

Ministry of Trade and Industry, Finland

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Teollisuuden Voima Oy

**ENVIRONMENTAL IMPACT ASSESSMENT PROGRAMME FOR THE OLKILUOTO 4
NUCLEAR POWER PLANT UNIT; STATEMENT BY THE CONTACT AUTHORITY**

On 31 May 2007, Teollisuuden Voima Oy (TVO) submitted an environmental impact assessment programme (the EIA programme) to the Ministry of Trade and Industry (MTI) in accordance with the environmental assessment procedure (hereinafter the EIA procedure), pursuant to the Environmental Impact Assessment Act (468/1994; EIA Act), on the fourth unit of the Olkiluoto nuclear power plant and the related projects. Prepared by the organisation responsible for the project, the EIA programme presents a plan for the necessary studies and implementation of the EIA procedure. The EIA programme also includes a description of the present state of the environment in the area likely to be affected.

Pursuant to the EIA Act, the MTI will act as the contact authority in the EIA procedure.

A public notice announcing the launch of the EIA procedure was published on 8 and 9 June 2007 in the following newspapers: *Helsingin Sanomat*, *Hufvudstadsbladet*, *Turun Sanomat*, *Satakunnan Kansa*, *Uusi Rauma* and *Länsi-Suomi*. The public notice and the assessment programme can be found on the MTI's website at www.ktm.fi

Members of the public were able to view the assessment programme between 12 June and 31 August 2007 in the local government offices of Eurajoki, Eura, Kiukainen, Lappi, Luvia and Nakkila and in the environmental office in Rauma. The Ministry organised a public meeting to discuss the project on 13 June 2007.

The comments and opinions invited and presented on the assessment programme are described in Chapter 3.

The Espoo Convention (67/1997) will be applied to the assessment of the project's cross-border environmental impacts. The parties to the Espoo Convention have the right to participate in the EIA procedure. The Ministry of the Environment is responsible for the practical arrangements for conducting the international hearing. The Ministry of the Environment has

notified the following countries of the project: Sweden, Denmark, Norway, Germany, Poland, Lithuania, Latvia, Estonia and Russia.

1 Project information

Organisation responsible for the project

The organisation responsible for the project is TVO, which holds the operating licences for the two present units in the Olkiluoto nuclear power plant until 2018. In addition, TVO is currently constructing the Olkiluoto 3 plant unit, for which the Government issued a construction licence in 2005. According to the information TVO has received from the project contractor, it has been estimated that the unit's completion will take place in 2011.

Project and its alternatives

TVO is exploring opportunities to expand a nuclear power plant, located on the island of Olkiluoto in the Eurajoki municipality, with a fourth unit. The purpose of the project is to increase power production capacity, both to satisfy demand and replace capacity about to be withdrawn from the market.

The electrical output of the planned unit will range from 1,000 to 1,800 megawatts and the thermal power from 2,800 to 4,600 megawatts. A pressurised water reactor and a boiling water reactor are both being considered. The Olkiluoto 4 unit is designed as a base-load power plant and, excluding an annual service shutdown, it will run continuously throughout the year. The unit has an estimated technical life cycle of approximately 60 years.

The project includes the intermediate onsite storage of spent nuclear fuel generated by the new unit, and the treatment and disposal of low- and intermediate level radioactive waste. The implementation of power transmission to the national grid is also included in the project.

A situation in which the Olkiluoto 4 project would not be implemented is regarded as a zero option. TVO would not consider building another type of power plant in the Olkiluoto plot instead of the new nuclear power plant unit, and the area would remain unused for the time being. The zero option assesses the environmental impacts caused by generating the electricity corresponding to the plant unit's production using the average Nordic power production structure.

The limitation of the alternatives is made on the basis of the importance of utilising existing infrastructure in nuclear plant projects.

According to TVO's plans, the construction of the nuclear power plant would take around 4 to 6 years, and its timing would be approximately between 2013 and 2018.

2 Licensing of nuclear facilities

Pursuant to the Nuclear Energy Act, the decision-making and licensing system is based on a principle whereby safety is continuously reviewed, the assessments being further defined throughout the procedure so that the final safety assessments are only made at the operating licensing stage.

2.1 Environmental impact assessment

TVO will draw up an EIA report based on the assessment programme and the contact authority's statement, followed by a public hearing on the EIA report. The responsible organisation estimates that the EIA report will be finished by early 2008.

The EIA procedure constitutes part of the safety and environmental impact assessment for nuclear power plants laid down in a decision-in-principle pursuant to the Nuclear Energy Act (990/1987).

2.2 Decision-in-principle

The planned nuclear power unit complies with the definition of a nuclear power plant of considerable general significance, as laid down in the Nuclear Energy Act, requiring the Government's project-specific decision-in-principle on whether the construction project is in line with the overall interests of society. In accordance with the Nuclear Energy Decree (161/1988), the decision-in-principle shall include an EIA report complying with the Environmental Impact Assessment Act. The scope of the project, outlined in the application for the decision-in-principle, may not exceed that described in the EIA report.

