



VATTENFALL



Transform to a more Circular Business



VATTENFALL

Vattenfall's purpose is to enable the fossil freedom that drives society forward. Circularity is essential to securing future resource needs, reducing costs, and achieving our sustainability targets

Transform to a more circular business	Circular targets in our wind business	From wind turbine blades to skis	Offshore wind turbines get reusable covers	Recyclable blades in Hollandse Kust Zuid	Exploring reuse of components at Dutch Design Week
From blades to buildings	Circularity in our heat operations	Watching eye encourages plastics recycling	Circular design in heat transfer station	From waste heat to fish feed	Creating demand for near-zero cement
Vattenfall and SSAB in new fossil-free steel collaboration	Circular IT and reuse of equipment	Reused bricks in new substation	Pilot project: reusing secondary substation buildings	Vattenfall's circular approach for office renovations	96% of material recycled in nuclear decommissioning of R2 research reactor



Photo: Getty images

Transform to a more circular business

Examples of circular projects across Vattenfall



To learn more about our circular ambition and action plan, please scan this QR code to visit our Vattenfall website.

Vattenfall's purpose is to enable the fossil freedom that drives society forward. Circularity is essential to securing future resource needs, reducing costs, and achieving our sustainability targets. By reducing the use of virgin materials, circularity results in less mining and processing of raw materials and the CO2 emissions and biodiversity impact related to it.

Different circular strategies

Circularity means that we will move from a linear take-make-waste economy to a circular economy, which can be achieved in several ways. It is important to work towards material recycling (closing the loop). However, circularity goes beyond recycling, it is also about reducing the use of raw materials (narrowing the loop) and extending the lifetime of products and components through e.g., reuse and repair (slowing the loop).

This brochure provides examples of how circularity is implemented in Vattenfall's business. The projects highlight a range of R-strategies for implementing circularity, as illustrated in the figure below. We hope these examples spark new ideas and promote further progress in accelerating circularity

