urenco

Sustainability report 2016

Our role in the nuclear supply chain


Sizewell B Nuclear Power Station, Suffolk, UK

URENCO plays a key role in the global nuclear fuel supply chain. Providing our customers with the enrichment services they need, we enable the production of low carbon electricity through nuclear generation.

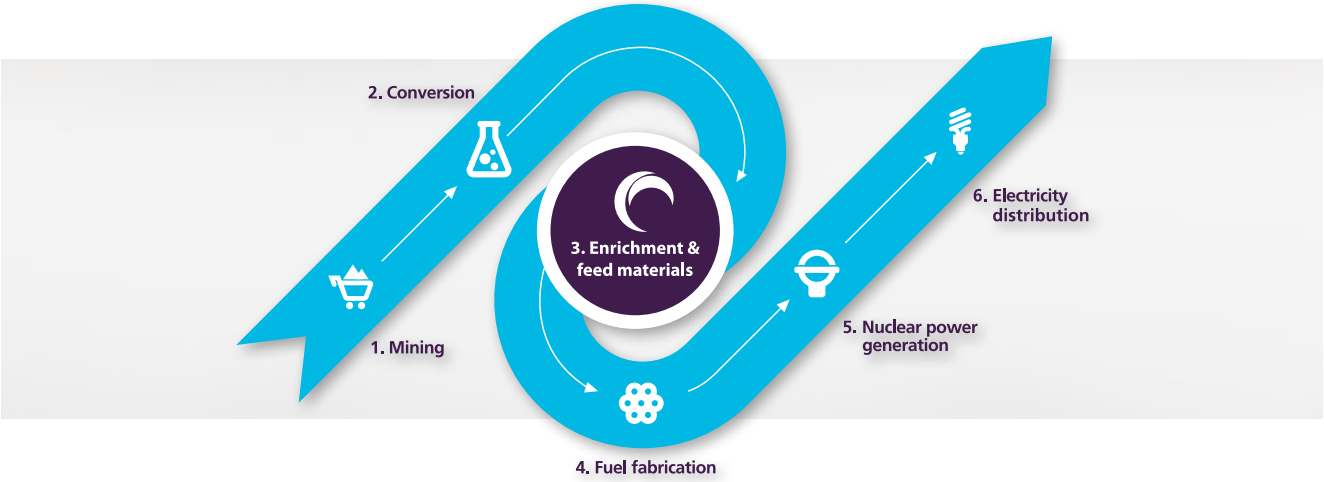
Around the world, we work with companies across the nuclear fuel cycle, including converters and fuel fabricators. Our aim is to provide our customers with a safe and reliable supply of enrichment services, alongside the highest level of service, quality and expertise. We have spent more than 45 years developing our technology and expertise in enrichment services. The number and location of our customers is shown on pages 10-11 of our 2016 Annual Report.

Managing risk and sustainability in the supply chain

We take seriously our responsibilities as part of the global nuclear fuel supply chain and adhere to International Atomic Energy Agency (IAEA) guidelines and all other national and international regulations regarding the transportation of radioactive material. We also adhere to strict regulatory requirements in all aspects of our own logistics procedures. Beyond that, we actively contribute to the development of the regulatory framework by attending IAEA workshops, the results of which serve as recommendations for changes in legislation.

We are carefully monitoring the consequences of the UK's withdrawel from the European Union and the EURATOM Community. For more information, please see page 22.