The application for the decision-in-principle is not solely based on the material provided by the applicant. The authorities will acquire supplementary reports, both those required pursuant to the Nuclear Energy Decree and other reports deemed necessary, providing a broader analysis of the project. In preparation for the processing of the application, the MTI will obtain a statement from the council of the local authority intended to be the site of the facility, and from its neighbouring local authorities, the Ministry of the Environment and other authorities, as laid down in the Nuclear Energy Decree. In addition, the MTI will obtain a preliminary safety assessment from the Radiation and Nuclear Safety Authority (STUK).

The MTI will provide local authorities, residents and municipalities in the immediate vicinity of the facility with an opportunity to express their opinions in writing before the decision-in-principle is made. The Ministry will arrange a meeting, where the public will have the opportunity to express its opinions verbally or in writing. These responses will be submitted to the Government.

Pursuant to the Nuclear Energy Act, before making the decision-in-principle, the Government shall ascertain whether the municipality where it is planned that the nuclear facility will be located (Eurajoki) is in favour of the facility, and that no facts indicating a lack of sufficient prerequisites for constructing and using a nuclear facility in a safe manner and not causing injury to people, or damage to the environment or property, have arisen in the statement from STUK or elsewhere during the processing of the application. The Government's decision-in-principle shall be forwarded, without delay, to Parliament for perusal. Parliament may reverse the decision-in-principle or decide that it should remain in force as such.

2.3 Construction licence

The actual licensing procedure follows the Government's decision-in-principle. Construction of the nuclear power plant requires a licence issued by the Government, stating that the construction project is in line with the overall interests of society. Furthermore, sufficient safety, protection of workers, the population's safety and environmental protection measures must have been taken into account appropriately when planning the operations, and the location of the nuclear facility must be appropriate with respect to the safety of said operations.

A hearing procedure involving municipalities, authorities and citizens will be established during the application process for the construction licence.

2.4 Operating licence

Operation of a nuclear power plant requires a licence issued by the Government. In order to receive a licence, the operation of the nuclear facility must be arranged so that it is in line with the overall interests of society, and so that the protection of workers, safety and environmental protection have been taken into account as appropriate.

A hearing procedure involving municipalities, authorities and citizens will be established during the application process of the operating licence.

3 Summary of comments and opinions

The following organisations were invited to comment on the assessment programme:

Ministry of the Environment, Ministry of the Interior, Ministry of Social Affairs and Health, Ministry of Defence, Ministry of Finance, Ministry of Transport and Communications, Ministry of Labour, Ministry of Agriculture and Forestry, Ministry for Foreign Affairs, State Provincial Office of Western Finland, Satakuntaliitto, Western Finland Environmental Permit Authority, Finnish Environment Institute, Radiation and Nuclear Safety Authority, Safety Technology Authority, Satakunta T&E Centre, South-western Finland T&E Centre, Occupational Safety and Health Inspectorate

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of Turku and Pori, Regional Environment Centre of Southwest Finland, Municipality of Eurajoki, Municipality of Eura, Municipality of Kiukainen, Municipality of Lappi, Municipality of Luvia, Municipality of Nakkila, City of Rauma, Satakunta Rescue Service, Confederation of Unions for Professional and Managerial Staff in Finland (AKAVA), Confederation of Finnish Industries EK, Finnish Energy Industries, Greenpeace, Central Union of Agricultural Producers and Forest Owners, Central Organisation of Finnish Trade Unions, Finnish Association for Nature Conservation, Federation of Finnish Enterprises, Central Union of Swedish-speaking Agricultural Producers in Finland, Finnish Confederation of Salaried Employees, WWF, Fingrid Oyj, Posiva Ltd and Advisory Committee on Nuclear Energy.

Comments were not received from the following organisations: Ministry of Defence, Ministry for Foreign Affairs, Western Finland Environmental Permit Authority, Finnish Environment Institute and Municipality of Kiukainen.

In the assessment procedure with respect to cross-border environmental impacts, the Ministry of the Environment notified the authorities of the following countries: Swedish Environmental Protection Agency (Sweden), Ministry of the Environment (Denmark), Ministry of the Environment (Norway), Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Germany), Ministry of the Environment (Poland), Ministry of the Environment (Lithuania), Ministry of the Environment (Latvia), Ministry of the Environment (Estonia), Ministry of Natural Resources (Russia).

