Status of the Decommissioning of Nuclear Facilities around the World

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FOREWORD

At the end of their useful life, nuclear facilities of all types must be decommissioned to render them safe and to remove and dispose of any associated material that could harm present and future generations. At this time, the first generation of nuclear power plants is gradually being taken out of service and decommissioned. Similarly, many of the research reactors around the world are being closed down and are candidates for decommissioning. The present report has been produced in order to evaluate the magnitude of the worldwide decommissioning task. Its scope extends beyond consideration of nuclear power plants and research reactors to include all facilities that use radioactive material.

The report reviews and summarizes the decommissioning activities that have been performed to date, those currently under way and those that will need to be performed in the future. An attempt is made to quantify the costs associated with implementing the necessary decommissioning activities. These cost estimates provide an indication of the level of effort that will be needed to safely effect decommissioning activities.

The IAEA has prepared a number of safety standards and technical reports pertaining to decommissioning. These publications can be used as a basis for developing a regulatory infrastructure and implementing a decommissioning programme.

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The IAEA officer responsible for the preparation of this publication was D.W. Reisenweaver of the Division of Radiation, Transport and Waste Safety.

EDITORIAL NOTE

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CONTENTS

1. INTRODUCTION

1.1. BACKGROUND

Almost every country in the world uses or handles radioactive material in some manner. This material may, for example, be in the form of fuel in a nuclear power plant or of a source used for medical purposes. The facilities that use and handle radioactive material vary in size from large, complex sites, such as nuclear power plants and nuclear fuel cycle facilities, to smaller facilities such as research laboratories, manufacturing plants and university laboratories. With the passage of time, questions will arise regarding the effects of ageing or the continued usefulness of these facilities. They will eventually cease operation and will require the implementation of a decommissioning strategy. It has been estimated that there are thousands of facilities worldwide that will eventually require some degree of decommissioning. Some facilities are currently undergoing decommissioning, and the nuclear industry has in fact been decommissioning various kinds of nuclear facility for the past 50 years. Thus some level of expertise in decommissioning has already been gained.

The IAEA has been actively developing safety standards [1–4] and technical information for use by regulators, operators, owners and decommissioning specialists for the past 25 years. These standards have been based on the experience up to this point. The purpose of the present publication is to assemble information that can be used by the IAEA and others to determine the resources that will be needed to support decommissioning activities around the world in the future and to try to identify areas and topics that may need attention. This work is based upon a review of the existing and future liabilities in the decommissioning process. This publication is also intended to serve as a reference source on facilities that use radioactive material around the world.

Most of the data gathered for this report were extracted from readily available sources of information — namely existing compilations — and then merged into a single listing (see the annexes on the CD-ROM at the end of this book). In some cases individual sites were added to the list after they were identified and found not to have been included in the sources that were used for this work. No single reference can be cited for the information presented in this book; the bibliography identifies the publications that were used as its basis.

1.2. OBJECTIVE

The objective of this publication is to review and summarize the decommissioning activities worldwide which have been performed to date, those currently under way and those projected to be performed in the future, and to evaluate the likely costs associated with the overall decommissioning activities.

1.3. SCOPE

The study presented in this book includes all facilities that use radioactive material and that will require eventual decommissioning, except that it does not include those facilities that use only sealed sources and can be decommissioned in a rather direct manner (i.e. by sending the source directly to a disposal site or returning it to the manufacturer). The report includes information on nuclear power plants, research reactors, accelerator facilities, fuel cycle facilities, research facilities and laboratories, manufacturing plants and university facilities. Both commercial and government facilities (including military sites) are included in the study to the extent that information on them was available. Land areas that require remediation, such as tracts with uranium mill tailings and former nuclear weapon test sites, are not included.

It should be noted that the information presented in this report is time sensitive. For example, the date for permanent shutdown of a facility may change. Plant life extension will increase the operating time of a plant, but there may also be cases of premature shutdown of facilities for political, economic or technical reasons.

1.4. STRUCTURE

The main text of this publication is organized as follows. Section 2 identifies the three main decommissioning strategies and describes how these strategies may be implemented. Section 3 describes the various types of facility that have been included in the study. Section 4 identifies the assumptions that were used in developing the evaluations of decommissioning costs and levels of effort. Section 5 provides the conclusions of the study. The four annexes given on the CD-ROM included in this book provide specific information on the facilities that were considered in the study.