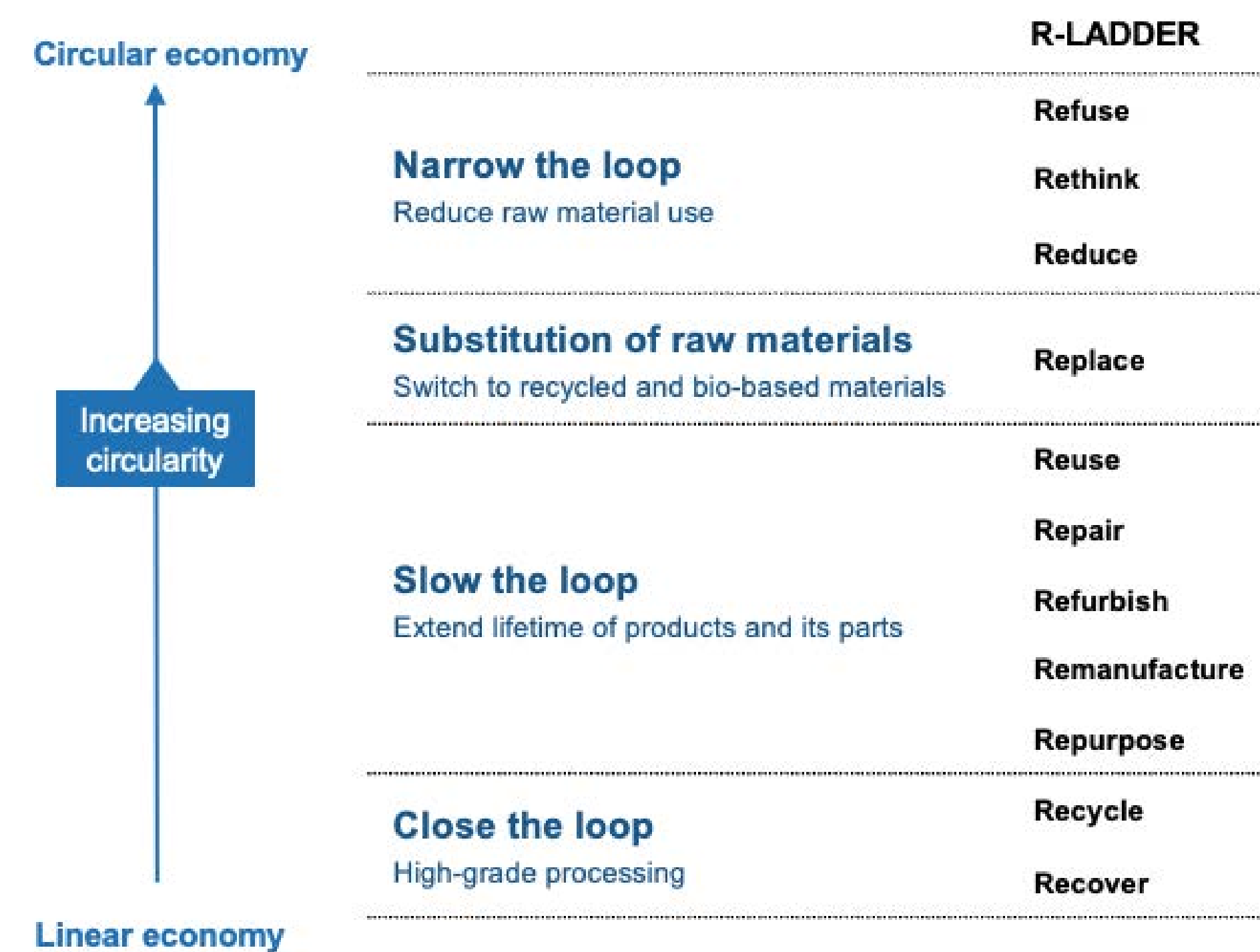


Illustration: Vattenfall

Figure. R-strategies to implement circularity

Circular targets in our wind business

Vattenfall adopted circular targets on wind turbine blades and permanent magnets.