Sweden, Norway and Estonia participate in the EIA procedure and have commented on the EIA programme. Lithuania will participate in the EIA procedure but has not commented on the EIA programme. Russia will participate in the EIA procedure but has not commented on the EIA programme, submitting its comment at a later date, when it will be delivered to the responsible organisation. Latvia has replied to the Ministry of the Environment that it will not participate in the EIA procedure. The Ministry of the Environment has not received replies from Denmark, Germany or Poland. If any of the potential participants in the cross-border procedure submit a comment, it will be delivered to the organisation responsible for the project.

Comments invited by the MTI

According to the statement submitted by the Ministry of the Environment, the assessment programme generally describes matters laid down in Section 9 of the Government Decree on the environmental assessment procedure (713/2006). However, the Ministry considers the programme to be a general description and deficient in parts.

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In the summary of its statement, the Ministry of the Environment advises that the EIA report on the planned nuclear facility should provide further details of the following matters in particular:

- Main alternatives to the project with sub-alternatives and, in conjunction with the zero option, opportunities to increase the efficiency of power consumption;
- Nuclear safety of the project and its impact on the current arrangements for nuclear waste management at Olkiluoto;
- Relationship with, and the interrelated and combined effects of the project under review (the Olkiluoto 3 unit currently under construction) with respect to, Posiva's nuclear fuel disposal facility;
- Limitations of the project and any associated projects, such as fuel sourcing, power transmission and demand for back-up power; and
- Impacts of cooling water on the state of the sea, taking into account the effects of Olkiluoto 3.

The Ministry of the Environment stresses the importance of making both the EIA report and the contact authority's respective statement available, when comments will be invited on a potential decision-in-principle.

According to *the Ministry of the Interior*, the EIA programme has been comprehensively prepared and the Ministry's Department for Rescue Services does not have any major suggestions for changes at this stage of the project. However, the Department for Rescue Services deems important the cooperation between local rescue services and any related parties, and the organisations implementing the EIA programme. The programme should include an assessment of the potential impact on rescue services.

The Ministry of Social Affairs and Health finds the EIA programme appropriate and comprehensive, with adequate consideration having been paid to potential risks, both direct and indirect, to the population's health and alternative risks.

The Ministry of Finance finds no cause to criticise the content of the EIA programme. However, the Ministry draws attention to the social significance of the project, and to implementing an assessment of economic, social and environmental impacts from the perspective of society in general during the decision-in-principal stage. The Ministry points out that the planners are able to assess how demand for electricity could be met if the nuclear plant unit is not built.

The Ministry of Transport and Communications maintains that particular attention should be paid to defining the observed area in the impact assessment, and the junction of road 2176 and highway 8. The report on the

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overall development of highway 8 between 2010 and 2020 should be taken into account in the studies and the EIA report.

The Ministry of Labour maintains that it is important to provide a detailed assessment of the project's impact on employment, both during the construction and the operational stage. A potential estimate of the availability of skilled labour may prove significant to the organisation implementing the project, since insufficient workforce may have an effect on the implementation schedule.

The Ministry of Labour further notes that, although the organisation implementing the project is not required to provide an impact assessment on improving energy efficiency and conservation at this stage, these will be assessed later by the Government, Parliament and other parties during the potential licensing of the project. The long-term strategy for the climate and energy policy, currently under preparation by the ministerial working group, will have an effect on the wide-scale social assessment of the project.

The Ministry of Agriculture and Forestry finds no cause to criticise the EIA programme in respect of its own sector. However, the Ministry maintains that problems relating to climate change, such as extreme weather conditions, may increase in the future. Since the planned facility is located on the coast, the EIA should take into account the potential increase in sea level changes and the impact of sea water warming on biological production, which may also present new challenges to the safe and uninterrupted operation of the facility.

According to *the Advisory Committee on Nuclear Energy*, the scope of the programme is appropriate. After the assessments described in the programme have been completed, sufficient basic data will be available for making the decision-in-principle. However, the Committee finds it critical that the EIA report should not simply repeat the content of previous EIAs but take into account changes in the operational environment to an appropriate degree.

For example, the ICRP's new guidelines on radiological protection, currently at the drafting stage, should be taken into consideration wherever possible, since they involve an assessment of radiation doses affecting both human and other populations. Since considering the impact of climate change is vital, the EIA report should provide a description of how to prepare for and adapt to climate change.

The Radiation and Nuclear Safety Authority (STUK) maintains that the EIA report should prescribe the key grounds and objectives for planning the limitation of emissions of radioactive substances and environmental impacts, as well as an assessment of the possibilities of meeting the safety requirements in force.

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The programme describes guidelines for analysing the environmental impacts of possible radioactive emissions in emergency situations. The EIA report should include a clear summary of the basis for such an analysis and describe, in an appropriate manner, the potential cross-border environmental impacts of radioactive substances.

The EIA report should account for and describe more precisely the intake and discharge of cooling water in the facility, including any possible remote intake and discharge options. A comprehensive dispersion calculation for waterways should cover the seasons and a range of weather conditions.