1. **Mining**
   Uranium ore is extracted, purified and milled to become uranium oxide, also known as 'yellow cake'.
2. **Conversion**
   Uranium oxide is chemically converted into uranium hexafluoride (UF_6), otherwise known as feed, and transported to one of our enrichment facilities.
3. **Enrichment and feed materials**
   Our customers' UF_6 arrives at our enrichment facilities. We heat the UF_6, turning it into a gas which we feed into our centrifuges. The centrifuges separate the two isotopes contained in uranium, U_{235} and U_{238}, and enrich the lighter U_{235} to up to 5%. Our centrifuges also enable us to conserve feed material, which means we can provide EUP and natural uranium in addition to enrichment services.
4. **Fuel fabrication**
   The customers' enriched uranium is transported to fuel fabricators, where it is converted into pellets before being loaded into fuel rods.
5. **Nuclear power generation**
   The fuel rods are transported to nuclear power stations, where they power nuclear reactors. Fuel rods are placed into the reactors, generating steam which drives turbines which in turn power generators.
6. **Electricity distribution**
   Nuclear power plants provide a secure source of low carbon energy, generating electricity for homes, schools, hospitals, offices and industries around the world.



Our role in the nuclear supply chain

The essential role of nuclear power in a balanced energy mix

We believe that a balanced energy mix is required to provide the world with a reliable and consistent supply of electricity. Some energy sources, like renewable energy, are most suited to cover gaps in electricity generation as soon as they are needed, while others, such as nuclear energy, are used for providing steady, base-load electricity.*

Nuclear power provides a constant supply of electricity to minimise the risk of power outages at peak times.

Figure 1 demonstrates the global electricity generation by source from the various energy providers.

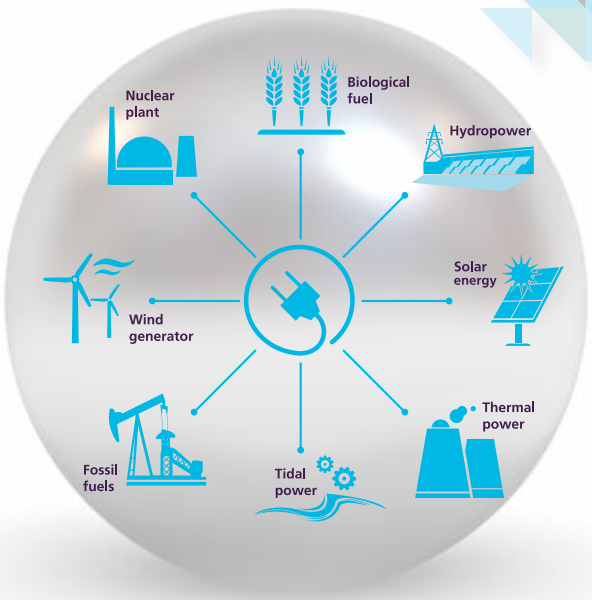
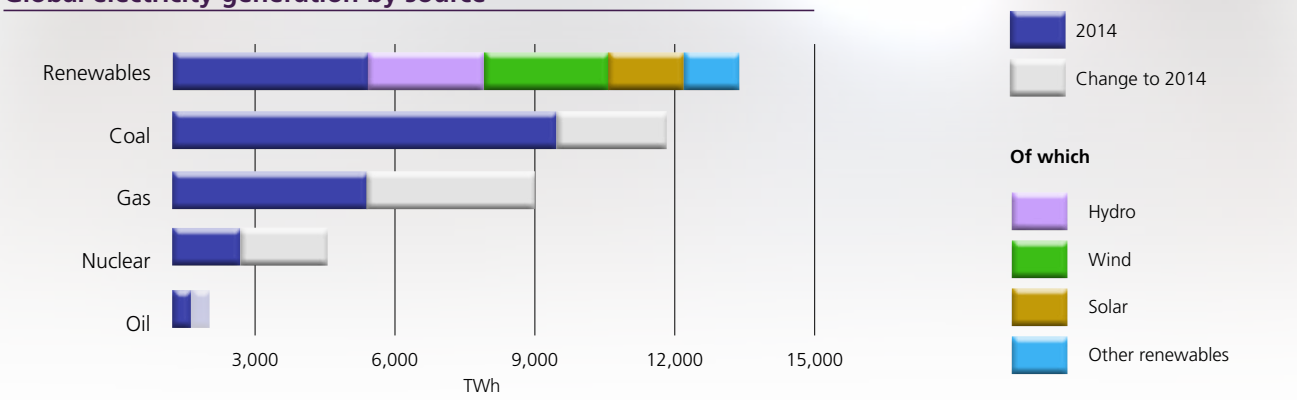


Figure 1

Global electricity generation by source



Global electricity generation by source in 2014 (terawatt hours, dark blue bars) and change to 2040 (grey, lilac, green, yellow and light blue bars).