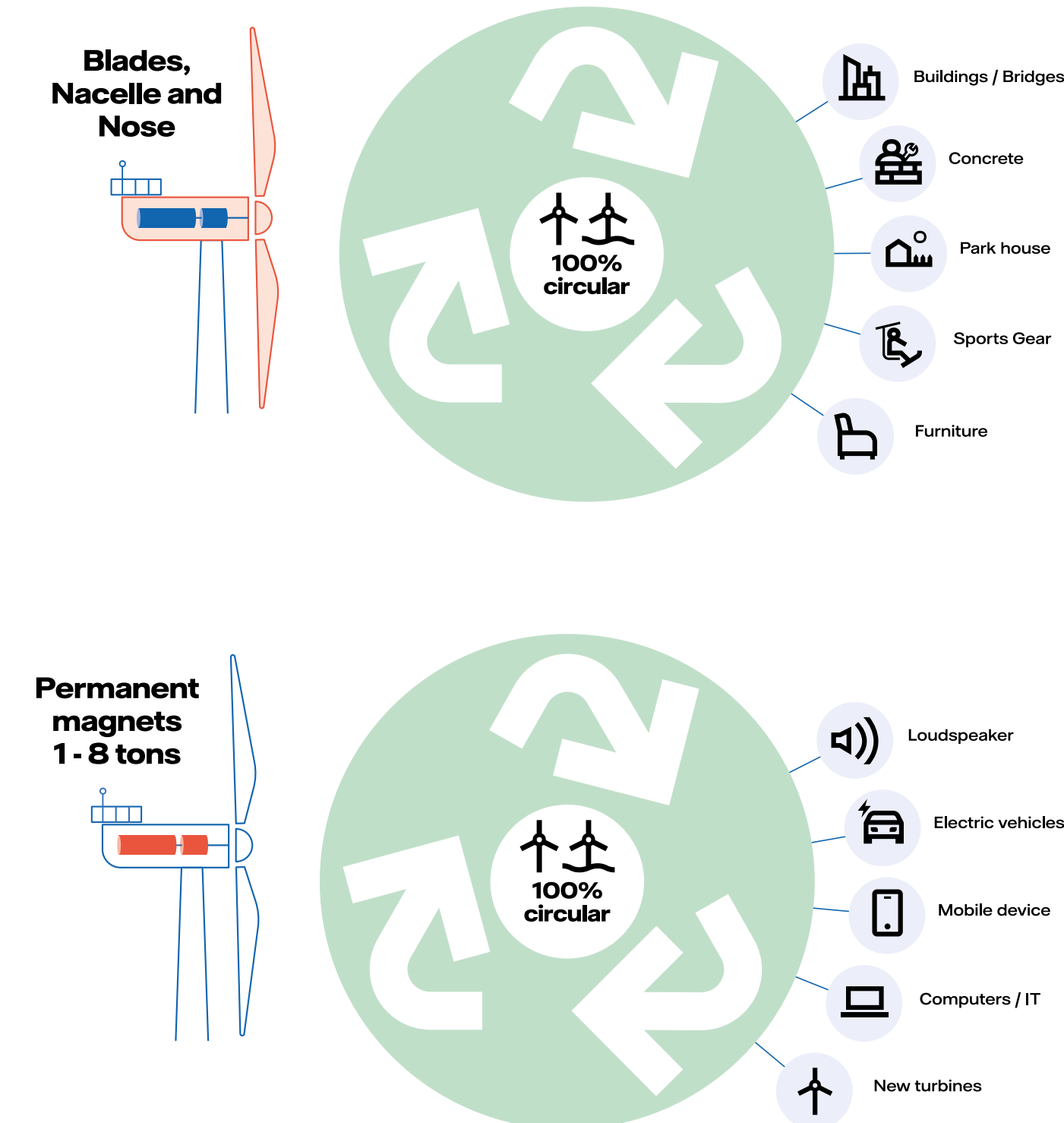
Photo: Jennie Lind

Vattenfall is committed to expanding its renewable energy portfolio to achieve its Net Zero target by 2040. Circularity is a key enabler to reduce environmental impacts from building new assets. By reducing the use of raw materials, circularity results in less mining and processing of raw materials leading to energy savings and lower impact on biodiversity in our supply chain. Today, 85 - 90% of the total mass of a wind turbine can already be recycled. However, recycling solutions for **turbine blades** and **permanent magnets** are still under development, presenting opportunities for further innovation in circular practices.

In 2021, Vattenfall committed to a landfill ban on decommissioned wind turbine blades from owned windfarms, a 50% circular outflow of wind turbine blades by 2025 and 100% circular outflow by 2030. In 2024, these targets have been extended to all composite materials from wind turbines including nacelle canopies and nose cones. Vattenfall reached the 2025 target and now aims to reach the 2030 target.

Circular outflow means that blades are reused, refurbished, repurposed, or recycled.

In 2024, Vattenfall committed to achieving a 100% circular outflow of permanent magnets from our decommissioned wind farms, from 2030 onwards. Vattenfall is dedicated to developing circular solutions to reuse, refurbish, repurpose, or recycle permanent magnets.



For further information please scan this QR code

R-strategy: Reuse, refurbish, repurpose and recycle

Business Area Wind



Photo: Martin Fryklund

From wind turbine blades to skis

We are working with partners to produce skis with recycled materials from wind turbine blades which have reached the end of their operational life.



For further information please scan this QR code

Blades are difficult to recycle because of the material composition and available recycling technologies. Blades are made of resin, glass or carbon fibre, balsa wood, PVC or PET foam, other polymers, and metals. Separating these components presents a significant challenge, complicating the recycling process and limiting the potential for recovering residual value. Moreover, technologies for recycling composite materials exist, but vary in maturity.

As part of our commitment to a 100% circular outflow of composite materials from wind turbines by 2030, we have explored various blade recycling technologies.

In collaboration with innovative Norwegian recycling company Gjenkraft, blade material was recycled into skis in 2024. Gjenkraft recycled the carbon fibre from the blades to high quality carbon fibres, which were then used by EVI to produce alpine skis that meet industry standards while significantly reducing environmental impact. The use of recycled materials results in less mining and processing of primary raw materials and the CO2 emissions and biodiversity impact related to it.

R-strategy: Recycle
Business Area
Wind



Photo: CCM B.V.

Offshore wind turbines get reusable covers

Reusable covers for foundations used during installation of offshore windfarm Hollandse Kust Zuid.

A monopile cover is a necessary stopgap in the stage between the foundations and the tower of a wind turbine being installed. It offers protection against seawater, rain and bird droppings. In the past, these covers were typically discarded after a single use.

Vattenfall challenged its suppliers to come up with a sustainable cover for Dutch offshore windfarm Hollandse Kust Zuid. CCM B.V., a start-up, designed a monopile cover made of fibre-reinforced polyester panels strengthened with steel beams and bolts. The design features not only material that can be reused over time, but also a cover that can be used several times over in the construction of other offshore wind farms. It is expected that individual covers can have a lifespan of 10 to 15 years.



For further information please scan this QR code

R-strategy: Reuse
Business Area
Wind

Recyclable blades in Hollandse Kust Zuid



Photo: Matthias Ibeler

Offshore wind farm Hollandse Kust Zuid in the Netherlands uses Siemens Gamesa's blades called RecyclableBlades which are designed for recycling.

Wind turbine blades are difficult to recycle due to the resin used in their construction, which requires high temperatures and pressures to break down. This process is energy intensive and degrades the material properties, complicating recycling efforts.

Vattenfall used three sets of Siemens Gamesa's RecyclableBlades in windfarm Hollandse Kust Zuid, which was the maximum available amount at that time (2022). RecyclableBlades are designed to facilitate recycling, by using a resin type that dissolves in a low-temperature, mildly acidic solution. This separates the resin from the other components in the blade: fiberglass, carbon fibre, plastic, wood, and metal without significantly impacting their properties. As a result, these materials can be efficiently recycled into new products afterwards.