STUK also points out that in section 6.1.1 it is stated that the protection zone was created for the impact of spent nuclear fuel, while in reality it is being used for preparing for emergency situations caused by the reactor.

The State Provincial Office of Western Finland finds that the assessment programme has been appropriately prepared; the suggestions for impact assessments on human health, living conditions and the attractiveness of living environment cover various aspects to a sufficient extent.

According to *the Regional Environment Centre of Southwest Finland*, the assessment programme is very clear and illustrative. The project and the alternatives have been presented and defined clearly in such a way that the environmental impacts caused by the project can be studied.

The Centre considers the two options covering the construction sites for the unit in Olkiluoto and the two alternative intake and drainage sites for cooling water sufficient for a project such as this. Energy conservation, the option excluded at this stage, will be considered in a review of the importance of the nuclear power plant to Finland's energy supply, supporting the Government's decision-in-principle. However, since energy conservation is linked not only to the zero option but also to the purpose and justification of the project, it would be appropriate to present and investigate it at the EIA stage as part of the national energy supply review.

The Centre also considers it important that the utilisation of condensation heat be covered in the options. These should include utilisation of condensation heat fully, to a large extent, partly and not at all (the current model).

In the waterways impact assessment, the impact of cooling and sewage water on water quality, biology, fish stocks and the fishing industry are assessed on the basis of existing studies and dispersion models. The impact of Olkiluoto 3 should be included in these calculations. The assessment report should include more specific information on the applied knowledge and research methodologies in order to provide the best possible transparency and to allow verification of the conclusions drawn from the assessment results.

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According to the Centre, the EIA programme does not show what kind of flow and water quality modelling will be used in the impact assessment. The Authority considers the local model inappropriate for the purposes of investigating the project's impact to a sufficient degree. Flow and water quality modelling should be directly linked to the Bothnian Sea and the Baltic Sea. The project's importance to the eutrophication of the Baltic Sea and to the survival of newcomer species should also be considered. The effects from the mitigation of damage caused by newcomer species, such as the eradication of hydrozoans in the current power plant's cooling system through chlorination, must be taken into account in the impact assessment.

The Safety Technology Authority has no comments on the EIA programme, although it notes that the programme does not include information on the hazardous chemicals used in the operation of Olkiluoto 4.

The Occupational Safety and Health Inspectorate of Turku and Pori has no comments on the EIA programme.

Satakunta T&E Centre finds the EIA programme comprehensive on the whole. However, the T&E Centre finds it important that the impact of cooling water on the sea areas adjacent to Olkiluoto and in the Bothnian Sea be satisfactorily assessed. Problems caused by climate change, such as sea level changes and more frequent exceptional weather conditions, should be taken into account.

Satakuntaliitto finds the EIA programme comprehensive, with the planned assessments creating solid ground for drawing up the EIA report and decision-making. On the basis of the approved regional plan and other similar plans, Satakuntaliitto states that it finds no cause to criticise the EIA programme. Currently preparing a provincial plan to replace the present regional plan, Satakuntaliitto points out the long-term development needs with respect to land use, the need for and presentation of power transmission in this EIA and the dispersion calculations for cooling water.

The South-western Finland T&E Centre finds no cause to comment on the EIA programme with regard to impacts on humans and society, the regional structure and economy, and transport. Instead, it considers that, with regard to certain impacts, the EIA programme remains rather superficial, for example regarding the effects of cooling water on the fishing industry. The T&E Centre also notes that there is no previous assessment of what would happen if fish entered the Olkiluoto power plant with cooling water, and considers that this eventuality should be investigated alongside the current EIA.

The Municipality of Eurajoki finds no cause to criticise the EIA programme. However, Eurajoki considers it important that a detailed study of the impact of cooling water on the immediate vicinity of the drainage area and on the

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wider marine area near Olkiluoto be conducted. Eurajoki also finds it vital that an EIA procedure for power transmission would be conducted alongside the Olkiluoto 4 EIA in the future.

According to *the Municipality of Eura*, the EIA programme is fairly successful in its comprehensive description of the natural environment and land use solutions in the area. Monitoring and research reports concerning the natural environment, including the aquatic ecology, are comprehensive. However, Eura finds that the techno-economic scope of the programme is too narrowly defined. For example, the residents' questionnaire targeted stakeholder groups only in the neighbouring areas. It further finds the method of limiting power transmission questionable.

The Municipality of Lappi maintains that, without question, the entire EIA process should be extended to a wider area, covering the neighbouring municipalities of Eurajoki. The environmental impact of power transmission lines should be reviewed during this EIA process, not leaving this to a separate EIA procedure. The assessment of traffic arrangements should take into account road 2070 between Lappi and Eurajoki.

The Municipality of Luvia finds that the key environmental impacts, likely to be caused by the different implementation options, are observed in the EIA programme. However, Luvia emphasises that the EIA must include model calculations for the dispersion of cooling water, the estimated effects of the thermal load on sea water temperatures and ice conditions in the nearby areas, and the assessment of changes to the sea currents in the area.

