

## FORATOM Position on Nuclear Long-Term Operation (LTO)

### Nuclear in Europe's Energy Future

In 2011, the EU presented its 2050 Energy Roadmap. The Roadmap contains a range of scenarios leading to a nuclear share in the EU electricity generation mix of between 3.5%<sup>1</sup> and 19.2%<sup>2</sup>. The nuclear industry believes that the 'high' share of 19.2% nuclear in 2050 is the more realistic and achievable. However, it will require continued operation of much of the existing fleet and strong and sustained new build programmes in Member States.

Across the EU there are currently 132 operating nuclear power plants in 14 Member States, delivering 1/3 of their electricity supply. More than 40% of these nuclear power plants, representing almost 46GWe of net capacity will reach 40 years of operation in the next 10 years. Extending the life of nuclear power plants is in the best interests of consumers and a sensible option for most power producers to maintain their production capacity. LTO under safe conditions will ensure the backbone of the EU's low-carbon economy remains, preserving highly specialised nuclear expertise and competence, maintaining thousands of skilled jobs and contributing to the competitiveness of national economies and their fiscal revenues. Other key benefits are enhanced security of energy supply, grid stability and competitive electricity prices with the largest beneficiary being the final consumer.

Of the 14 Member States with operating NPPs, at least 10 countries will pursue LTO of their existing plants, and 2 have committed to a phase-out policy. There are 13 Member States either with declared new build policies or considering new build programmes, including Poland and Lithuania which do not currently operate NPPs.

Nuclear new build plans announced by EU Member States, together with LTO to 60 years for plants currently operating already equates to 20 % of the EU's 2050 projected electricity demand being met by nuclear power.

A recent assessment by the OECD Nuclear Energy Agency (NEA, 2012), highlights both the benefits and challenges of pursuing LTO. In particular there are a number of parameters which are out of the control of the power utility which can have a significant role to play in the decision to pursue LTO. However, taking those in to consideration, the NEA analysis shows that 'LTO of NPPs has significant economic advantages for most utilities envisaging LTO programmes'.<sup>3</sup>

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<sup>1</sup> 'European Commission Energy Roadmap 2050' Scenario 4 'High RES'

<sup>2</sup> 'European Commission Energy Roadmap 2050' Scenario 5 'Delayed CCS'

<sup>3</sup> 'The Economics of Long-term Operation of Nuclear Power Plants' OECD NEA, 2012

## The Benefits of Nuclear Energy

Nuclear energy currently makes a major contribution to all three pillars of the EU's energy policy:

(1) During operation, nuclear power plants release no GHG emissions, and have helped avoid 436 million tonnes of CO<sub>2eq</sub> discharges per year, on the basis of the current (2011) energy mix in the course of generating around two-thirds of the EU's low-carbon electricity.

(2) Nuclear energy produces reliable baseload electricity and plants operate with very high capacity factors. The cost of nuclear generated electricity is stable, predictable and competitive with other conventional energies, helping to boost economic development, and the creation of jobs in the EU.

(3) Nuclear energy also plays a key role in ensuring energy security. NPPs are relatively invulnerable to short term fluctuations in the availability of fuel, both because operators can easily stockpile fuel for several years and because uranium is imported to Europe from a diverse range of reliable partner countries spread around the world.

The nuclear industry also sustains many high-quality jobs in Europe, maintaining technological leadership in a rapidly growing global sector. In Europe, it currently employs around 250,000 direct jobs and around 800,000 total jobs<sup>4</sup>.

## The LTO Advantage

Utilities are choosing to pursue LTO programmes for a number of reasons. Primarily, LTO represents sound asset investment management. From the beginning of operation, plant management and maintenance plans take into account the objective of long-term operation. It should be kept in mind that utilities have made investments in the upkeep of their NPPs since the start-up of operations, as well as reducing the cost impact of LTO at the end of a unit's original design basis lifetime. It is good practice to anticipate the safety requirements regarding ageing management and safety margin improvements throughout the plant lifetime.<sup>5</sup>

Extending the life of a power plant incurs a much lower capital investment cost than the building of a new NPP: generally well below 1,000 €/kW<sup>6</sup>. With the current pressures on the availability of capital and the associated importance of minimising investment risk, utilities themselves may be in a position to make a part of the investments on their own balance sheet. Capital markets may also be more readily drawn to such energy projects with lower construction costs, shorter lead times and which are completed to schedule.