For further
information please
scan this QR code

R-strategy: Recycle
Business Area
Wind



Photo: Jorrit Lousberg

Exploring reuse of components at Dutch Design Week

Wind turbine nacelle turned into a tiny house, showcasing innovative reuse of components during the Dutch Design Week 2024

The nacelle is the housing of the machinery of a wind turbine, like the rotor and generator. It is made of glass-fibre reinforced plastics, a watertight and lightweight material. The tiny house was conceived and designed by Superuse and executed by Blade-Made and Wood-wave. The liveable space of 35 m² retains the recognizable exterior of a wind turbine nacelle, while the interior has been redesigned to include living spaces. It is equipped with sustainable features such as a heat pump and solar panels and furnished with second-hand furniture and materials. This project showcases the potential for repurposing wind turbine components and reducing the need for energy-intensive

recycling processes. The tiny house was prominently displayed at Dutch Design Week (DDW) in October 2024.

Building on insights from DDW 2024, Vattenfall's DDW 2025 exhibition showcased retired wind turbine components and gathered ideas for how they could be reused or repurposed. Visitors could also test a digital platform that let them easily redesign components for new applications within and beyond the wind sector. The exhibition highlighted the strong circular potential of these components, presenting them as a "gold mine" for designers, developers, and engineers.



For further information please scan this QR code

R-strategy: Repurpose
Business Area
Wind



From blades to buildings

Illustration: Lloyd arkitektkontor

In a new high-tech neighbourhood in Lund in southern Sweden, turbine blades from a decommissioned wind farm have become a very visible part of the facade of an eco-friendly multistorey car park.

When Danish onshore windfarm, Nørre Økse Sø, was decommissioned in 2023, Vattenfall explored opportunities to repurpose or recycle the blades. This led to the idea of incorporating part of the blades into the facade of the new Niels Bohr car park in Lund, Sweden. It was inaugurated in 2025 and is the first 'wind power-built' car park in Europe.

The blades were used to create curtain walls, non-structural walls designed to remain open for safety reasons. The architect, Jonas Lloyd, aimed to achieve what is called "visible sustainability". The aim was to construct a building where it is apparent to people that wind turbine blades were used in the facade



For further information please scan this QR code

R-strategy: Repurpose
Business Area
Wind



Photo: Elisabeth Redlig

Circularity in our heat operations

Vattenfall's initiative SamEnergi is turning excess heat into local value through smart integration with district heating networks

SamEnergi is Vattenfall's initiative that makes it easier to harness excess heat in our surroundings. Through a smart and standardised model, we can buy excess heat from companies, transfer it into the district heating network, and utilize it where it creates the greatest value – for example, to heat homes, offices, and commercial buildings. This means that energy that would otherwise be lost becomes a valuable resource for the nearby community.

SamEnergi operates along two complementary tracks. The first focuses on capturing excess heat from businesses already located close to our district heating networks, such as data centers, bakeries, and smelters. Previously, this was mainly an option for heavy industry,

but SamEnergi allows it to be done also for smaller sized companies. The second track looks ahead. To increase the availability of excess heat in the future, SamEnergi identifies strategic locations where new energy intensive industries – for example, data centers – can establish themselves with optimal conditions for heat recovery. Since the distance to the district heating grid is crucial for minimising heat losses and ensuring a viable business case, Vattenfall actively prepare selected sites and secure key prerequisites such as buildable land and sufficient power capacity.

Through SamEnergi, energy can be utilized twice. This reduces the need for primary energy and supports a more circular and resource efficient energy system.



For further information please scan this QR code

R-strategy: Recover

**Business Area
Customers &
Solutions,**

**Business unit
Heat**

Watching eye encourages plastics recycling



Photo: Stock footage

FossilEye is Vattenfall's innovative solution for quickly measuring the plastic content in waste before energy recovery.

Using a digital eye in the form of cameras, the tool quickly determines what is plastic in the waste, hence the name FossilEye. The solution provides feedback on the extent to which plastic has been removed earlier in the waste management chain. The aim is to encourage initiatives earlier in the waste cycle to reduce the amount of plastic and thereby fossil emissions from the waste. The technology has been developed by the company RoboWaste, based on innovative ideas from the three Energy companies Vattenfall, Tekniska Verken Linköping, and Umeå Energi.

During 2025, development has progressed with improved waste feeding solutions and refined calibration methods that increase measurement stability and accuracy.

A practical development project with RoboWaste – the company behind the technology – began in January 2026, with implementation of these upgrades in the pilot installation planned before summer.

Once the upgraded system is in place, Vattenfall Heat, together with Tekniska Verken Linköping and Umeå Energi, intends to run a verification and certification programme for FossilEye. These steps bring the technology closer to becoming a commercial solution that can help accelerate the transition towards lower fossil content in waste and energy recovery.



