

NUCLEAR
RESULTS IN 2021
AND FUTURE
PERSPECTIVES

EXECUTIVE SUMMARY



Foro Nuclear

Foro de la Industria Nuclear Española



Nuclear power in Spain

Nuclear power is essential for reducing polluting emissions and to the energy transition

The net electricity output of the seven Spanish nuclear reactors in 2021 amounted to 54,040 GWh, which represented 20.8% of the country's total net electricity production. Gross generation stood at 56,564 GWh. Nuclear power, with half a century of operation in Spain, has been producing in excess of 20 per cent of all the electricity consumed in Spain for more than ten years in a row.

Nuclear generation accounted for 30.36% of all the CO₂-free electricity generated in the

country and it is thereby crucial in the fight against climate change.

As of December 31, 2021, the net installed capacity of the Spanish nuclear fleet was 7,117 MW, 6.31% of the country's total net installed capacity. Gross installed capacity was 7,398.7 MW. This output means that Spanish nuclear power stations constituted, once again, the power source that operated the longest, thus ensuring the stability of the country's electrical grid.

OPERATING LICENSES

In Spain, the operating periods of nuclear power plants are not set for a fixed amount of time. Operating licenses are renewed after the Spanish Nuclear Safety

Council (CSN) carries out an assessment and the Ministry for Ecological Transition and the Demographic Challenge (MITECO) grants their renewal.

DATES OF AUTHORIZATION OF OPERATION

Nuclear power plant	Date of entry into force of the current license	Valid until	Next renewal
Almaraz I	07/23/2020	11/01/2027	---
Almaraz II	07/23/2020	10/31/2028	---
Ascó I	09/27/2021	10/02/2030	---
Ascó II	09/27/2021	10/02/2031	October 2031
Cofrentes	03/18/2021	11/30/2030	---
Trillo	11/17/2014	11/17/2024	November 2024
Vandellós II	07/23/2020	07/27/2030	July 2030

Source: Foro Nuclear

Nuclear power is well known for its contribution to achieving energy sustainability goals and to the transition to a low-carbon economy. In this regard, and within the framework of the Spanish Government's 2021-2030 Integrated National Energy and Climate Plan (PNIEC), on March 18, 2021, MITECO granted the renewal of Cofrentes nuclear power plant's operating license until November 30, 2030, by means of Ministerial Order TED/308/2021.

Likewise, on September 27, 2021, MITECO approved Ministerial Orders TED/1084/2021 and TED/1085/2021 whereby it granted the renewal of the operating licenses of units I and II of Ascó nuclear power plant until October 2, 2030, and October 2, 2031, respectively.



Units I and II of Ascó nuclear power plant as well as Cofrentes had their operating licenses renewed in 2021



Spent fuel is perfectly controlled and stored in nuclear power plants

SPENT FUEL MANAGEMENT

Radioactive waste is not all the same. It is classified according to the nature of the radioactive isotopes it contains. Hence, it is divided into two main groups: very low, low- and intermediate-level radioactive waste -which is kept stored at the El Cabril disposal facility on a permanent basis- and **high-level radioactive waste, which is mostly irradiated or spent fuel.**

Spanish nuclear power plants store their irradiated fuel in the spent fuel pool that was originally built for this specific purpose and, once the pool is full, in an Individual Temporary Storage Facility (ATI) under dry storage conditions.

The José Cabrera (which is currently undergoing decommissioning), Trillo, Ascó, Almaraz and Cofrentes power stations have an ATI currently in operation; Cofrentes' storage facility came into service in June 2021. Santa María de Garoña nuclear power plant (which is in the pre-decommissioning stage) has finished building its ATI although is not up and running yet.

As of December 31, 2021, there were 17,062 irradiated fuel elements temporarily stored in Spanish nuclear power plants, of which 14,601 were kept in spent fuel pools and 2,461 in ATIs.

THE SPANISH NUCLEAR INDUSTRY

In spite of the Covid-19 pandemic, **the Spanish nuclear industry continued to take part in many national and international projects, thus creating highly qualified jobs** with a lot of technological know-how and a firm commitment to research and development.

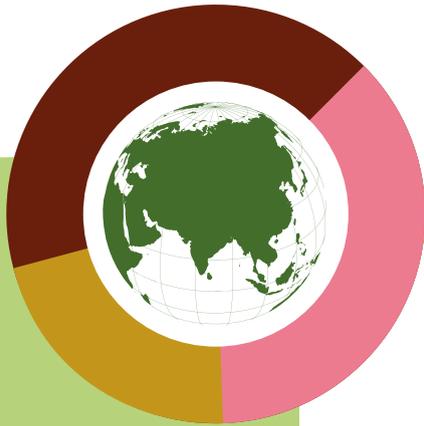
The contribution of many Spanish companies to the development of the Spanish nuclear program since its inception has given rise to a solid, competitive and experienced industry, which is present throughout the value chain and has an increasingly consolidated international presence.

The worldwide recognition and prestige of the Spanish nuclear

industry is also reflected in its development of maintenance and retrofitting projects for Spanish nuclear reactors, which thus operate with the utmost safety guarantees and excellent performance indicators.

The Spanish nuclear industry has state-of-the-art capabilities and exports products, services and advanced technology to over 40 countries. The activities of Spanish firms show that nuclear is not only sustained but continues to be designed and developed in Spain to support the nuclear power plants in operation in the country and to serve a growing international nuclear market.

