

Karmøy Technology Pilot

Hydro's pilot plant at Karmøy has the most climate and energy efficient aluminium production technology in the world.



Facts about the Karmøy Technology Pilot

- Hydro is a world leader in research and development in the aluminium industry. We want to use the technology pilot at Karmøy to roll out the world's most energy and climate efficient technology for producing aluminium.
- In recent years, our researchers in Hydro's technology centers in Årdal, Porsgrunn and Neuss have developed the next generation in electrolysis technology, which will reduce energy consumption and emissions in the aluminium industry. This technology is now ready to be tested in a full-scale production plant.
- If we succeed, the new technology as a whole can be installed in future aluminium plants, and some technology elements can be implemented in existing plants to improve energy efficiency and operational stability.
- The new pilot facility is built at Hydro's existing aluminium plant at Karmøy in Rogaland County.
- Using 60 new pots, the pilot plant will produce about 75 000 tonnes of aluminium a year. Aluminium production started in early 2018.
- The pilot plant will provide new jobs at Karmøy and increase total production capacity by 40 percent.
- The technology pilot is estimated to cost NOK 4.3 billion, supported by a contribution of close to NOK 1.6 billion from Enova, a Norwegian public enterprise which supports new energy and climate-related technology.
- Innovation Norway provided NOK 22.5 million in support to the technology development program for the pilot, which made it possible to maintain momentum until the investment support from Enova was secured.

GROUND BREAKING NEW TECHNOLOGY

The pilot plant will produce aluminium with the highest energy efficiency and smallest CO₂ footprint in the world.

Facts about the technology:

- The new technology, HAL4e, has been tested in a limited number of full-scale production cells at our research center in Årdal, Norway.
- Out of the 60 cells in the technology pilot, 48 cells operate with an energy consumption of 12.3 kWh/kg aluminium. This is well under the world average of 14.1 kWh/kg aluminium and Hydro's own average of 13.8 kWh/kg aluminium.
- In addition, 12 test cells (HAL4e Ultra cells) are installed based on the identical technology platform as the HAL4e cells, but for the purpose of implementing new technology elements with a lower technology

readiness level. The HAL4e Ultra cells are expected to operate with an energy consumption of 11.5-11.8 kWh/kg aluminium. No one has yet managed to produce aluminium with such low energy consumption and high productivity.

- The world's lowest energy consumption in aluminium production will be matched with continued high productivity. Compared with the technology used in our modern plants in Sunndal and Qatar, the new pots will be 50 per cent larger and produce 50 per cent more metal from each pot, while also using less energy per kilo produced.

CLIMATE BENEFITS

Aluminium produced using hydropower creates only one-fifth of the CO₂ emissions of aluminium produced using electricity from coal power plants.

Facts about the climate benefits:

- Aluminium is a lightweight, malleable and infinitely recyclable metal that helps to make cars lighter and less energy intensive, buildings more environmentally friendly, and packaging that makes food last longer and reduces the need for refrigeration.
- It is expected that the world will need 45-65 percent more aluminium in 2025 than in 2015.
- By using hydropower instead of coal, the pilot plant at Karmøy will save the global environment from one million tonnes of CO₂ emissions.

- The pilot has the ambition to be a benchmark regarding emissions. Direct CO₂ emissions are expected to be reduced to 1.40-1.45 kg CO₂ equivalents per kg aluminium, which will be best in the world.
- Direct CO₂e emissions with the new technology in the pilot will be 0.8 kg lower per kilo of aluminium than the world average. Compared to world average CO₂e emissions, the pilot plant at Karmøy will produce 60 000 fewer tonnes a year.
- If the rest of the world produced aluminium with the technology Hydro is now rolling out, there would be energy savings equivalent to almost the entire Norwegian annual hydropower production.