

Policy Issues in Europe on Nuclear Power Plant Life

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1. Introduction

Good morning, ladies & gentlemen. I am very honoured to be given this opportunity to address the IAEA's Scientific Forum and to present the European industry perspective on the subject of life cycle management of nuclear power plants.

The subject of life management for nuclear plants is becoming more and more important as the majority of operating units in the EU passes middle age, and in circumstances where for the moment there are few developed plans for building new plants. I will attempt here to give a brief overview of the main issues, taking into account recent policy initiatives from Brussels. These have focussed on attempts to understand in more detail the likely trends affecting future growth in electricity demand, security of energy supply, and obligations under the Kyoto protocol. There are also some important legislative initiatives on the way, the outcome of which may form part of the background against which more positive discussions about nuclear plant lifetime extension could take place. These concern nuclear safety, waste management, and the funds for decommissioning of redundant nuclear plants.

Before going further is worth pausing for a moment to underline that for several nuclear countries in the current EU, the question of lifetime extension does not apply at all for the moment. I am of course referring to my own country, Germany, to Sweden and to Belgium. In all these cases the present governments are trying to phase out their nuclear power. These efforts may not of course see full implementation, especially since they are planned over many years. It is always possible that successive governments will change their minds, but for the moment we cannot count on that. In the remaining EU nuclear countries however, the question of life extension should be actively discussed. On the other end of the scale we see what is happening in Finland, where new build is being planned, and where undoubtedly the existing plants will be retained in safe operation for as long as it is economically possible to do so. It is also worth noting in this context that seven nuclear states will join the EU in the coming years, and although some of them will close nuclear units as part of the entry conditions, others which are part built now will be completed.

It is fair to say that even taking into account the political phase outs I have mentioned, there is adequate scope for a serious discussion about plant life extension in the enlarged European Union. This will become more and more important as the consequences of plant retirement become clearer, and as issues such as climate change climb higher on the political agenda. All this has implications for the way in which electricity market rules are developed, for the

regulation and re-licensing of ageing plants, and for the construction of replacement nuclear capacity.

2. Present situation in Europe

Let me turn to the present situation in Europe.

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The nuclear park of EU-15 comprises 145 units, providing over one third of the total electricity needs of the EU. The corresponding net capacity is 122 GW, out of a total of 575 GW (or 21%). The average age of these units, as of today, is 22.3 years.

The nuclear park of the EU candidate countries comprises 26 units, providing about 20% of their total electricity needs. The corresponding net capacity is 14 GW out of a total of 100 GW (or 14%). The average age of these units, as of today, is 15.7 years. The relative youth of nuclear plants in the candidate countries compared with those in the present EU is worth pointing out. This may indicate that there is more time to deal with the technical aspects of ageing in those countries, though it should be mentioned that special consideration may be required to account for the specific challenges associated with reactors of Russian design, such as for example the question of pressure vessel embrittlement.

The life management of a nuclear plant operating in a country where there is no political interference is normally a matter between the operator and the independent regulator. The regulator sets the technical safety standards for continued licensing, and the operator assesses whether he can upgrade, maintain and operate the plant to that standard and still make a profit. In this context plant life extension is a purely technical/economic decision. However, broader considerations than simply profit making apply at the political level, where security, environmental, and market elements must be factored into energy policy in order to provide a framework in which utilities can play their role most effectively. I would like to underline this point in particular where policy making at the EU level is concerned. Research programmes are also a part of this framework because they could lead to results which may help us to get the best out of our nuclear assets before retiring them. These then are the themes I would prefer to address in this presentation, rather than the purely technical aspects of lifetime extension.

3. Green Paper on Security of Energy Supply

Regarding initiatives at the EU policy level, a good starting point for a contemporary discussion about nuclear life extension is the Commission's Green Paper on Security of Energy Supply, which came out in November 2000. This paper produced valuable forecasts of the energy situation in the enlarged EU out to 2030, and enabled an informed debate to take place concerning among other things the role of nuclear energy.

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This graph came from assumptions made in the Green Paper debate, and as you will see, it shows a sharp decline in nuclear capacity after 2010, based on an assumed 40-year life limit. This would occur at around the time that Kyoto commitments really begin to take hold. Just after 2030, there would be almost no nuclear capacity left. However, the possibility of new build, and the scope for plant life extension were not specifically addressed in the Green Paper. This omission should really be corrected in any further policy level discussions. I will mention now some details from the Green Paper discussion since it forms part of the background for further analysis.