The Spanish nuclear industry, which has state-of-the-art capabilities and technology, has an increasingly consolidated international presence



Nuclear power
around the world
in numbers

442

REACTORS IN OPERATION IN
33 COUNTRIES

58

REACTORS UNDER
CONSTRUCTION IN 20 COUNTRIES

10.5%

OF THE WORLD'S
ELECTRICITY

1/3

OF THE EMISSIONS-FREE
ELECTRICITY

Long-term
operation makes
it possible to
guarantee electric
supply and fight
against climate
change

Nuclear power in the world

As of December 31, 2021, **there were 442 reactors in operation in 33 countries around the world. Another 58 new reactors were under construction in 20 countries.** In the past few years nuclear output has been around 2,700 TWh, which **represents 10.5% of all the electricity consumed in the world and almost one third of all the electricity generated without releasing polluting emissions.** Nuclear power is the second lowest source of carbon after hydro-power.

Over the past year, six new reactors were connected to the grid in China, India, Pakistan and the United Arab Emirates and seven more began to be built in China, Russia and Turkey.

By the end of the year, there were 106 reactors in operation in 13 out of the 27 member states of the European Union, which generated more than 25% of all the electrical energy consumed in the EU. Another four units were undergoing construction in Finland, France and Slovakia.

CONTINUITY OF OPERATION OF NUCLEAR POWER PLANTS

The continuity of operation of a nuclear power plant refers to its operation beyond the period initially considered in its design while maintaining its safety level. Accumulated international experience shows that this is technically feasible.

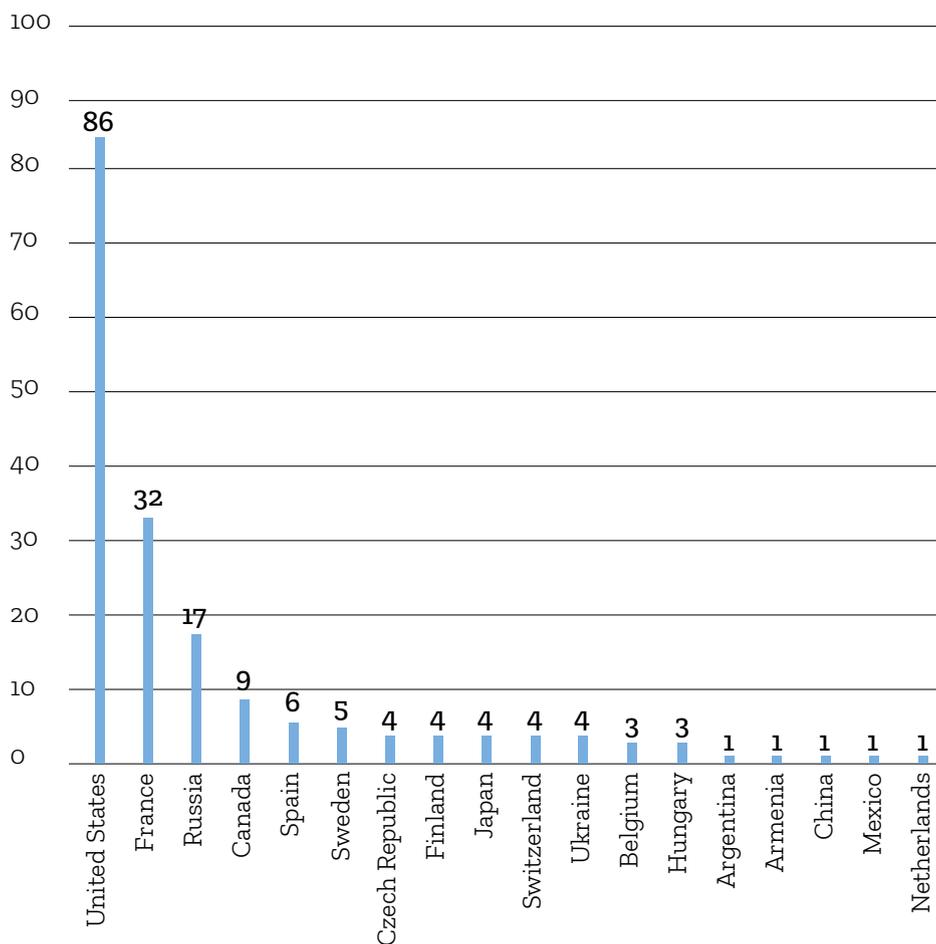
REACTORS AROUND THE WORLD WITH AUTHORIZATION FOR LONG-TERM OPERATION

Data valid as of December 31, 2021
Source: Foro Nuclear with data from PRIS-OIEA, NRC, ASN, Rostekhnadzor/Rosatom, CNSC, MITECO, SSM, STUK, NRA/Jaif, SÚJB, ENSI, SNRIU, FANC, HAEA, ARN, ANNP, CNNC, ANVS and SENER/Government of Mexico.

Thus, as of December 31, 2021, there were 186 nuclear reactors around the world that had been authorized to operate for more than 40 years by the regulatory bodies of 18 countries. In the U.S., where the majority of reactors have 60-year licenses,

at least six of them will now be able to operate for 80 years.

In all, more than 40% of the nuclear reactors in the world have been licensed for long-term operation, as shown below:





What is Foro Nuclear?

Foro de la Industria Nuclear Española is the association that has been representing the interests of the Spanish nuclear industry for the past 60 years. It brings together almost 50 companies and organizations, including electric utilities, nuclear power plants, engineering companies, service companies, system and large-component suppliers, industry and professional associations and universities. Its main purpose is to boost their international presence and to support the maintenance and continuity of Spanish nuclear power stations.



In 2022, Foro Nuclear marks 60 years dedicated to presenting the value of the whole of the Spanish nuclear industry as well as bringing forward the relevant role of nuclear power, both at the energy and environmental levels



www.foronuclear.org

