II. Highlight on the current situation

Key data (2014)

Number of reactors: Seven nuclear units operating at two nuclear sites

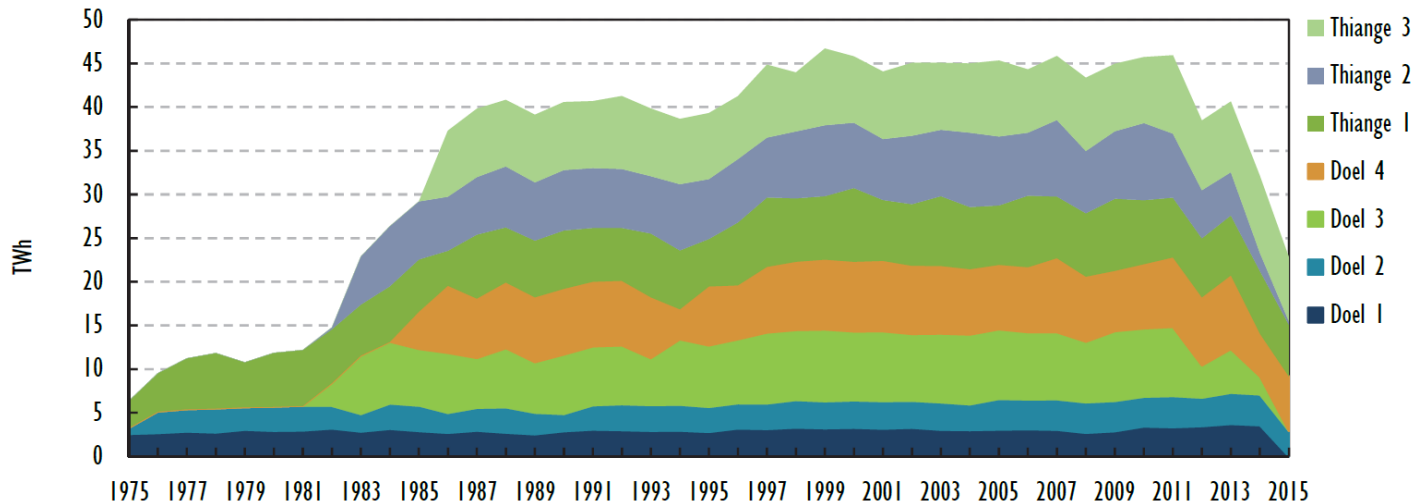
Installed capacity: 5 927 MW_{net}

Electricity generation: 33.7 TWh, -28.8% since 2004¹

Share of nuclear: 16.6% of TPES and 47.2% of electricity generation
(source: Energy Policies of IEA Countries, Belgium, 2016 Review, p. 129)

- Drop in generated electricity by nuclear power plants these last years due to an increase number of temporary unavailability

Figure 10.1 Electricity generated in nuclear power plants, 1975-2015

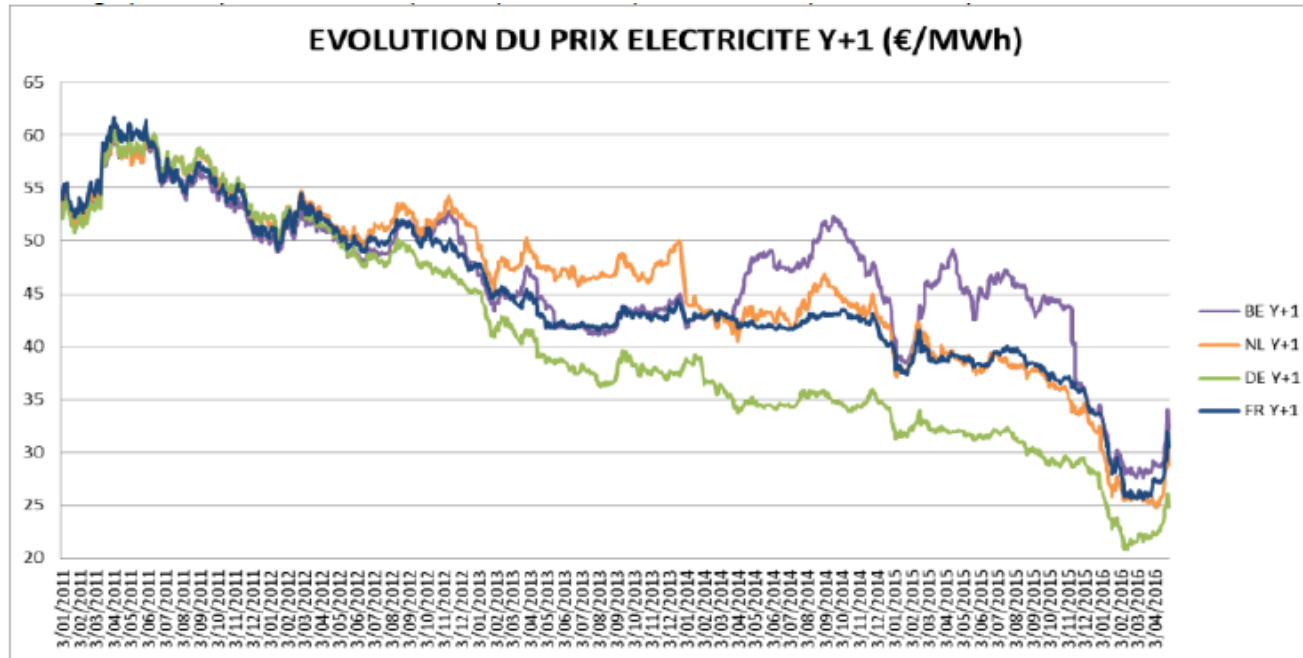


Source: OECD/NEA based on IAEA PRIS database.

