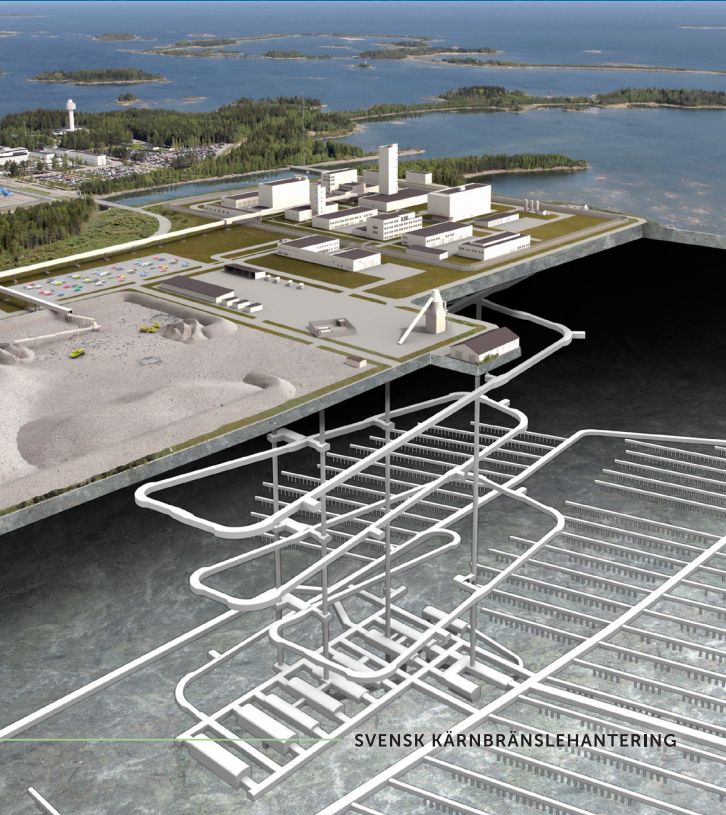




# SKB's mission is

to take care of the Swedish radioactive waste



SVENSK KÄRNBRÄNSLEHANTERING



You will find more information and the latest news about SKB and the planned Spent Fuel Repository in Forsmark on our website.

## To protect people and environment

Sweden has radioactive waste. It is SKB's mission to take care of this waste and protect people and the environment, now and in the future. For more than thirty years, SKB has been operating a system that manages radioactive waste in a safe manner. The work is pursued under the constant supervision of regulatory authorities and experts.

The system includes interim storage of the spent nuclear fuel from Swedish nuclear power plants and final disposal of radioactive operational waste. But in order to achieve longterm safety, the system needs to be supplemented with a final repository for spent nuclear fuel.

SKB is therefore applying for the necessary permits and is planning to build a final repository for spent nuclear fuel in Forsmark.

### ELECTRICITY PRODUCERS' RESPONSIBILITY

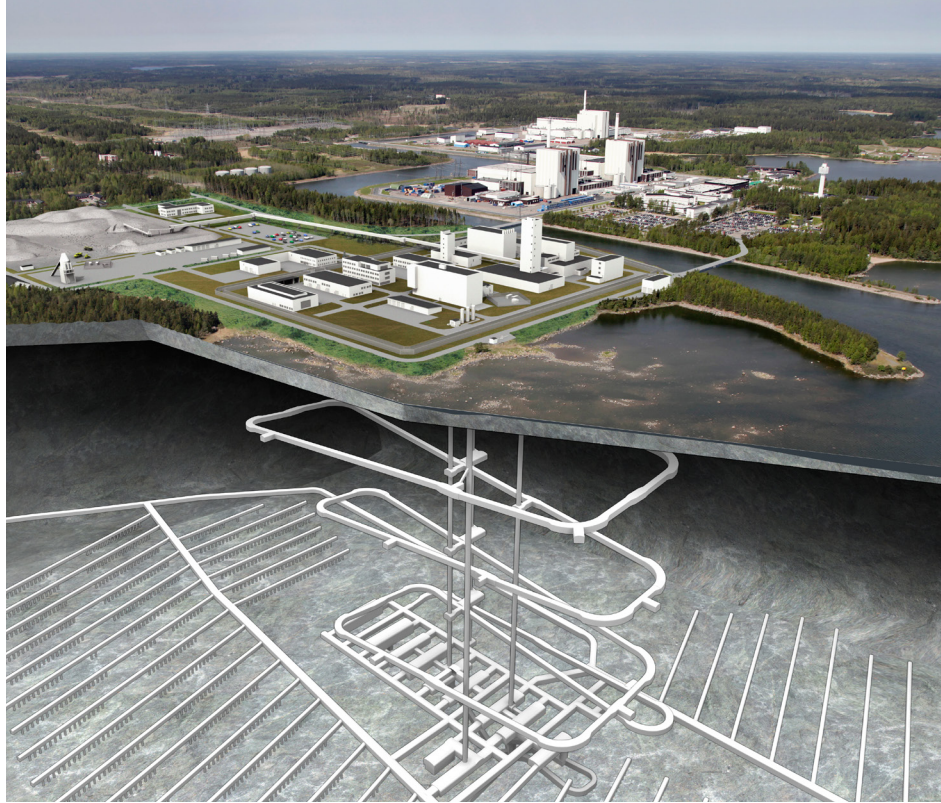
Svensk Kärnbränslehantering AB (the Swedish Nuclear Fuel and Waste Management Co), is owned by the companies that operate the Swedish nuclear power plants. Nuclear power is subject to a type of producer responsibility where the owners are required by law to dispose of the Swedish nuclear waste. The financing comes from fees imposed on the electricity produced by the nuclear power plants. The state determines how this money is used.