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R-strategy: Recycle

**Business Area
Customers &
Solutions**

**Business unit
Heat**

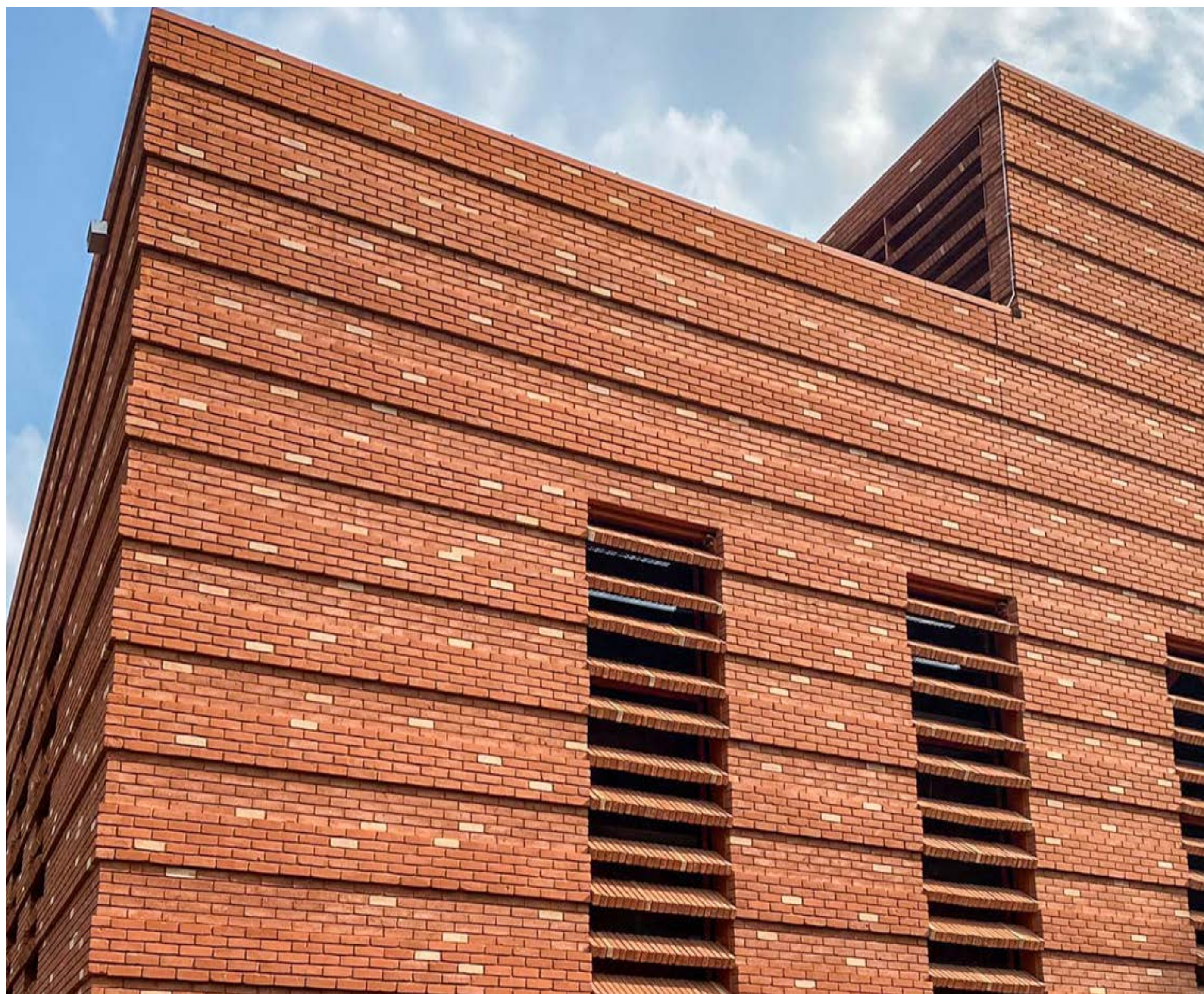


Photo: FRONT

Circular design in heat transfer station

Recycled bricks used in
Vattenfall's heat transfer
station in Amsterdam



For further
information please
scan this QR code

The Hakfort Heat Transfer Station is part of the district heating network of the city of Amsterdam. The heat distribution station has been constructed as circular as possible with reusable steel construction and reusable wooden beams. Furthermore, the roof of the building is covered with grasses.

Construction waste has also been processed in the bricks themselves. FRONT, former StoneCycling, supplied bricks and brick strips. In the sliced bricks the construction waste can be seen in the form of light speckles. The combination of different textures and layers, presented in a lively orange facade, resulted not only in a functional and circular design, but also in an aesthetically pleasing building. In this project, approximately 104 ton of waste was upcycled.