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A key point made in the Green Paper was that there is a need to sustain economic growth, while at the same time reaching the Kyoto targets for greenhouse gas reductions.

The Green Paper concluded that for the enlarged EU (30 countries):

- Overall energy dependency will grow from 36% now to 60
- CO₂ emissions with respect to the 1990 level will increase by 31% as demand rises and the nuclear contribution declines.
- Nuclear has an important role to play in reducing greenhouse gas emissions.

However, the Green Paper also noted that:

- Nuclear are disliked;
- Renewables are popular, but their contribution is limited;
- Oil and gas are popular, but are big contributors to energy dependence; and

- electricity production offers the widest scope for reductions in CO₂ emissions.

In summary, the different trends would lead towards 2030 to seriously adverse consequences for CO₂ emissions and overall dependence on external energy sources.

From this brief picture you can see the dilemma facing the EU in meeting its energy

needs and environmental goals over the next thirty years and beyond. These few predictions illustrate clearly the scope for the nuclear opportunity, provided the outstanding issues associated with acceptability can be resolved. This includes in the short and medium term the possibilities for lifetime extension.

4. EU policies

4.1 Package of new EC legislative proposals

In addition to the Green Paper, other factors have to be taken into account when analysing EU policy options.

- There has been considerable pressure for some time to establish EU nuclear safety standards. This is increasing as Accession approaches.
- The results of a Eurobarometer opinion survey, published in April 2002 [3], concluded that a majority of the EU citizens agreed that nuclear power should remain an option for electricity production in the EU, **provided that** all wastes are managed safely.

- Earlier this year the European Parliament overwhelmingly voted in favour of a stricter management of nuclear plant decommissioning funds in order to make sure that these funds are available at the end of life, and that they can never be used for other purposes than decommissioning.

These factors led the Commission to propose a legislative package to resolve the outstanding issues. This package is now in the final stages of preparation and is scheduled for adoption by the Council by around the end of this year. I would like to say a few words about the scope of this package, so far as I am aware of it through informal contact with the Commission. Let me first make a disclaimer. I am not speaking about the package on behalf of the Commission, nor am I promoting it. I am simply presenting to you what I know about a current legislative initiative because it will clearly have implications for future discussion of nuclear issues in the EU, including the issue of plant life extension.

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The package includes three Directives, to be binding on all Member States, as follows:

- ***EU-wide safety standards***

Although there is already a high degree of convergence regarding safety requirements among the member states currently operating nuclear power plants, the Commission feels that harmonisation must be pushed even further. A formal framework applicable to all member states – and candidate

countries alike – is seen as necessary to the present EU, and essential to have in place before accession.

- ***Spent fuel and radioactive waste management***

This proposed Directive is motivated by what the Commission sees as a lack of progress from governments in moving towards the disposal of high-level radioactive waste and spent nuclear fuel. The new framework will set out requirements for each member state to have a clearly defined programme for ultimate disposal of all categories of radioactive waste. Member states will also be required to report back to the Commission at regular intervals on the progress made.

- ***The management of decommissioning funds***

The draft framework Directive on this matter will require that all funds set aside to cover all end-of-life nuclear liabilities should be clearly ‘ring-fenced’ and subject to transparent, external accounting, although still being the property of the relevant owners. The Commission will require regular, detailed reporting on what funds are available and how these funds are being collected and managed.

All these Directives will have links to the discussion about nuclear power plant life management.

Safety standards would presumably provide a framework in which the safety issues associated with extended licensing could be resolved. This might also ensure those future discussions about safety really concentrate on objective criteria, rather than ideological or political constraints.

EU citizens are concerned about radioactive waste management – how can the policy makers and industry talk about life extension without clear long term plans for waste management?

Decommissioning funds are managed quite differently in all the member states. Before being able to make a successful case for life extensions, what measures should the policy makers and industry take to create a commonly accepted and well-controlled system for the decommissioning funds?

These Directives seem to present a considerable challenge to the Member States which have nuclear power, and to the industry itself. Over the coming Months Foratom will be very active in evaluating the proposals and providing detailed comments to the Commission.

I would like now to move on to discuss some specific aspects of the plant life management issue.