# A final repository for spent nuclear fuel in Forsmark

Canisters with spent nuclear fuel will be emplaced in the Spent Fuel Repository for final disposal. The repository is designed so that it will remain safe after closure without maintenance or monitoring. Investigations all over the country have shown that the bedrock in Forsmark in Östhammar Municipality possesses the necessary characteristics to ensure longterm safety. The plant for encapsulation of the spent nuclear fuel will be built in Oskarshamn.

The Spent Fuel Repository will:

- Isolate the spent nuclear fuel for at least 100,000 years.
- Be built in 1.9 billion year old bedrock.
- Hold about 6,000 canisters – the quantity of spent nuclear fuel expected to be produced by today's nuclear power plants.
- Be located at a depth of around 500 metres.
- Comprise a total of 60 kilometres of tunnels.
- Occupy an area of about 24 hectares on the surface. This includes industrial premises, offices and a rock heap.



*Illustration of the planned Spent Fuel Repository.*

## **Our work requires local support**

In order to build the Spent Fuel Repository in Forsmark and the encapsulation plant in Oskarshamn, SKB needs the support of the community and the local population. The municipalities of Östhammar and Oskarshamn have followed SKB's work closely for many years. Opinion polls show strong support among the municipal residents.

# Formal review required for permission

Ultimately, it is the Government that gives permission for the Spent Fuel Repository to be built. But first the Land and Environmental Court and the Swedish Radiation Safety Authority will review the material and make their recommendations. The municipality also has to say yes to the project.

## The Land and Environmental Court

An application under the Environmental Code is submitted to the Land and Environmental Court. SKB must demonstrate what consequences the activity at the facilities may have for human health and the environment and how these consequences can be prevented or mitigated. The Court's review statement is submitted to the Government, which decides whether the activity is permissible. Then the Court stipulates conditions.

## Swedish Radiation Safety Authority

The application under the Nuclear Activities Act is reviewed by the Swedish Radiation Safety Authority. Their review

statement is submitted to the Government, which issues a permit, after which the Swedish Radiation Safety Authority stipulates conditions.

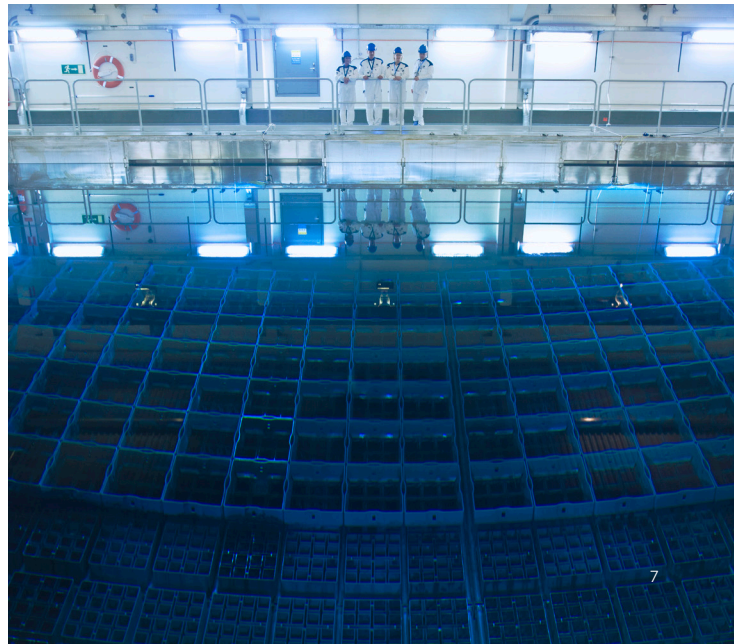
# Why a Spent Fuel Repository?