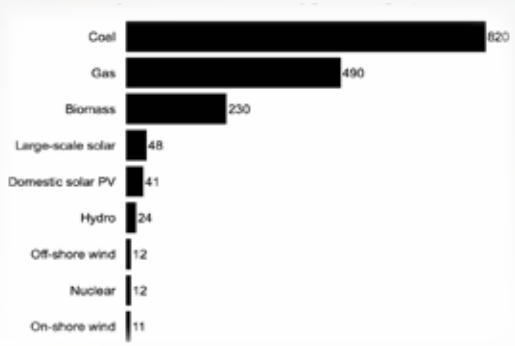
Source: IEA World Energy Outlook 2015, presentation to the press.

We believe that nuclear energy plays an important role in helping the world to lower greenhouse gas emissions and combat climate change. **Figure 2** demonstrates the life cycle emissions from different energy sources, indicating that nuclear is one of the lowest.

Figure 3 shows the various scenarios which may occur over the next decade if (globally) we decrease our carbon emissions, or continue down the same path. As a primary source of low carbon energy, nuclear power is well placed to help ensure the world keeps global warming below 1.5°C.

Figure 2

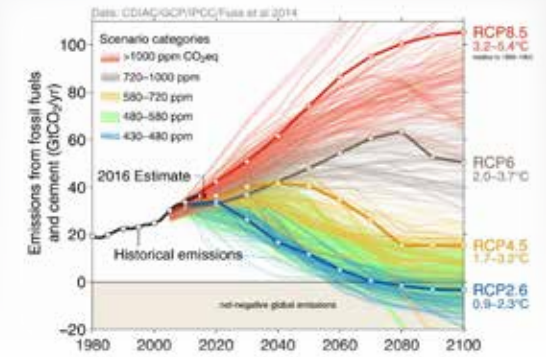
Life cycle emissions from electricity generation, gCO_2/KWh



Source:
Intergovernmental Panel on Climate Change Life Cycle Assessment 2011. Updated 2014.
http://energyforhumanity.org/en/briefings/carbon-emissions/lifecycle-carbon-emissions-of-electricity-generation-sources/

Figure 3

Observed emissions and emissions scenarios



Source:
Fuss et al 2014; CDIAC; IIASA AR5 Scenario Database; Global Carbon Budget 2016

* Source: (**https://ourfuture.energy/post/33**)

Glossary

British Science Association

A registered charity founded in 1831, whose vision is of a world where science is at the heart of society and culture.

Capital expenditure

Purchases of property, plant and equipment including prepayments relating to payments to ETC in advance of contracted cascade deliveries, which will be supplied in future periods.

CNS

Capenhurst Nuclear Services Limited, a subsidiary company of URENCO, has taken responsibility for storage of certain uranic materials on behalf of the Nuclear Decommissioning Authority at the Capenhurst facility in the UK.

Deconversion

This is the process of removing the volatile fluorine component from uranium hexafluoride to make stable uranium oxide (U308). URENCO has chosen to use U3O8 as the long-term retrievable storage form of uranium.

EBITDA

Earnings before exceptional items, interest (including other finance costs), taxation, depreciation and amortisation and joint venture results (or income from operating activities plus depreciation and amortisation, plus joint venture results). Depreciation and amortisation are adjusted to remove elements of such changes already included in changes to inventories and other expenses.

Energy Savings Group (ESG)

The ESG is responsible for driving action, accountability and engagement in energy efficiency and optimisation. Three times a year, the ESG convenes meetings to share learnings and propose initiatives to minimise energy usage.