The Municipality of Nakkila states that the EIA programme provides reasonable prerequisites for reviewing the environmental impact of the fourth plant unit. However, the assessment of producing and transporting nuclear fuel is insufficiently presented by a responsible nuclear energy company like TVO. The EIA report must clearly show that Finland does not import nuclear fuel produced or concentrated in questionable conditions with regard to occupational health and safety or environmental protection. Nakkila regards the review of emergency situations as superficial, and suggests that consideration be given to extending the emergency planning zone.

The City of Rauma emphasises the impact of the thermal load on the sea, created by the current and the planned facilities. The assessment report should show the effects in a situation where heat created in the production process is cooled using a different technique, not causing a thermal load on the sea. The report should also consider the effects of climate change on the operation and environmental impact of the nuclear power plant.

Satakunta Rescue Service finds that Chapter 7 of the EIA programme provides good grounds for assessing the environmental impact in the assessment report. The Rescue Service considers the current protection zone

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and the division into emergency planning zones as functional, but points out that if the picture of the risks involved changes in the EIA process from its current state, the division into emergency zones should be reassessed. In addition, the Rescue Service suggests that a representative from Satakunta Rescue Service be invited to the current EIA monitoring group at TVO.

The Confederation of Finnish Industries EK finds the assessment programme comprehensive.

Finnish Energy Industries consider the EIA programme comprehensive, and also note the project's social significance.

Greenpeace states that the environmental impacts of the entire production chain of nuclear fuel should be considered as environmental impacts of the project. It further maintains that the effects of a serious nuclear emergency should be considered as potential environmental effects. The EIA report should mention that the potential environmental impacts of such an emergency would last for hundreds of thousands of years, the nuclear waste finally ending up in ground water or on the surface.

The zero option should include a scenario whereby Finnish energy needs are met by sustainable energy solutions without increasing the use or import of nuclear energy and fossil fuels. This option should be based on the expectation that electricity consumption will decrease as the consequence of a determined energy policy.

WWF suggests that the EIA programme should give equal weight to different options, which can satisfy the need for, and objectives of, the project. These options should particularly include an increase in energy efficiency and the use of renewable sources of energy. The assessment should mention how different views, such as those of citizens and organisations, have been considered when the options were formed.

WWF maintains that the impact assessment should be enhanced by considering the entire life cycle of the project, including the environmental impact of processing and transporting uranium. The environmental impact of construction should be assessed with regard to using natural resources and creating emissions.

WWF also suggests providing more detailed information on the assessment of environmental impacts, such as on the Natura area and people, the affected area and the effects of emergencies. *WWF* notes that up-to-date data should be used in the assessment.

The Central Union of Agricultural Producers and Forest Owners finds communication and interaction important, maintaining that the communication and participation plan presented in the EIA programme provides a solid base for interaction. Residents, land owners, stakeholder

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groups and other potentially affected groups in the area should be heard and their views taken into account.

The Union suggests that attention should be paid to the indirect effects of the project, such as the planned power transmission structures. The Union also remarks on the project's social significance and the need to review questions relating to the energy policy in the decision making process.

The Central Organisation of Finnish Trade Unions considers uninterrupted operation and safety in all circumstance to be the key points of the assessment. The assessment should take into account the experiences accumulated from Olkiluoto 3, the latest international data on the safety of nuclear power plants and STUK's views as a whole. All in all, the organisation finds the assessment programme sufficient.

The Confederation of Unions for Professional and Managerial Staff in Finland (AKAVA) presents the organisation's general energy and climate policies, and AKAVA's member organisations point out the social significance of nuclear power as part of these policies.

AKAVA proposes that the reviewed options include the utilisation and profitability of condensation heat (The Finnish Medical Association) as well as energy conservation, either in the EIA or before the prospective licensing decision on the construction of the nuclear unit (The Finnish Union of Environmental Professionals and the Trade Union of Education in Finland).

In the main, the assessment programme is considered appropriate and comprehensive. However, AKAVA proposes providing additional information with regard to the impact assessment. Although the safe final disposal of nuclear waste is a key question in the nuclear power industry, the utilisation of waste may present a future option for energy production (The Finnish Medical Association). Unexpected emergencies and exceptional situations should include changes in the environment, threats caused by human activities and securing basic energy production in unexpected situations. It should be determined which factors with a detrimental effect on the environment should be excluded from the zero option (The Finnish Union of Environmental Professionals).

The Finnish Association for Nature Conservation maintains that the need for the project should be justified to a sufficient extent in the assessment programme. Energy conservation and renewable sources of energy should be reviewed as options.