Regardless of the future of nuclear power, the existing spent nuclear fuel must be disposed of. Today's interim storage facility requires monitoring and cooling to be safe. A solution is therefore needed that does not require postclosure monitoring.

A consensus exists nationally and internationally that geological disposal is the best solution.

### RADIOACTIVITY

Unlike some other hazardous substances, spent nuclear fuel becomes less hazardous with time. But it can never be said to be completely harmless at any time. After 30 years of interim storage, the fuel's radioactivity has diminished by 90 percent. After 100,000 years, the radioactivity of the spent nuclear fuel is comparable to that in the quantity of uranium ore originally mined to produce it.

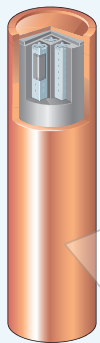


# Strength through multiple barriers

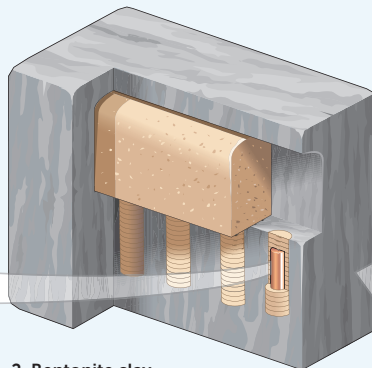
SKB is planning to use a method for final disposal of the spent nuclear fuel based on three protective barriers. The idea is that the repository should imitate nature, and for this reason materials are used that exist naturally in the Earth's crust.

The spent nuclear fuel will be encapsulated in copper. The leakproof copper canisters are emplaced in the bedrock at a depth of about 500 metres, embedded in bentonite clay. When deposition is finished the tunnels and

1. The first barrier, the copper canister, has an insert of nodular iron that makes the canister strong. Copper corrodes very slowly in the chemical environment in the bedrock. No radionuclides can escape from intact canisters.
2. The second barrier is bentonite clay. The clay is a buffer that protects the canister against small movements in the rock. It prevents water from flowing around the canister and acts as a filter in the event a canister should be breached.



1. Copper canister



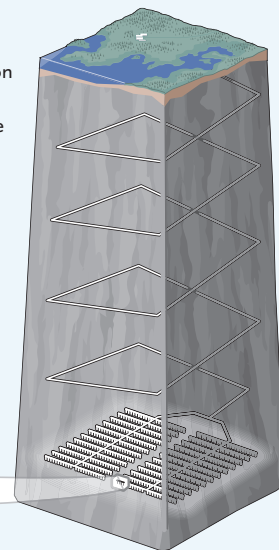
2. Bentonite clay

rock caverns will be sealed. The Spent Fuel Repository will isolate the fuel for at least 100,000 years.

## Investigations all over Sweden

The search for a site for a final repository for spent nuclear fuel was initiated in the 1970s. Investigations were conducted in large parts of the country and finally identified two areas with good prospects from a number of viewpoints: Forsmark in Östhammar Municipality and Laxemar in Oskarshamn Municipality. Analyses and results from investigations of the bedrock and on the ground surface subsequently led to the selection of Forsmark.

3. The third barrier is the bedrock. The rock acts as a filter. It can retain radio nuclides for such a long time that a large fraction will decay to stable elements before eventually reaching the ground surface.



3. Spent Fuel Repository

## Decades of research

Since the mid 1970s, SKB has pursued a research programme to develop methods and technologies for safe final disposal of spent nuclear fuel. SKB is conducting research in such fields as geology, chemistry, physics and the social sciences in co operation with universities, institutes of technology and research institutes all over the world.

### A dress rehearsal

The Äspö Hard Rock Laboratory, thirty kilometres north of Oskarshamn, is a unique research facility for geological disposal. At a depth of 500 metres we are conducting a range of experiments, everything from charting the pathways of the water in the rock to studying the lives of the microbes.

### With nature as a model

By using nature as a laboratory and studying how materials are affected, we learn how copper, bentonite clay, rock and uranium dioxide (of which the spent nuclear fuel is composed) behave under different conditions and over different periods of time.

### International interest

SKB's research has aroused great international interest. This is evident from the large number of foreign visitors to SKB's research facilities, such as the Äspö Hard Rock Laboratory and the Canister Laboratory in Oskarshamn.

# Today's system

A large part of SKB's work involves the daytoday management of radioactive waste. Spent nuclear fuel is stored temporarily and radioactive operational waste is permanently disposed of. The safety standards are stringent, and SKB is always open to new knowledge and development.