(source: Energy Policies of IEA Countries, Belgium, 2016 Review, p. 130)

II. Highlight on the current situation

- Price evolution following the decision of extending the life of existing nuclear power plants:



(source:
http://www.creg.info/Tarifs/tableau_debord.pdf)

- Prices were experiencing significant pressure with the drop of nuclear availability over 2014-2015 (temporary shutdowns, technical unavailability)
- Significant price drop from November-December 2015 on, linked to the political decision of extending the life of two existing nuclear power plants (see also: <http://www.creg.info/pdf/Divers/Z1506FR.pdf>)
- Consequence: regional price convergence is back

II. Highlight on the current situation

- **Impact on electricity produced from gas although they are needed for the transition:**
 - **CCGTs and OCGTs are suffering (not being called in current market conditions)**
 - **A large number of them announced shutting down due to insufficient return**
 - **The question of a CRM is regularly put forward to allow these plants (and more specifically recent CCGTs) survive**
 - **6 new gas power plants projects have been abandoned in the last 5 years**

- **Short-term impact on security supply:**
 - **Limited need for a strategic reserve**
 - **Lower risks of load shedding and blackouts**

- **Impact on the energy transition in the medium term since no transition plan is yet defined: delaying the issues?
Which energy-mix?**

III. Way forward to decarbonisation

- Before framing the regulatory framework, need to define a vision:

- European Union: Clear vision but lacking of direction

“Nuclear energy is part of the energy mix of half the EU Member States. In those countries that chose to use it, nuclear has a role to play in ensuring security of electricity supply. [...] Doing so will help achieving the objectives of the 2030 climate and energy framework.”

(source: European Commission, Nuclear Illustrative Programme, COM(2016)177 final, 4/4/2016, p. 2)

- Enhanced cooperation between Member States is needed

III. Way forward to decarbonisation

➤ Politics of Member States & implementation of the European vision = Governments and Parliaments' role i.e. for BELGIUM:

The government of Belgium should:

- *Adopt a market-based long-term inter-federal energy vision and energy pact in order to provide clarity, policy consistency and investment security; engage all political parties and all relevant stakeholders in jointly developing the energy vision and energy pact to increase its legitimacy.*
- *Follow closely the principles of transparency, predictability and regulatory certainty when designing and implementing energy policy.*
- *Strengthen the measures for further diversifying energy supply and limiting energy demand, in particular through energy efficiency, renewable energy and intensified collaboration with neighbouring countries.*
- *Address as a high priority the electricity capacity shortage; clarify the role of nuclear power in the energy mix after thoroughly assessing whether an early phase-out of nuclear power over a short period of time, as currently scheduled, is feasible and reasonable from the perspective of electricity security, GHG mitigation and the costs of generating electricity.*

(source: Energy Policies of IEA Countries, Belgium, 2016 Review, p. 155)