The Association maintains that the impact assessment should be enhanced by considering the entire life cycle of the project, including the environmental impact of processing and transporting uranium, the decommissioning of facilities, nuclear waste management and transport. Combined effects should be reviewed in addition to the environmental

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impact of the project, including the effects of the current units at Olkiluoto in different situations (life cycles, decommissioning).

Environmental changes, which may have an effect on the project, should also be considered. Particular attention should be paid to the exposure of local residents to airborne radioactive isotopes, the potential risk of concentrated isotopes in species in the terrestrial environment through emissions, and the volume and specification of isotopes discharged into the aquatic environment of the Bothnian Sea.

The Federation of Finnish Enterprises states that the EIA programme has been appropriately drawn up, covering all key aspects of assessment to a sufficient extent.

The Federation would find it reasonable to review a zero option, in which emissions of different power production methods are assessed. This would provide an estimate of the actual alternatives to the power plant.

The Finnish Confederation of Salaried Employees finds no cause to criticise the EIA programme.

Fingrid Oyj has investigated the possibilities of connecting the Olkiluoto 4 unit to the national grid and the necessary reinforcement of the grid on the basis of data on the facility. The necessary reinforcements of the grid are included in the long-term development plan of the national grid and also form part of the preparations for a provincial plan. Fingrid Oyj has commenced its investigations for establishing power line routes. The environmental impacts of these changes will be assessed in a separate EIA procedure.

Posiva Oy finds no cause to criticise the EIA programme.

Sweden's environmental authority, *Naturvårdsverket*, considers the EIA programme sufficient on the whole. The main impacts will be on the sea, and data on these is gathered under the environmental monitoring programmes of the current facilities. The EIA programme is also considered appropriate by Sweden's nuclear safety authority, *Statens Kärnkraftinspektion*. It finds the impact assessment of the normal use of the power plant particularly comprehensive.

Comments invited by the Swedish environmental authority emphasise the assessment of radioactive emissions from several perspectives. Particular attention should be paid to the potential long-range transportation of radioactive emissions and the related preparations, technologies to reduce emissions and mitigating the potential harmful effects. The impact of emissions on the environment and industries should be assessed, e.g. fish stocks and fishing. The authority notes that it would be prudent to assess the

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combined impacts of the planned unit and the current units on the radioactivity of the Baltic Sea.

It suggests that the impact assessment could be enhanced by examining the whole life cycle of the project and assessing the environmental effects due to the production of nuclear fuel and spent nuclear fuel.

The comments draw attention to the lack or deficient handling of a zero option, with particular mention of the lack of alternative means of power production.

In *Norway, the Ministry of the Environment* acts as the environmental authority. It emphasises the assessment of reactor safety, emergency situations, unexpected events and radioactive emissions. It would be prudent to describe the plans and monitoring systems for emergencies and exceptional situations.

Comments invited by the Norwegian environmental authority also emphasise the assessment of radioactive emissions from several perspectives. Particular attention should be paid to the potential long-range transportation of radioactive emissions and the related preparations, and mitigating the potential harmful effects. The impact of emissions on the environment and industries should be assessed, e.g. vegetation, animals, reindeer husbandry and recreational use.

Acting as the environmental authority, *the Estonian Ministry of the Environment* stresses the description of cross-border emergencies from several perspectives. The description should identify any impacts requiring protection from radiation, and the methods of informing neighbouring countries in emergencies.

The authority notes that it would be prudent to assess the combined impacts of the planned and the current units.

Other comments and opinions

This summary introduces issues and views that have been presented or highlighted in other comments or opinions. A total of 18 other comments or views were submitted. Eight of these were from organisations and ten from private persons (four individuals).

The following organisations presented a comment or opinion: Women Against Nuclear Power, Finnish Youth for Nuclear Energy, Women for Peace in Finland and Amandamij (joint comment), Raumanmeri Fishing Area, The Swedish NGO Office for Nuclear Waste Review (MKG), the Réseau Sortir du nucléaire network, the Sorkan osakaskunta partners and the Edelleen ei ydinvoimaa popular movement against nuclear energy.

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Several comments suggest that the environmental impact assessment should be enhanced by considering the entire life cycle of the project, including the environmental impact of processing and transporting uranium, the decommissioning of facilities, nuclear waste management and transport.

The comments also mention the project's social significance and address the need to assess other alternative means of energy production. Several opinions do not present views relating to the EIA programme in addition to the aforementioned comments but either oppose or support the use of nuclear energy in general.

Raumanmeri Fishing Area considers it important that the dispersion and impacts of cooling waters from Olkiluoto be assessed using an up-to-date calculation model, which can be more extensively linked to the flow conditions of the Bothnian Sea. Impacts on fish stocks and the area's fishing industry should be estimated on the basis of these assessments. The potential increase in the number of newcomer species (such as *Mytilopsis leucophaeata*, the false dark mussel) to the area due to the effects of cooling waters should also be assessed.

