

## Environmental and Social Data Sheet

### Overview

Project Name: EUROPEAN SPALLATION NEUTRON SOURCE – ESS  
Project Number: 2016-0569  
Country: SWEDEN, DENMARK  
Project Description: Construction and operation of a multi-disciplinary research laboratory in Lund, Sweden, based upon the world's most powerful neutron source.

EIA required: yes

Project included in Carbon Footprint Exercise<sup>1</sup>: no  
(details for projects included are provided in section: "EIB Carbon Footprint Exercise")

### Environmental and Social Assessment

#### Environmental Assessment

The construction of the ESS is expected to take about seven years. Land preparation and construction of the major building structures will take four years and the installation work inside buildings will take up the rest of the time. During the construction phase, it is mainly the transportation to and from the construction site and the heavy equipment jobs in the field of activity that can cause disturbances to the environment especially in terms of noise and air emissions. The environmental impacts of air emissions are expected to be minor and would not require any specific action.

The operation of the plant requires large amounts of energy. ESS plans to exclusively use renewable energy and recycle large portions of the waste heat. By this, the environmental consequence of energy consumption is moderate.

The cultural environment is affected somewhat. The facility will bring a large impact on the landscape as open farmland is replaced by large buildings, but the installation is designed to keep the impact at minimum levels.

During the operation, air emissions at the site mainly occur from ventilation of different parts of buildings, transport within the operating area and possible leakage of refrigerant gas (helium), which is used in some parts of the building. Air emissions are expected to be so small that they do not result in any significant adverse environmental impacts. Neither air emissions from traffic to and from the facility are considered to give rise to any significant adverse environmental impacts. Also traffic is not expected to have any significant impact as it will consist primarily by passenger traffic to and from the facility. The noise from the ESS facility consists of noise from the ventilation equipment in the buildings and from the transport within the site. Altogether these activities do not give rise to noise levels exceeding the

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<sup>1</sup> Only projects that meet the scope of the Pilot Exercise, as defined in the EIB draft Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: above 100,000 tons CO<sub>2</sub>e/year absolute (gross) or 20,000 tons CO<sub>2</sub>e/year relative (net) – both increases and savings.

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regulation guideline values for noise from newly established industrial facilities. No negative environmental impacts can be predicted.

During the process of producing neutrons, ionizing radiation and radioactive substances will be produced. The operation of ESS will also generate radioactive waste, especially in the form of technical equipment that needs replacing. Radioactive waste will be stored on short term within the facility, in a special waste building, awaiting removal to waste<sup>2</sup> handle supplier.

Concerning ionizing radiation, the facility is designed in such a way that the radiation dose to the public does not exceed the ESS General Objectives. These target values are more stringent than the present regulations from the Swedish Radiation Safety Authority. Both during normal operation and incidents, emissions of radioactive material will be so small that they do not adversely affect human health or the environment outside the facility.

The facility is expected to have a lifetime of 40 years. Environmental impacts of the decommissioning phase can only be assessed on an overall plan. When decommissioning, parts of buildings and technical equipment inside them and the ground closest to the target station and accelerator will be radioactive. An adequate disposal of such material is required to ensure that no adverse environmental impacts will arise. Assuming that current regulations are followed and adequate safeguards, deemed liquidation, in respect of radioactivity in land and buildings, with current knowledge do not result in any significant adverse environmental impacts.

The overall assessment is that the environmental effect of the construction, operation and decommissioning phase is limited and acceptable.

### **Environmental Compliance**

In order to comply with the requirement from the Swedish Environmental Code, ESS has produced an Environmental Impact Assessment (EIA), which treats all aspects of environmental influence, e.g. location of the facility including alternatives, cultural ecological heritage, noise & emissions during construction and operation. The process in accordance with the Swedish Environmental Code also includes dialogue meetings and open hearings with the public, private organisations as well as with authorities in Sweden and the closest neighbour country Denmark. The contact with Denmark is handled by the Swedish Environmental Protection Agency. The initial information (the EIA) was sent to Denmark in May 2012. The letter refers to the UN ECE Espoo Convention from 1997. Since the specific Directive 97/11/EC is in line with the Espoo convention, the state of Sweden is in practise following the Directive. All information given to the Environmental Court has been forwarded to the Danish authorities. They were also informed and invited to participate at the formal court hearing (although they choose not to participate). The Environmental Court (EC) held an open hearing (in Lund) of the ESS application in the end of April this year (2014). The court decision came in the middle of June this year and it approved the EIA and gave ESS the permission to construct the facility at the proposed site outside Lund. A number of requirements, conditions and guidelines regarding the construction and operation were

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<sup>2</sup> The waste that cannot be classified as free-release material will be disposed by the SKB - the Swedish Nuclear Fuel and Waste Management Company. This will be done in either of two facilities; the repository for radioactive operational waste (SFR) or the repository for long-lived radioactive waste (SFL). Both facilities are situated/planned for at Forsmark on the east coast of Sweden, 50 km south of Gävle.

SKB was jointly established by nuclear power companies in Sweden in the 1970s, and is tasked with managing Swedish nuclear and radioactive waste in a safe way ensuring maximum safety for human beings and the environment.