5. Plant life extension

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In the medium term, nuclear plant life extension is about bridging the gap between the units now in operation, and the arrival of sufficient new capacity to

replace them. As suggested earlier, continuity of the nuclear contribution to the energy mix of the enlarged EU is important for reasons of security of supply, and in order to meet our Kyoto obligations. These two facts alone underline the growing importance of the issue.

This graph shows a forecast of increasing electricity demand, and the contribution which could come from nuclear over the next 30 years. As you can see, various scenarios for nuclear are mentioned. We don't yet know when it will be possible to bring on line all the replacement capacity that will be needed, and we are not certain what the growth in electricity demand will be over the same period. What is clear is that the role of life extended nuclear plants in percentage terms, though important in terms of bridging the gap, will diminish as electricity demand grows. Therefore the need to replace nuclear with nuclear will become progressively important in the medium to longer term. Policy makers must not lose sight of these facts. Let us spend some time illustrating these remarks.

For instance, if the lifetime of all EU Western design NPPs were extended to 50 years, an additional 6450 TWh would be produced. This represents twice the total EU electricity consumption in 2001.

It is also possible to look at the plant life extension issue under the generation capacity side. For instance, a ten-year life extension for the same reactor park

would produce almost twice the amount of energy expected from renewable sources as envisaged by the EU programmes.

It is also worth underlining that available figures indicate that plant life extension programmes are cost-effective in terms of the investment needed, timescales involved and public acceptance.

5.1 EU policies

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So far, plant life extension is not considered by the European Commission as an issue in its own right. It is treated as part of the activities aimed at enhancing the safety of operating nuclear power plants. These activities consist mainly of projects that are part of the successive R&D framework programmes implemented by the EU. In addition to the basic research on materials science conducted by the European Commission's JRC research establishment, a number of other projects are funded, mostly based upon attempts to establish and improve networks of excellence that enable the various industrial actors and national research bodies to collaborate in an efficient way, and afterwards to share the results of their work between the participants. This work has also included in the past, attempts to bring together researchers and industrial representatives from the present EU states and the candidate countries. Within this framework there have been valuable projects aimed at understanding the ageing issues of VVER power plants, particularly the question of embrittlement in

the welds of reactor pressure vessels. All of this work is valuable, and should continue under future Framework Programmes.

Four additional comments can be made about the research programmes:

- In addition to the technological aspects of ageing, the human aspects are also given due consideration. Personnel training and the maintenance of a suitable pool of professional experts are considered as high priority objectives.
- The FP6 budget line for nuclear activities is 1.230 billion €
- Expenses earmarked for nuclear technology and safety under FP6 reach 50 million €
- Expenses earmarked for plant life extension and other programmes under FP6 reach 10-15 million €

It has to be recalled that Framework Programme runs from 2002-2006.

5.2 National policies

For the moment, plant life extension has mainly a utility and national dimension. In order to widen the debate, EU policy makers should both encourage further the dialogue among the different nuclear operators and strengthen the co-operation structures between national nuclear regulators, particularly taking into account the special needs in the EU applicant countries.

Despite considerable harmonisation of regulatory practices in the EU, very diverse policies have been applied to the operational lives of nuclear plants. These range from 30 to 50 years. For those countries where life extension is being considered seriously, the American and Japanese initiatives to consider

license extensions for up to 60 years where possible is being followed up with great interest, and might inspire further similar actions in the EU.

6. Conclusions

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Several conclusions can be drawn from this quick overview of the European scene.

- The European nuclear industry as a whole is delivering what it can to permit the extended operation of existing nuclear power plants.
- Extended economic operation of NPPs can be achieved while keeping safety at the highest level.
- The Green Paper debate and the forthcoming legislative package ***could*** provide a more solid basis for life extension of nuclear plants.
- As of today, most of the R&D is done by the industry itself. Reaching the overall plant life extension objective could be greatly improved by extending and improving the R&D funded at National and Community level.
- Life extension will provide a modest but important contribution to the future electricity needs of the EU. Plant life extension can therefore be seen as contributing to bridging the gap between supply and demand until new nuclear power plants are ordered.
- The EU should follow the US example in pioneering licence renewal with the help of national regulators. The industry will play its part but this initiative must be supported at Community level.

Thank you for your attention.

7. References

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