Likewise, the actual work carried out for the LTO of an NPP can have a positive impact on job creation, and the continued operation of the plant ensures sustaining jobs already

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<sup>4</sup> ENEF Competitiveness sub-Working Group report 'Socio-economic benefits of the nuclear industry in the EU to 2050', May 2013

<sup>5</sup> ditto

<sup>6</sup> 'The Economics of Long Term Operation of Nuclear Power Plants' OECD Nuclear Energy Agency 2012

directly or indirectly resulting from its operation.<sup>7</sup> The local communities around each NPP have also grown and thrive economically, as a result of income generated by the plant operation.

The fact that the majority of utilities currently operating power plants in Europe are seeking to implement long-term operation, testifies to the specific advantages of LTO. Major factors include the onsite availability of existing plant infrastructure; public acceptance of currently operating NPPs; and short realisation times for necessary LTO upgrade work.

Whilst dependent on the design type, LTO of NPPs can involve the need to replace large plant components (such as a steam generator), and other major refurbishments or replacements. A high-end cost estimate has been made for the upgrade of a single NPP at 900M€<sup>8</sup>, which could extend the life-time by up to 20 years. Such costs attributing to LTO take in to consideration the obsolescence of equipment at the NPP<sup>9</sup> and can include major refurbishment, as well as any necessary upgrades, for example those which may have been required in the post-Fukushima stress test exercise.

### **Parameters and Boundaries for Pursuing LTO**

The decision to pursue an extension of the operating lifetime for an NPP rests with the utility which generally has an LTO strategy managed in an integrated approach with a long-term vision (20 years for instance) to ensure safe operation and to justify the corresponding investments.<sup>10</sup> Several risks will be appraised by the utility before investing into LTO.

- In most countries, authorisation by the national nuclear safety regulator must be sought and granted in order for LTO to be implemented. In all its operations, the EU nuclear industry sets high standards for safety as a priority and carries-out continuous safety improvement programmes in its existing plants as required by the EC's Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations. Potential regulatory stumbling blocks on granting LTO could include time delays in issuing authorisations and possible changes in safety requirements.
- It is important to maintain public and political support for LTO, and the risk of a loss of confidence is a risk that needs to be managed as part of a utility's energy strategy and LTO goals. Only robust, cross-party political support and a stable and predictable legal and regulatory framework coupled with clear national energy policy can give a solid foundation for nuclear investment.

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<sup>7</sup> ditto. Page 4: "For the LTO, considering that LTO activities are closer to new built than standard maintenance and operation, a first evaluation of supplementary jobs might perhaps best be estimated by taking the ratio of investments for LTO versus new built (1 to 5) – leading to 30 000 direct and indirect jobs over the period 2015-2035, and a grand total of 50 000 jobs including the "induced jobs"."

<sup>8</sup> ditto

<sup>9</sup> ditto

<sup>10</sup> European Nuclear Energy Forum Sub Group Nuclear Installation Safety 'Considerations on harmonised conditions for safe long-term operation of Nuclear Power Plants in the EU' 27 April 2010

- In parts of the current oversupplied European electricity market, prices have been steadily decreasing close to the variable costs of thermal generation, with no little margin for profit on investments. At the same time, customers find that their energy bills are rising. In the medium-to-long-term, market price evolution will depend on the cost of gas; the growing share of renewables; and the CO<sub>2</sub> emission price. Investment in LTO remains a sound economic proposition in a world of uncertain fossil fuel prices and is less risky than many other options, such as investing in a new CCGT or coal fired unit which would imply higher capital cost and higher fuel costs. In assessing future generation adequacy, consideration must be made on how much firm and non-firm capacity is available. Existing hydro and nuclear plants are seen as providing the greatest flexibility to the system, while staying fully competitive cost-wise. This fact strongly supports the need for long-term operation of existing nuclear power plants.

## Conclusion

The case for long-term operation is robust. The 132 operating nuclear power plants are an important asset for Europe, strongly contributing to final energy price moderation, security of supply, CO<sub>2</sub> emissions reduction and employment. However, clear energy policy and political support are a prerequisite. In the 12 Member States where nuclear power plant lifetime is not a priori restricted, particular attention should be given to:

- communicating the drivers of nuclear safety: continuous improvement and safety upgrades means that no reduction in safety standards or performance as plants age;
- communicating the benefits of nuclear, particularly the benefits of existing nuclear as a low-cost source of low carbon energy at a time when there is a keen focus in Europe on spiralling energy bills;
- better rewarding of flexibility and capacity in the electricity market design;
- target harmonization and reduce market and nuclear regulatory differences from one MS to another.