Enrichment

The step taken in the nuclear fuel cycle that increases the concentration of U_{235}, relative to U_{238}, in order to make uranium usable as a fuel for light water nuclear reactors.

ETC

Enrichment Technology Company Limited.

Euratom

The European Atomic Energy Community, established in 1957 by members of the European Union.

Global Reporting Initiative

The reporting framework which provides guidance on sustainability performance reporting.

Hazardous waste

Transported, imported, exported or treated waste deemed hazardous under the terms of the Basel Convention Annexes I, II, III and VIII.

Head Office

URENCO Group's head office in Stoke Poges, UK.

IAEA

The International Atomic Energy Agency is the world's central intergovernmental forum for scientific and technical cooperation in the nuclear field.

LED

Light-emitting diode.

Materiality

Materiality refers to the sustainability elements which are sufficiently important that they should be reported. They cover the organisation's significant economic, environmental and social impacts, or substantively influence the assessments and decisions of stakeholders.

Non-hazardous waste

Transported, imported, exported or treated waste that is not deemed hazardous under the terms of the Basel Convention Annexes I, II, III and VIII.

Nuclear Fuel Supply Chain

The multiple steps that convert uranium as it is extracted from the earth to nuclear fuel for use in power plants. Uranium enrichment is one step in the nuclear fuel supply chain.

Order book

Contracted and agreed business estimated on the basis of 'requirements' and 'fixed commitment' contracts.

Recycled

The process of putting a product to another use once its primary use has been exhausted.

Reused

The process of putting a product to another use once its primary use has been exhausted.

Richie

Richie is an animated character and acts as URENCO's science ambassador. The Richie programme is a core element of URENCO's school and education outreach. Through Richie, URENCO connects with its youngest audiences, teaching them about science and energy in an engaging and interactive way.

Richie Lecture

URENCO's annual Richie Lecture is a celebration of STEM education for school children, featuring a lecture on a related topic, held at the Science Museum.

SMR

Small modular reactors are advanced reactors that produce electric power up to 300MWe, designed to be built in factories and shipped to sites for installation as demand arises.

Stable Isotopes

URENCO's Stable Isotopes business uses centrifuge technology to produce a variety of other products for medical, industrial and research applications.

STEM

Refers to the core subjects of Science, Technology, Engineering and Maths.

Supplier of choice

Increasing available capacity and experience of new operating environments facilitates first class service delivery and the flexibility to meet the changing needs of our customers. This will enable URENCO to be considered the 'supplier of choice' by our customers.

Glossary

SWU

Seperative Work Unit. The standard measure of the effort required to increase the concentration of the fissionable U_{235} isotope.

Tails (depleted UF_6)

Uranium hexafluoride that contains a lower concentration than the natural concentration (0.711%) of the U_{235} isotope.

Tails Management Facility (TMF)

The facility constructed and operated by URENCO ChemPlants Limited that will manage the deconversion of tails to stable uranium oxide (U3O8). Currently under construction at URENCO's UK site in Capenhurst, UK, it will consist of a number of associated storage, maintenance and residue processing facilities to support URENCO's long-term strategy for the management of tails.

U_{235}

The fissionable uranium isotope found in natural uranium.

U_{238}

The non-fissionable uranium isotope that makes up most of natural uranium.

UD

URENCO Deutschland.

UNL

URENCO Nederland.

Uranium

A fairly abundant metallic element. Approximately 993 of every 1,000 uranium atoms are U_{238}. The remaining seven atoms are U_{235} (0.711%), which is used in today's nuclear power stations to generate energy by fission.

Uranium hexafluoride (UF_6)

All enrichment processes today work with gaseous material; therefore, uranium is converted to UF_6.

URENCO ChemPlants Limited (UCP)

URENCO ChemPlants Limited, a subsidiary company of URENCO, is responsible for the construction and operation of the Tails Management Facility at URENCO's site in Capenhurst, UK.

UUK

URENCO UK.

UUSA

URENCO's enrichment facility in New Mexico, US, owned and operated by Louisiana Energy Services LLC.

Further information
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