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defined, along with the process of their follow-up and approval. As usual, a control program for the follow-up of the decision has been produced by ESS, which has been approved by the regulatory authority, the Regional County Board.

#### Swedish Radiation Protection Act

ESS is not classified as a nuclear facility. However, as a facility creating ionisation radiation and handling radioactive waste, ESS needs a license to build, commission and operate in accordance with the Swedish Radiation Protection Act. Concerning handling of radioactive waste and possible radiation emission from the ESS facility, the Swedish Government has informed the EU member states in accordance with the application of article 37 of the Euratom Treaty (2010/635/Euratom). The material for the information was prepared by ESS and reviewed/approved by the Swedish Radiation Safety Authority (SSM) the authority issuing regulations within the field of nuclear safety and radiation protection. The licensing process will be done in a graded approach. Within this process, the Swedish Radiation Safety Authority (SSM) first reviews the permissibility of having ESS built at the chosen site resulting in a permission to start construction. Later in the process, applications and permissions will be handled for installation, commissioning and finally for normal operation.

On March 15 2012, ESS sent in its application to SSM asking for permission to build and construct ESS at Lund. Thereafter, ESS has complemented its application with a number of additional documents. The application includes reports of airborne emissions during normal operation and disturbances as well as preliminary descriptions of the radioactive waste and its final handling and deposition (outside the facility). Further on in the process, ESS will suggest a monitoring program for the radiation protection to be approved by the Swedish Radiation Safety Authority. The application is based on a Preliminary Safety Analysis Report (PSAR). This will later on be developed into a Safety Analysis Report (SAR) that will form the basis for the upcoming applications for installation and commissioning. On May 23 2014 SSM released its preliminary review report together with the proposed requirements for the ESS construction, and on July 17 2014 the SSM granted the permit to ESS to go ahead with the construction.

#### The Planning and Building Act

In accordance with the Swedish Planning and Building Act, ESS needs a formal building permit from the Municipality of Lund. Before such a permit can be given, the municipality has to develop a Detailed Plan (DP) for the site. The Lund Municipality approved the Detailed Plan (DP) in March 2013. Thereafter, ESS has decided to apply for building permits in a graded approach, i.e. applications will be done for the separate buildings, as they will be finally designed. In March 2014, the first building permit was received for the infrastructure at site (roads etc.).

#### **Public Consultation and Stakeholder Engagement, where required**

The process has been open to the public since 2009. The Environmental Court (EC) held an open hearing (in Lund) of the ESS application in the end of April 2014. The public objections were mainly related to the use of land and its restitution. Following this in June 2014, the EC has approved the start of construction setting of requirements, conditions and guidelines regarding the construction and operation were defined, along with the process of their follow-up and approval. The final date for appeals was on the beginning of July and with a decision on August 15 the Court of Appeals rejected two appeals that were put forward.

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## Other Environmental and Social Aspects

From the very beginning of the ESS project, strong emphasis has been put to Sustainable and Environmental aspects of the project. ESS has adopted an Environmental policy that states "ESS will contribute to society and be a world leader in environmental sustainability for research facilities". ESS has performed an Environmental Survey, identifying the areas and goals of interest that now form the foundation of the Environmental Management System under development and to be implemented later this year. Specifically, ESS works with an energy program that follows the 4R strategy – Responsible, Renewable, Recyclable and Reliable, thus ensuring that ESS is carbon neutral and therefore contribute greatly to the sustainability of the facility. For the construction of ESS, specific instructions have been made regarding sustainable and environment aspects.

## Conclusions and Recommendations

Concerning applicable environmental legislation, the ESS facility falls under the jurisdiction of the Swedish Environmental Code and the Swedish Radiation Protection Act.

ESS has produced an Environmental Impact Assessment (EIA), which treats all aspects of environmental influence during construction and operation. The Environmental Court (EC) held an open hearing of the ESS application in the end of April this year. While the application handles all environmental issues, including ionisation radiation, the EC leaves the radiation protection issues to the Swedish Radiation Safety Authority (SSM). The court decision came in the middle of June this year and it approved the EIA and gave ESS the permission to construct the facility at the proposed site outside Lund. The overall assessment of the EIA is that the environmental effect of the construction, operation and decommissioning phase is limited and acceptable.

ESS as a facility creating ionisation radiation and handling radioactive waste, needs a license to build, commission and operate in accordance with the Swedish Radiation Protection Act. The licensing process is done in a graded approach meaning first granting permission to start construction, and eventually for installation, commissioning and finally for normal operation). On March 15 2012, ESS sent in its application to SSM asking for permission to build and construct ESS at Lund, and has thereafter complemented its application with a number of additional documents. On July 17 2014 the SSM granted the permit to ESS to go ahead with the construction.

The project overall is considered acceptable with minor residual impacts.

## Conditions and Monitoring requirements

*The promoter undertakes to:*

- Produce the subsequent environmental documents and approvals as required by the EC decision
- Produce the radiation protection relevant documents (for the installation, commissioning and operation phase) as they are required by the SSM approval process.