The Sorkan osakaskunta partners suggest that the discharge of cooling water from the planned fourth power plant unit should be run via the north of the island of Olkiluoto in order to mitigate the detrimental load on the islands.

4 Contact authority's statement

The Ministry of Trade and Industry states that the EIA programme for the Olkiluoto 4 nuclear power plant unit meets the content requirements of EIA legislation and has been handled in the manner required by the legislation. The comments submitted consider the programme to be appropriate, in the main, and quite comprehensive.

However, attention should be paid to the following issues in the investigations and the drafting of the assessment report. The organisation responsible for the project should also account for the additional questions, notes and views presented in the comments and opinions, answering as many of them as possible in the assessment report.

4.1 Project description and the alternatives

The assessment programme presents a summary of the power range and potential types of the planned power plant, including the operational principles of the boiling water reactor and the pressurised water reactor.

In the Ministry's view, the EIA report should include a review of current nuclear power plants on the market which are suitable for the project under review. Similarly, the safety planning criteria for the prospective plant must be presented with respect to the limitation of emissions of radioactive

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substances and environmental impacts, alongside an assessment of the feasibility of meeting the safety requirements in force. The Ministry suggests that for the purposes of communicating the project it may prove advantageous to include a short description of the cost structure of the project and its alternatives in the assessment report.

The assessment programme briefly describes the zero option, considering the environmental impacts caused by generating the electricity corresponding to the plant unit's production using the average Nordic power production structure.

The programme further proposes that energy conservation should not be analysed as an alternative, since the organisation responsible for the project does not have access to any energy conservation means that would allow the replacement of the quantity of electricity produced by the nuclear power plant. It is also noted in the programme that the MTI must submit a review of the importance of the nuclear power plant to Finland's energy supply to the Government, in order to enable the Government to make its decision-in-principle. The Ministry agrees that national reviews of the energy economy fall under the remit of the organisation responsible for the project. Should these reviews be necessary to support decision-making, they will be drawn up by the central government.

However, in addition to the aforementioned review, several comments propose assessments of conservation and the more efficient use of energy. The Ministry maintains that the organisation responsible for the project is a company that generates power only for its shareholders. Therefore, it cannot access any significant means of energy conservation or efficiency.

The Ministry also notes that the report on the importance of a new nuclear power plant or power plants to the national energy supply, supporting the Government's decision-making with regard to reaching the decision-in-principle, will include information on energy conservation and efficiency. However, this perspective will cover the Finnish energy supply as a whole and thus could not be applied to the issue of replacing the power plant under review. The Ministry points out that the Government is currently preparing a long-term climate and energy strategy.

The Ministry recommends that the assessment report briefly introduce the energy efficiency and conservation efforts undertaken by the applicant.

4.2 Impacts and the assessment

In the EIA programme, the impact of cooling and sewage water on water quality, biology, fish stocks and the fishing industry are assessed on the basis of existing studies and the results of dispersion model calculations. The area under more detailed review under the modelling covers 12 x 12

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square kilometres to the fore of Olkiluoto. The possibilities of utilising cooling waters will also be assessed.

Several comments remark on the significant impact of cooling water on the state of the marine environment around the power plant, suggesting that the assessment be extended further to the Bothnian Sea and the Baltic Sea. The effect of warming on the fishing industry is mentioned in several comments.

The Ministry is of the view that the impacts of cooling waters form the most significant environmental impact during normal plant operation. Therefore, when analysing the environmental impacts of sea water warming, any background material available must be utilised extensively and the analyses must be linked on a wider scale to the state of the Bothnian Sea and the Baltic Sea. Uncertainties in calculation results must be illustrated clearly. Also, the alternatives for cooling water intake and drainage options must be presented clearly, and any possibilities for remote intake and drainage must be examined.

The calculations for cooling water should be presented in a conservative way and so that thermal stress caused by all four units is taken into account. In addition, the need for a Natura review pursuant to Section 65 of the Nature Conservation Act should be considered (concerning the Natura area FI0200073).

Olkiluoto is an area undergoing major changes. According to the current plans, the Olkiluoto 3 unit, now under construction, should be operational by 2011. In addition, Posiva is building an underground research facility, ONKALO, intended to form part of the final disposal facility for spent nuclear fuel. At this rate, Posiva expects to apply for a construction licence for a used fuel disposal facility by the end of 2012. The final disposal is planned to begin in 2020. In addition, TVO has plans to expand the intermediate storage facility for used fuel, and possibly also the final disposal facility for waste produced by the power plants.

The MTI emphasises that, in the EIA report, the interrelationships between Olkiluoto 3, ONKALO/final disposal facility, Olkiluoto 4 and other planned projects (such as schedules, environmental impacts during the construction and operational phases, the need for licensing in accordance with the Nuclear Energy Act, traffic volumes and safety) should be explained in an illustrative way so that a clear overall picture can be formed of the state of, and changes to, Olkiluoto.