## Interim storage of spent nuclear fuel

In the vicinity of the Oskarshamn nuclear power plant, the spent nuclear fuel is stored temporarily in pools of water 30 metres beneath the ground surface. During the interim storage, the fuel's radioactivity diminishes, making it easier to handle in the Spent Fuel Repository.

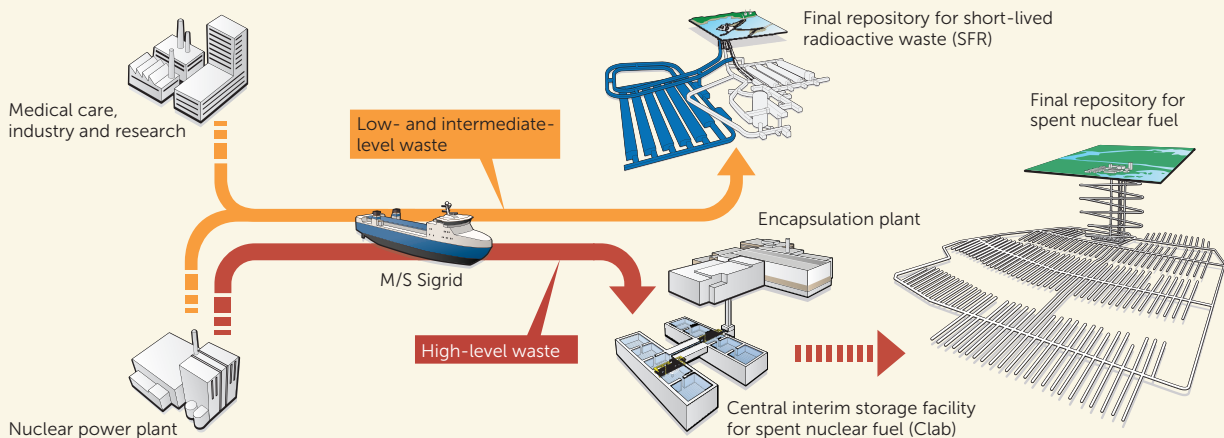
## Final repository for short-lived radioactive waste

The nuclear power plants' operational waste is low and

intermediatelevel waste consisting for exampel of protective clothing, tools and filter resins. This waste is disposed of in a facility located at a depth of 50 metres in the bedrock near the Forsmark nuclear power plant. Some radioactive waste from industry, research and medical care is also disposed of here. In the future SKB is planning to extend this repository to create space for decommissioning waste from dismantled nuclear power plants.

## Transportation

The ship M/S Sigrid transports radioactive waste from the nuclear power plants to SKB's facilities. She has very good seaworthiness and buoyancy. Combined with specially designed transport casks, this guarantees a safe transport.





### SKB as a company

SKB is a company with broad expertise. Its staff includes engineers, scientists, business graduates, lawyers, IT specialists, information officers and social scientists. Many of our employees work with the daytoday operation of our facilities.

At the beginning om 2018 SKB had more than 600 employees in Forsmark, Stockholm and Oskarshamn.

### Local development

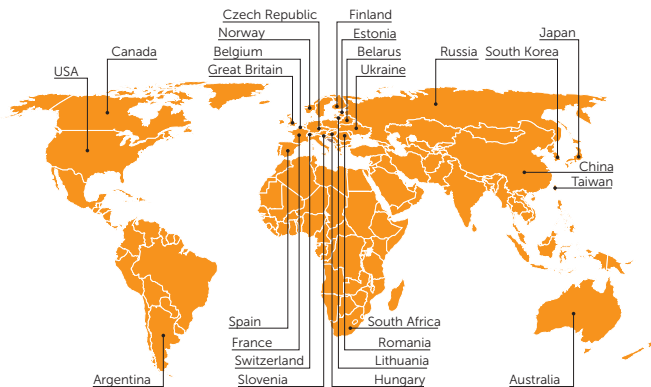
There is a cooperation agreement between SKB, the owners and the municipalities of Oskarshamn and Östhammar. It is aimed at contributing to the development of the two municipalities, which have assumed a heavy responsibility in a matter of vital national importance. It is estimated that added values totalling SEK 2 billion will be created during the period 2010–2025.

As a part of this work, SKB Näringslivsutveckling AB (SKB Nu) was created to contribute to and develop new and existing enterprises.

SKB Nu is a subsidiary of SKB, with offices in Östhammar and Oskarshamn.

### International cooperation

The knowledge and experience amassed by SKB is exported via the subsidiary SKB International. The company helps other countries to increase the level of safety and reduce the environmental risks in their management and disposal of radioactive operational waste and spent nuclear fuel.



Countries where SKB International has been active.



## Pay us a visit

Thousands of people visit  
our facilities every year.

Read more about how to book  
your visit on our website.

**skb.se**