III. Way forward to decarbonisation

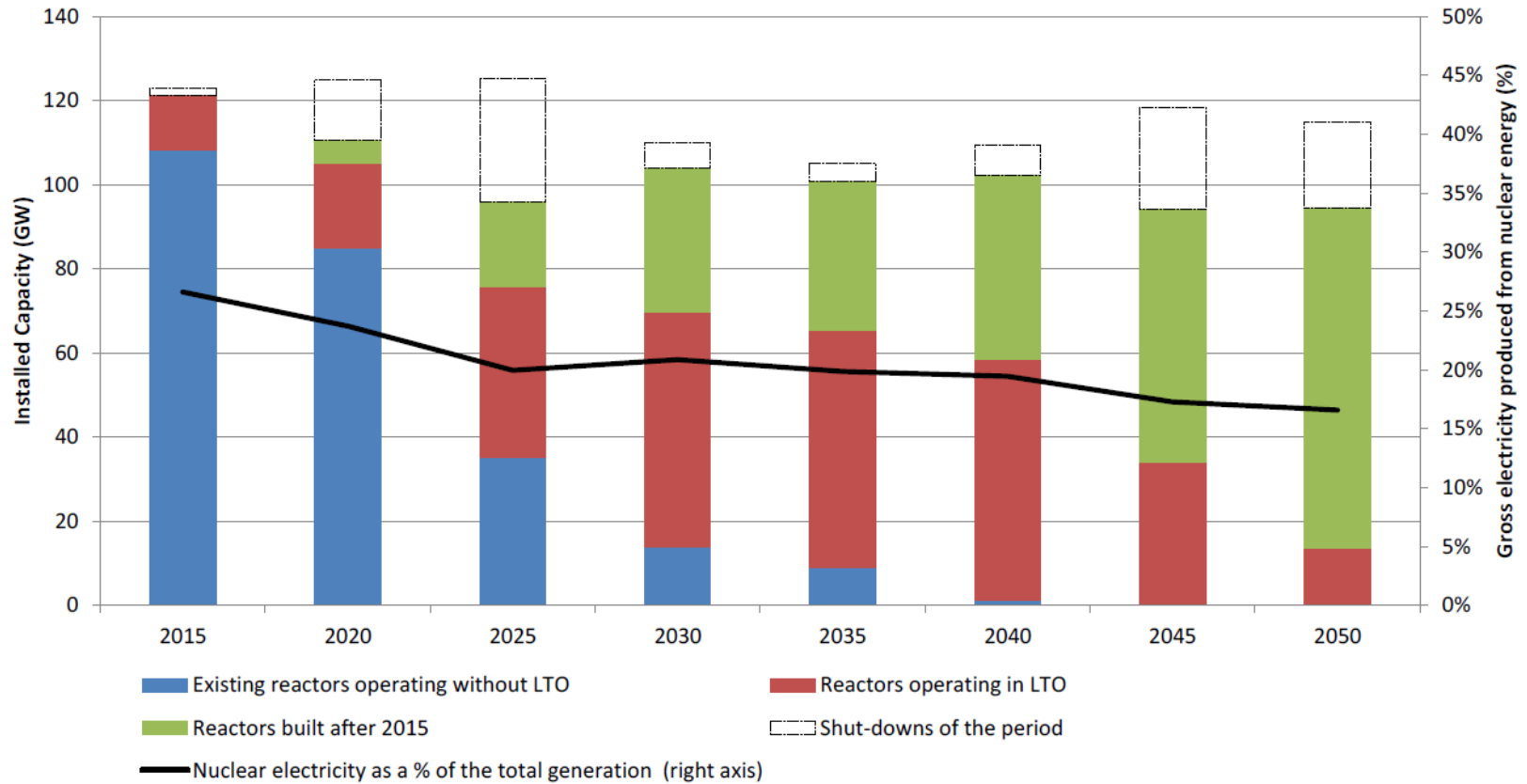
- **Regulatory stability is needed:**
 - **Principles of transparency, predictability and regulatory certainty when designing and implementing energy policy regardless the choice for a specific technology;**
 - **Attract investments & prepare the transition;**
 - **Ensure a level-playing field between sources of low carbon generated energy.**

III. Way forward to decarbonisation

- **If willing to extend the lifetime of existing nuclear capacities, what regulation is needed?**
 - **Security and safety strategies and regulation: highest standards;**
 - **Waste management: perspectives and enhanced R&D policies;**
 - **Decommissioning financing: secured funding system and adapted systems with regard to a lifetime extension;**
 - **Diversifying of fuel supply: avoiding regional instability;**
 - **Level-playing field to avoid technological discrimination and wrong market signals**

III. Way forward to decarbonisation

Figure 11 Projection of nuclear installed capacity EU28 2015-2050



(source: European Commission, Nuclear Illustrative Programme, COM(2016)177 final, 4/4/2016, p. 2)

III. Way forward to decarbonisation

- Planned nuclear power plants (situation on 31/12/2014) around the world: Asia is leading in the run for building new nuclear capacities (i.e. China: 43, India: 22)

ZONE GÉOGRAPHIQUE Geographic area	UNITÉS Units	PUISSANCE BRUTE Gross capacity MWe
EUROPE DE L'OUEST	6	8 400
EUROPE DE L'EST	38	40 950
MOYEN-ORIENT	1	1 400
ASIE	82	94 800
AMÉRIQUE DU NORD	5	6 000
AFRIQUE	8	9 600

(source: Commissariat à l'Énergie atomique et aux Énergies alternatives, Nuclear power plants around the world, Ed. 2015, p. 48)

IV. Role of Regulatory Authorities

- **Role in calculating the level of taxation for nuclear power plants**
 - Tihange 1
 - Existing non extended nuclear power plants
- **Role in determining the functioning rules for strategic reserves and for the adequacy plan & role in controlling the price of the services offered in this framework**
- **Role in ensuring a level-playing field between technologies alongside with the Competition Authority**
- **Role with respect to market price issues: monitoring, controlling, REMIT...**
- **Important role with regard to Consumer protection**
- **Diversifying of fuel supply: barely no role**

V. Conclusions

- Does life extension of older assets such as nuclear power plants affect the energy market? **YES**
- Does life extension of older assets such as nuclear power plants affect the energy transition process? **YES**
- What about gas turbines facing a lack of profitability and shutting down while it could be a useful technology for the transitional period to decarbonisation (notably to replace coal)? **NEED FOR A CLEAR VISION**
- What about decommissioning and recycling of PV and wind turbines, once their lifetime is over? **FOOD FOR THOUGHT**