**R-strategy: Replace
and Recycle**

**Business Area
Customers &
Solutions**

**Business Unit
Heat**



Photo: Jennie Lind

From waste heat to fish feed

We are testing a system in Boden, Sweden where excess heat from a data centre is used to grow black soldier fly larvae that become feed for salmon and trout at Vattenfall's Heden compensation farm.

The larvae replace imported fishmeal, reducing pressure on wild fish stocks, supporting local production, and reduces transportation needs. They are grown on food scraps using waste heat from servers powered by hydropower from the Lule River.

The pilot covers around 30,000 trout and evaluates how well the fish adapt to larvae-based feed and whether this process can be scaled. Early results show strong acceptance, with careful feeding needed to maintain natural migration behaviour.

The initiative is part of the national "Feed for the Future" programme led by SLU and Ax foundation, developing feed from Swedish residual streams. It supports Vattenfall's sustainability ambitions while creating local jobs and biodiversity initiatives in Heden.

Heden on the Lule River is Vattenfall's largest compensation fish farm, annually releasing over 650,000 salmon, sea trout and lake trout to restore populations in the Lule River.



For further information please scan this QR code

R-strategy: Recover

Business Area Generation

Business Unit Hydro



Creating demand for near-zero cement



Photo: Adobe Stock

Vattenfall and Cemvision have partnered to develop and supply near-zero emission cement, potentially reducing CO₂ emissions by 95% compared to traditional cement by 2030.

Vattenfall and Cemvision entered an agreement (LOI) in 2024 for the development and future supply of near-zero emission cement. This innovative cement has the potential to reduce CO₂ emissions by up to 95% compared to traditional cement, significantly lowering the carbon footprint of construction projects.

In line with Vattenfall's First Movers Coalition (FMC) cement commitment, an agreement was signed with Cemvision in December 2025 to supply circular, near-zero-carbon cement during 2028-2030. It will mainly be used in wind farm

construction, covering 20% of Vattenfall's cement use in this period. The FMC commitment means that 10% of the cement use should be near-zero-carbon cement from 2030.

Cemvision develops cement made from recycled residual materials from industries, including mining and steel industries, manufacturing in a process where Cemvision's kilns are fuelled by fossil-free energy. The cement consists of 85% recycled material, and the ambition is to increase this amount to 95%.



For further information please scan this QR code

R-strategy: Replace and Recycle



Photo: Åsa Bäcklin

Vattenfall and SSAB in new fossil-free steel collaboration

Vattenfall and SSAB have signed a letter of intent regarding deliveries of fossil-free steel produced with HYBRIT technology.

Building on the existing HYBRIT initiative launched in 2016, which aims to revolutionize the steel industry by replacing coal with fossil-free hydrogen, the two companies expanded their collaboration in 2023 to include deliveries of fossil-free steel. SSAB will supply Vattenfall with fossil-free steel produced at the HYBRIT pilot plant in Luleå, to be used in Vattenfall's operations. Deliveries of fossil free steel will come from:

- SSAB Zero™ which is made of recycled steel and produced with fossil-free electricity and biogas
- SSAB Fossil-free™ steel which is produced by using HYBRIT® technology, with direct reduction of iron ore using fossil-free hydrogen – emitting water instead of CO₂.

The collaboration also involves working with subcontractors to ensure at least 10% of the steel Vattenfall purchases annually is fossil-free by 2030. This initiative supports Vattenfall's goal of achieving net zero emissions by 2040 and aligns with the First Movers Coalition's objectives.



Our climate target



FMC



For further information please scan this QR code

R-strategy: Replace and Recycle



Photo: Jimmy Eriksson (Agency: NORD ID/NORD DDB)

Circular IT and reuse of equipment

Vattenfall has a long-term partnership with IT recycling companies Inrego and AFB to optimize reuse and recycling of IT equipment.

Increasing the reuse and recycling of IT equipment has been a key focus for many years. Today, all mobile phones and all our laptops and desktops are collected for reuse and refurbishment. Previously, some laptops used in highly sensitive environments could not be sent for reuse or refurbishment. In 2025, focused work was carried out to develop and implement secure and compliant processes for handling these devices. As a result, laptops from highly sensitive environments are now included in reuse and refurbishment, marking an important step forward in our circular IT device management.

Since 2020 Vattenfall has collaborated with Inrego to optimize the reuse of IT equipment. During 2025, 7 434 units have been sent to the partner for reuse from our offices in Sweden, Poland, Denmark and the UK.

