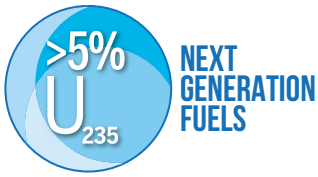
urenco

The Energy to Succeed

Delivering for a net zero world

Annual report and accounts 2021

Next generation fuels



As a leader in the nuclear industry, we are well positioned to provide the enrichment services needed to support the nuclear industry's efficiencies, advancements and innovations in fuel production.

Images top to bottom:
Urenco UK; UUSA

Urenco's programme to enable the production of LEU+, low enriched uranium up to 10% uranium-235, at our US and UK sites (UUSA and Urenco UK) is progressing quickly with the completion of detailed technical feasibility and plant optimisation plans. This new product can be used in existing light water reactors seeking to achieve higher levels of safety and improved economics. Urenco's existing advanced gas centrifuge technology is capable of producing LEU+ and few modifications will be needed to the current facilities at UUSA and Urenco UK.

LEU+ is a positive initial step towards the subsequent potential production of other advanced fuels for civil nuclear power generation and a project to create an advanced fuels facility has commenced. It will be designed to supply research and test reactors, as well as the emerging market to fuel advanced reactors. This includes the fuel requirements for U-Battery, an advanced/small modular reactor development Urenco is supporting.

Advanced fuels can be produced using our existing centrifuge technology. We are currently focusing on developing the commercial scope of the new facility; confirming its location, capacity and how it will connect to existing plants; and designing a new transportation package for the fuels. This project is being undertaken within the framework of international agreements related to Urenco.

We have the knowledge and experience to play a leading role in this area, which will provide an enhanced service for our customers and make a positive contribution to net zero targets.

CASE STUDIES

AURORA
ENERGY RESEARCH

Aurora Energy Research study

In September, Urenco published the findings from an independent study that it initiated with Aurora Energy Research to investigate the benefits of deploying both nuclear and renewables in hydrogen production, to support the energy transition and meet UK climate targets.

The report, called 'Decarbonising Hydrogen in a Net Zero Economy', was supported by the IAEA, EDF and Lucid Catalyst.

The key findings of the study included:

- To facilitate rapid decarbonisation and cut dependency on fossil fuels, both nuclear and renewables are needed for power and hydrogen production.
- Together, nuclear and renewables can provide the hydrogen volumes needed for net zero in 2050.
- Deploying large volumes of nuclear alongside renewables is economically efficient, reducing the net present value of the UK's total system spend by 6-9% (£40-60bn) to 2050.
- Combining hydrogen and nuclear leads to competitive costs. Using heat and electricity together from a nuclear power plant for hydrogen production provides a strong cost advantage.

While the study is focused on the UK, the results are applicable to other countries, including developing nations.

U-Battery mock-up

A full scale, first of its kind, mock-up of the main vessels of an advanced modular reactor (AMR) was revealed in September at an event hosted by U-Battery and Cavendish Nuclear.

The project was to design and manufacture a full size mock-up of the reactor pressure vessel, the intermediate heat exchanger vessel and the connecting duct. Its successful completion marked a major milestone towards using AMR technology to provide a low carbon, cost effective, locally embedded and reliable source of power and heat for diverse applications, including energy intensive industries and remote locations.

It also demonstrated how the AMR can be built using modular techniques, making it easy to construct and transport.

The project was the result of an award made by the UK Government's Department for Business, Energy and Industrial Strategy under the Advanced Manufacturing and Materials programme. Part of the Government's Nuclear Innovation Programme, the objective was to enable research and development to bring innovative nuclear technologies to market.

In addition to the Advanced Manufacturing and Materials programme, U-Battery is participating in Phase 2 of the UK Government's Advanced Modular Reactor Competition. In July 2020, it was one of three vendors to progress from Phase 1 to Phase 2 of the competition and was awarded £10m of funding to initiate design and development work.