The new recommendations for radiation protection, published in October 2007 by the International Commission on Radiological Protection (ICRP), will be taken into account when assessing the impacts on vegetation and animals.

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A new nuclear unit would require improved power transmission. Fingrid Oyj has investigated how the Olkiluoto 4 unit could be connected to the national grid, and examined the reinforcement of the grid based on information received from TVO on the facilities.

The necessary reinforcement in connecting the power plant to the grid, and elsewhere in the national grid, has been taken into account in the provincial planning, carried out in partnership with the regional councils alongside land use planning. The company has commenced the preliminary planning of necessary power lines, and will launch an environmental impact assessment of the power lines during 2007–2009. In its own EIA report, TVO is obligated to provide information on the environmental impact of the required power transmission in the Olkiluoto area.

Assessing the impacts of exceptional and emergency situations must not be limited to the exclusion area or the emergency planning zone for rescue operations. The Ministry is of the view that the EIA report must present various emergency scenarios involving radioactive emissions and, with the help of illustrative examples, should describe the extent of the affected zones and the impacts of emissions on people and the environment.

The assessment may use the classification system (INES) of the International Atomic Energy Agency (IAEA), and the EIA report must present a clear summary of the basis used in the review. The assessment must also include a review of the possible environmental impact of radioactive substances on the states around the Baltic Sea and on Norway.

As exceptional situations, any eventual phenomena caused by climate change and the related preparations to cope with such phenomena must be examined (changes in sea level and other exceptional weather phenomena).

In the assessment of the environmental impact on transport, particular attention should be paid to defining the observed area in order to include the traffic arrangements for the junction of road 2176 and highway 8. The combined effects of other projects under construction or at the planning stage should be included in the assessment.

With regard to the socio-economic review of the EIA procedure, a detailed assessment should be provided of the project's impact on employment, both during the construction and operational stage of the power plant.

According to the EIA programme, the organisation responsible for the project will examine the environmental impacts of nuclear fuel production and transport, including mining, concentration and fuel manufacturing. The environmental impact assessment is based on existing studies. Some comments point out that the environmental impacts of the entire production chain of nuclear fuel should be considered environmental impacts of the project. The Ministry finds it reasonable that the organisation responsible

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for the project should examine the environmental impacts of the entire fuel supply chain in general and, additionally, the company's opportunities to influence this chain.

According to the EIA programme, the report will describe the quantity, quality and treatment of ordinary, hazardous and radioactive waste generated at the plant unit, and assess the related environmental impacts. The environmental impacts of the disposal of spent nuclear fuel have been described using the results of the EIA procedure carried out by Posiva Oy in 1999, and the studies carried out thereafter. In the comments, grounds are presented for assessing the environmental impact of nuclear waste management using the latest data. The Ministry finds the plan proposed by the organisation responsible for the project to be appropriate, and points out that the latest available data must be quoted in the assessment.

The Ministry also maintains that the report should review nuclear waste management as a whole, including extensions to the necessary storage and final disposal facilities and their environmental impacts.

4.3 Plans for the assessment procedure and participation

The MTI considers that the arrangements for participation during the EIA procedure can be made according to the plan presented in the assessment programme. However, sufficient attention should be paid in communications to, and interaction with, the entire affected area of the project, across municipal borders and all population groups. The Ministry requests that the parties consider ways of presenting the impact of participation in the assessment report.

When the assessment report is finalised, the MTI will publish a public notice, make the report available, and invite various authorities to comment on the report. The statement on the EIA report, prepared by the MTI in its capacity as a contact authority, will be delivered to the municipalities in the affected area and to the appropriate authorities.

4.4 Assessment report

Pursuant to the Nuclear Energy Act, submitting an application to the Government for a decision-in-principle is possible before the contact authority has published a statement on the EIA report.

In its comment, the Ministry of the Environment stresses that when comments are invited on a prospective decision-in-principle, both the EIA report and the contact authority's respective statement must be made available.

The MTI does not consider it appropriate that an EIA report and an application for a decision-in-principle be presented for comments at the

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same time, since they relate to the same project. The Ministry hopes that the contact authority is able to submit the EIA report for comments and provide the contact authority's statement before the application for a decision-in-principle is presented to the Government.

5 COMMUNICATING THE STATEMENT

The MTI will deliver the EIA statement to those authorities which have submitted comments. The statement will also be available on the Internet at www.ktm.fi

The Ministry will send copies of the comments and opinions concerning the assessment programme to the organisation responsible for the project. All comments and opinions received by the Ministry are published on the Internet.

The original documents will be stored in the Ministry's archives.

Mauri Pekkarinen
Minister of Trade and Industry

Jorma Aurela
Senior Engineer

For information

Authorities which have submitted comments