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| WiN Sweden | |
| Chapter president | Ida Lindberg |
| Chapter board members | Forsmark Vattenfall (NPP)  OKG (NPP)  Ringhals (NPP)  Svafo (Decommissioning and Waste Management)  Westinghouse  Infotiv (Consultant company)  Nuvia Nordic (Consultant company)  ÅF consult (Consultant company) |
| Number of members | 440 |
| Chapter accepted by WiN Global | 1993 |
| Nuclear power infrastructure | Sweden has ten power-generating reactor units at three sites: Oskarshamn (3), Ringhals (4) and. Forsmark (3). Seven of the ten reactors are boiling water reactors (BWR’s) and three are pressurised water reactors (PWR’s).  Barsebäck 1 was shut down in November 1999 and Barsebäck 2 was permanently closed May 31 2005**.** During today's service operation, they are preparing for the dismantlement by conducting studies within the relevant areas. For instance, this covers the disassembling of reactor tanks, the cleaning of pools, the dismantling of buildings and the restoration of land. The time for dismantlement is determined once the final repository for dismantlement waste has been built.  Due to business driven decisions, four of the reactors (Ringhals 1 and 2, Oskarshamn 1 and 2) may be closed down earlier than previously planned. Vattenfall has already decided to change direction for the operational lifetime for R1 and R2 at Ringhals, and they will be closed down 2018-2020 instead of 2025. Both Vattenfall and E.ON see market conditions, burdensome taxes and continued low prices the coming years, together with increasing production costs. The trend is that we in the future are facing fewer, but larger and more effective, reactors in Sweden.  Sweden has no research reactor, since Studsvik Nuclear Power Plant was decommissioned in 2005.  Swedish Nuclear Fuel and Waste Management, SKB, is responsible for a system of facilities used to handle all waste from the Swedish nuclear power plants. These facilities include a central interim storage facility for spent nuclear fuel (Clab) near Oskarshamn, and a final repository for short-lived radioactive waste (SFR) in Forsmark. Transport is by sea, using the vessel m/s Sigrid.  In March 2011 the applications for handling of the final disposal of Nuclear Waste were submitted to the Swedish Radiation Safety Authority (SSM) and to the Land and Environment Court. The first preliminary review statement from the Swedish Radiation Safety Authority is now published. The final review statement is planned to be delivered to the Swedish Government 2017. When the Government has reached its decision, the applications will again be referred to the Swedish Radiation Safety Authority and the Land and Environment Court, which will stipulate the terms and conditions for the facilities. It will then also be up to the municipalities to decide on planning permission under the Planning and Building Act. In its current timetable SKB plans to start construction of the Spent Fuel Repository and the Encapsulation Plant some time early in the 2020s and they will take about ten years to complete. |
| Nuclear medical applications | Sweden has separate networking groups with focus on nuclear medical application, for example Swedish Society for Radiation Physics [www.radiofysik.org](http://www.radiofysik.org) and Swedish Society for Nuclear Medicine [www.sfnm.se](http://www.sfnm.se) . |
| Waste management philosophy | In the spring of 2011 SKB submitted its applications for permits to build a Spent Fuel Repository at Forsmark and an Encapsulation Plant at Oskarshamn. These applications show that it is possible to construct a final repository for spent nuclear fuel that complies with official requirements for 100 000 years.  The applications cover the entire system that will enable the final disposal of spent nuclear fuel. They deal with the facility at which the spent nuclear fuel will be encapsulated before final disposal, the Encapsulation Plant, and the final repository in which it will be placed, the Spent Fuel Repository.  An important part of the application comprises the analysis of long term safety after the Spent Fuel Repository has been sealed. This analysis has been made with the help of tried and tested methodology and covers a period of up to one million years. The stipulated requirement is that during this long period of time the annual dose from the Spent Fuel Repository for human beings will not exceed around one per cent of the natural background radiation.  Another important appendix to the application is a description of the environmental impact. In it, SKB accounts for what impact its plans could have on human beings and the environment during construction and operation. The results show that the consequences for the local population and for the natural and cultural environment are no greater than for any other major mining or infrastructure project. Any consequences that may, nevertheless, arise, primarily for the natural environment, can be managed and limited with the help of various measures |