This has generated CO₂e savings of approximately 765 tonnes calculated by the research center IVL, the Swedish Environmental Institute, using their science-based model. In Germany, AFB is the partner taking back the IT equipment and reusing it. In 2025, 1 618 IT and mobile equipment were processed resulting in a saving of approximately 200 tonnes CO₂e. The CO₂ savings were calculated by TU Berlin, myclimate and Star Cooperation.

Reusing IT products reduces the need to extract primary natural resources. After thorough data destruction, hardware testing, spare parts procurement, repairs, upgrades, and cleaning, in 2025, AFB successfully reused 83% and Inrego 70 % of the equipment. Any remaining items were professionally recycled to ensure sustainable resource management.



For further information please scan this QR code

**R-strategy: Reuse
Refurbish and Recycle
Vattenfall IT**

Reused bricks in new substation



Photo: Pontus Bergman

Using reused bricks for substation buildings reduced the carbon footprint by over 90%, enhancing sustainability in power grid project.

To meet the demands of an increasingly electrified Solna, located just outside Stockholm, the power grid has been strengthened with a new regional grid station, completed in 2024, along with new underground cables offering higher capacity than before. This infrastructure will provide greater power and stability to large parts of Solna, supporting the municipality's growth and development.

By using reused bricks for the buildings, the carbon footprint was reduced by over 90 percent compared to using newly manufactured bricks. Additionally, a green area has been designed with trees for noise reduction, a more pleasant environment for nearby residents, and the potential collection of stormwater and rainfall of up to 600 cubic meters. Various species of trees and plants have been planted to increase biodiversity and create variation in the green experience throughout the year. Finally, solar panels on the roof support the station's internal operations and reduce the load on the municipal power grid.



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R-strategy: Reuse
Business Area
Distribution, Vattenfall
Eldistribution



Photo: Simon Wennberg

Pilot project: reusing substation buildings

As part of our efforts to reduce environmental impact, Vattenfall Eldistribution will test circular construction and reuse of existing substation buildings.

Vattenfall Eldistribution AB owns thousands of secondary substations and constantly reinvests to ensure stable electricity delivery. However, new building constructions made of concrete have a significant climate and environmental impact. Further, it can sometimes be difficult to get a new building permit for a new substation in populated areas which incentivizes refurbishments of existing concrete substations. Sometimes, reusing and upgrading existing concrete buildings and simply exchanging switchgears and transformer instead of purchasing and installing a whole new secondary substation can be a more complex process. It requires experience, collaboration, problem-solving skills, and proper documentation.

Additionally, a clear strategy is missing for reuse when planning new secondary substations. To address these issues, a pilot project was launched in early 2024 to explore the reuse of secondary substation buildings and is now part of Vattenfall Eldistribution's Technical Development Forum. The project will run to 2027, involves ten secondary substations, and focuses on gathering data from environmental, economic, and organizational input. In 2025, the first secondary substation project was evaluated. Continuous evaluation will help develop guidelines and criteria to support future circular construction initiatives.



For further information please scan this QR code

R-strategy: Reuse

**Business Area
Distribution, Vattenfall
Eldistribution**



Photo: Mark Seelen

Vattenfall's circular approach for office renovations

Vattenfall maximized the reuse of existing materials when renovating the Arnhem office in 2023

During the 2023 renovation of Vattenfall's Arnhem office, most products, including doors, furniture, and IT equipment, were reused, promoting sustainability and reducing environmental impact by avoiding the use of virgin materials.

Offices periodically require refurbishing and renovation to maintain functionality and aesthetics. The challenge lies in the significant resource use and environmental impact associated with traditional renovation and refurbishment processes.

To address this, Vattenfall focused on circularity during the renovation, by maximizing the reuse of existing materials. As a result, the Arnhem office reused approximately 85 % of the partition walls, glass cassettes, and doors, 90% of the furniture, and all IT equipment. This approach minimised waste and made the office renovation more sustainable.