| Research | Nuclear Waste Research  SKB has been undertaking research and development for more than 30 years. Today these activities can be divided into three categories: scientific research, technological development and social research.  The aim of the scientific research is to understand how conditions in the different final repositories for radioactive waste alter over time and what long-term impact this can have on safety. SKB’s research program therefore covers many disciplines, such as geology, ecology and climate.  Technological development comprises continuous work on the construction, manufacture, testing and further development of all the technological components of the final repository system for both spent fuel and low and intermediate level waste. Much of the research and development work takes place in SKB’s three laboratories at Oskarshamn: the Äspö Hard Rock Laboratory, the Bentonite Laboratory and the Canister Laboratory. They provide opportunities for full-scale tests and demonstrations of techniques in realistic conditions.  Since 2004 SKB has also been funding research linked to the social sciences and humanities. These focus on how information about the Spent Fuel Repository can be handed down to future generations.  **European Spallation Source, ESS**  The European Spallation Source, ESS, is a planned [materials science research](https://en.wikipedia.org/wiki/Materials_science) facility using the [neutron scattering](https://en.wikipedia.org/wiki/Neutron_scattering) technique. At least 17 European countries will sponsor ESS and the facility is being built in [Lund](https://en.wikipedia.org/wiki/Lund), Sweden. The research facility is planned to start operation in 2019 and it will enable scientists to see and understand basic atomic structures and forces.  The ESS will use [spallation](https://en.wikipedia.org/wiki/Spallation), a process in which fragments of material ([spall](https://en.wikipedia.org/wiki/Spall)) are ejected from a body due to impact or stress. The future facility is composed of a [linear accelerator](https://en.wikipedia.org/wiki/Linear_accelerator) in which [protons](https://en.wikipedia.org/wiki/Proton) are accelerated and collide with a [tungsten](https://en.wikipedia.org/wiki/Tungsten) target. By this process, intense pulses of [neutrons](https://en.wikipedia.org/wiki/Neutron) are emitted and led through [beamlines](https://en.wikipedia.org/wiki/Beamline) to experimental stations, where research is done on different materials. This will help discover and develop new materials with applications in manufacturing, [pharmaceutical drugs](https://en.wikipedia.org/wiki/Pharmaceutical_drug), [aerospace](https://en.wikipedia.org/wiki/Aerospace), engines, [plastics](https://en.wikipedia.org/wiki/Plastic), [energy](https://en.wikipedia.org/wiki/Energy), [telecommunications](https://en.wikipedia.org/wiki/Telecommunication), [transportation](https://en.wikipedia.org/wiki/Transportation), [information technology](https://en.wikipedia.org/wiki/Information_technology) and [biotechnology](https://en.wikipedia.org/wiki/Biotechnology).  According to its designers, the ESS will provide neutron beams up to 30 times brighter than any current [neutron source](https://en.wikipedia.org/wiki/Neutron_source).  **MAXLAB**  MAX IV Laboratory is a national laboratory hosted by Lund University. It operates accelerators producing x-rays of very high intensity and quality. Almost 1 000 scientists per year come to the lab and use the x-rays for scientific research making the invisible visible. It is presently building a new project which will be the brightest x-ray source in the world when opening to users in 2016. At current, 13 beamlines are funded for the MAX IV facility: Seven at the 3GeV ring, five at the 1.5GeV ring and one at the short pulse facility (SPF) at the MAX IV linac. These beamlines are planned to go into user operation between 2016 and 2018. |
| Post-Fukushima | **New conditions for Independent Core Cooling to improve reactor safety**  December 2014, the Swedish Radiation Safety Authority issued a decision on conditions for the Independent Core Cooling system. By 2020, Swedish nuclear power plants are required to implement an independent system for cooling of the reactor core. Since final installation takes time to implement, the Authority has also issued a decision on requirements for a transitional solution to be in place by 2017.  The Independent Core Cooling system implies a function with an autonomous source of power that feeds the reactor core with water. It is activated if the other cooling systems fail to function. This system must be installed at all nuclear power reactors in Sweden by 31 December 2020.  Independent Core Cooling reduces the risk of core melt in connection with an accident and thus the risk of a large radioactive discharge.  **EU Stress Tests**  The European Council requested that the safety of all EU nuclear plants should be reviewed, on the basis of a comprehensive and transparent risk and safety assessment ("stress tests"). These “stress tests” are defined as targeted reassessments of the safety margins of nuclear power plants, developed by ENSREG, including the European Commission.  The “stress tests” covers extraordinary triggering events like earthquakes and floods and the consequences of any other initiating events (e.g. transport accidents, such as airplane crashes) potentially leading to multiple loss of safety functions requiring severe accident management.  Many actions and projects have been initiated at the NPP´s due to the results of the stress tests. |
| Ageing management and Long Term Operation, LTO | The NPP´s Ringhals 2 and Oskarshamn 1 and 2 have reached the life time limit at 40 years and are now processed in LTO. All Swedish NPP´s will reach 40 years within 10 years. The Swedish Radiation Safety Authority, SSM has required all NPP´s to implement Ageing Management Programs. |
| Web links | vattenfall.se/forsmark  [okg.se/en](http://okg.se/en)  vattenfall.se/ringhals  svafo.se  skb.se  europeanspallationsource.se  [maxlab.lu.se](http://www.maxlab.lu.se) |