R-strategy: Reuse
Vattenfall
Real Estate &
Facility Management

96% of material recycled in nuclear decommissioning of R2 research reactor

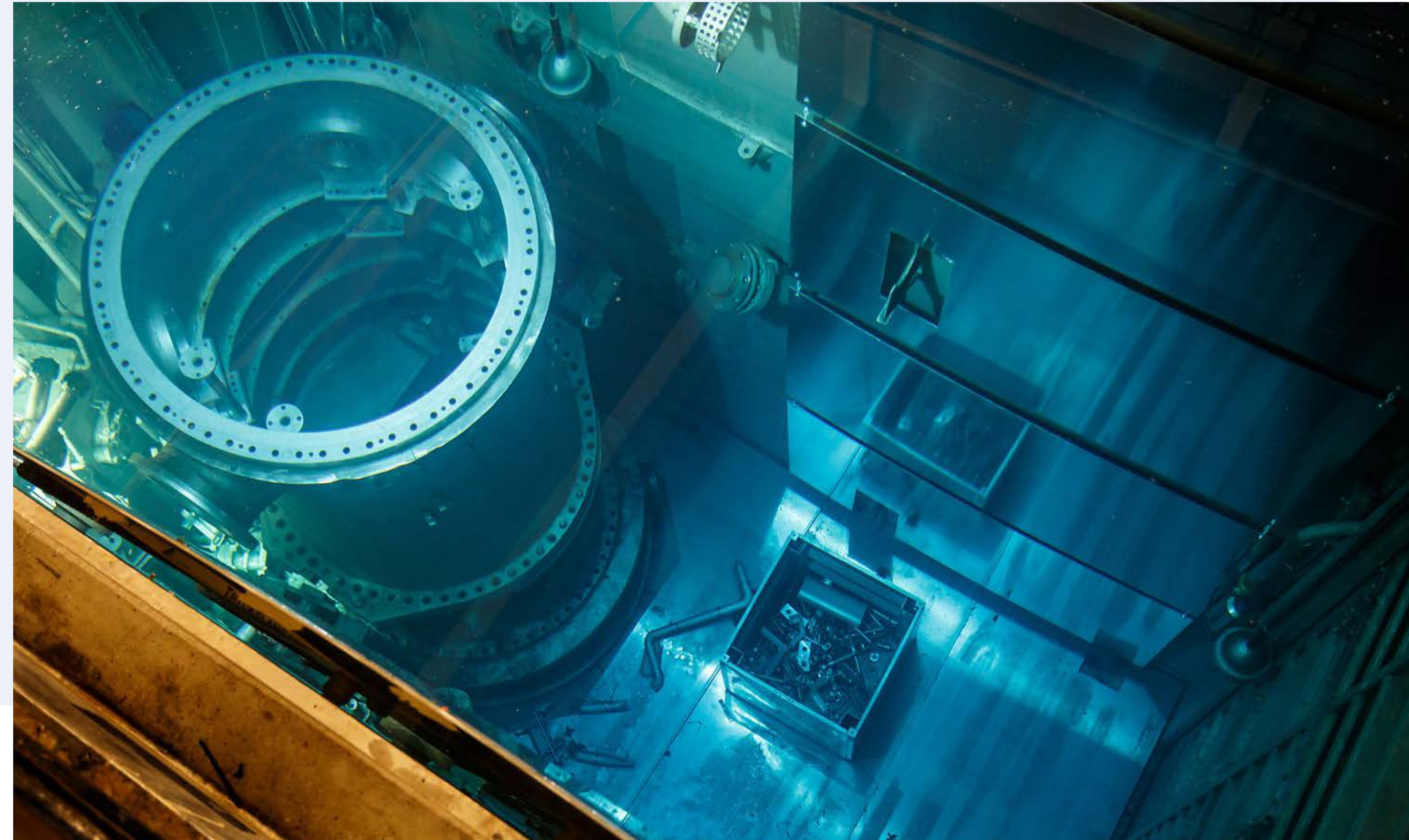


Photo: Fredrik Ekenborg

Vattenfall achieved high recycling rates during the dismantling of the R2 nuclear research reactor.

During AB Svafo's work with decommissioning and dismantling of the nuclear research reactor R2, approximately 9 000 tons of waste have been generated. The waste consists mainly of concrete and metal. Through careful planning of working methods and by sorting the material at the source, together with well-developed methods for radiological clearance, 86% of the material has been recycled. Less than 1% of the waste has been sent to landfill and the remaining 13% has been packed for interim storage before it can be sent to SKB's final repositories for nuclear waste.

The subsequent conventional demolition of the building generated nearly 39 000 tons of waste, mainly concrete, soil and stones. By establishing site-specific reference

values for contaminants in the material, concrete and soil could be used for backfilling in the deep cavities that arose when the reactor building was demolished. Metal was recycled thanks to skilful sorting. This led to a recycling rate of as much as 98% of the material from the conventional demolition. Additional material was required for backfilling, but Svafo was given the opportunity to acquire surplus materials from a construction project carried out by Cyclife Sweden AB. This saved money and reduced the environmental impact of transportation.

This means that an astonishing 96% of the total volume could be recycled.

AB Svafo is a non-profit-making company within the Vattenfall Group, with the purpose of decommissioning nuclear facilities from previous research and development activities in Sweden. The intermediate storage and management of Swedish legacy waste, until its final disposal, are included in this task.



For further information please scan this QR code

R-strategy: Recycle

Business Area

Generation, AB Svafo