2. DECOMMISSIONING STRATEGIES

Decommissioning is defined by the IAEA as the administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility. This implies that decommissioning does not begin when the facility is permanently shut down, but starts as early as the design stage. The end point of decommissioning is normally the removal of the facility from regulatory control. This may allow the facility to be reused for other purposes or may result in the complete structural demolition of the facility and in the site being returned to its natural state, commonly referred to as a 'greenfield' condition.

Over the years, the IAEA has used several methods for describing the various decommissioning strategies. In the past, one of these methods included a system of referring to various decommissioning options as Stage 1, 2 or 3. Since 1996, this nomenclature has not been used by the IAEA. The IAEA endorses three decommissioning strategies — immediate dismantling, deferred dismantling and entombment. In some Member States other options or slight modifications of these options are used. These IAEA defined options are in principle applicable to all facilities; however, some may not be appropriate owing to political concerns, safety requirements, local conditions or financial considerations. The following is a short description of each of these decommissioning options.

— **Immediate dismantling** means the prompt removal and processing of all radioactive material from the facility and its transfer to a predesignated site for either storage or disposal. This option is implemented as soon as possible after permanent shutdown of a facility is completed.
— **Deferred dismantling (sometimes called safe storage or safe enclosure)** is the process of allowing radioactive decay to occur before starting the dismantling process. This may allow greater ease in the final dismantling at a later date, reduced worker radiation doses when the dismantling work is eventually performed and more time for the collection of decommissioning funds, and may even allow the area to be released after some period of time without any major decontamination or dismantling activities.
— **Entombment** is the process of fixing the contamination and activated material within a part of the original structure and allowing this modified, sealed structure to remain in place. This essentially means that the site becomes a near surface waste disposal site.

The following strategies, while not IAEA endorsed, have been implemented in different Member States and are included here for the sake of completeness:

— **Phased decommissioning** may take place if there is a need for a break in the decommissioning process to allow the resolution of certain technical issues, or to make provisions for waste management or for other resources to perform the work.
— **Abandonment** describes a case where the former operator (or even the current licensee) merely leaves the facility in the condition it was in when operations were being performed. Very little or no cleanup is performed prior to termination of operations. While this may initially be financially advantageous, it is not an internationally accepted practice and often will result in greater damage to the environment, pose a greater risk to the public and eventually result in a larger cost for the decommissioning of the facility.

3. GENERAL DESCRIPTION OF FACILITIES BY TYPE

The main focus of this publication is the compilation of a listing, by type, of the various facilities that are currently in operation, have been permanently shut down, are currently undergoing decommissioning or have already undergone decommissioning.

The scope of this report is broad in nature and includes the following types of facility:

— Nuclear power plants;
— Research reactor facilities;
— Fuel cycle facilities, including:
  • Uranium milling facilities,
  • Uranium conversion and recovery facilities,
  • Enrichment facilities,
  • Fuel fabrication and heavy water production facilities,
  • Fuel reprocessing facilities;
— Industrial facilities, including waste management facilities;
— Research facilities.

The number of facilities of these types worldwide is substantial. For example, in the United States of America alone, there are over 21 000 licensees

that use or possess radioactive material [5], and on average 300 licences are terminated each year. Generally only a small number of licensee sites will require any significant decommissioning effort to achieve the required release standards. In some cases, however, rather extensive decommissioning activities may be required to release these areas.

The following example from Canada [6] gives some perspective on the current users of radionuclides according to the types of activity being performed:

— Commercial 2187
— Medical 878
— Governmental 443
— Educational 302

No country has a centralized system which collects information on the decommissioning of facilities formerly used for nuclear applications, research or programmes. Most Member States have programmes that track the status of the various licences, but again there are few details in the technical literature or in the proceedings of conferences on the work completed on decommissioning sites.

3.1. NUCLEAR POWER PLANTS

Nuclear power plants (NPPs) are used for the production of electricity with distribution to an electrical grid for use by consumers. Some NPPs also generate heat for district heating or desalinization purposes. Table 1 provides a summary of the current status of NPPs worldwide. The basis for this information is Annex I, which is a complete list of NPPs. There has already been a considerable amount of experience gained from the decommissioning of NPPs by various Member States. The number of NPPs worldwide exceeds 500 units, with more than 400 units still remaining in operation.

TABLE 1. STATUS OF COMMERCIAL NUCLEAR POWER PLANTS (AS OF AUGUST 2003)

Operating	446
Under construction	45
Shut down or undergoing decommissioning	107
Decommissioned	14

3.2. RESEARCH REACTORS (INCLUDING CRITICAL ASSEMBLIES)

Research reactor facilities are used for a variety of purposes, including training, radioisotope production, irradiation of samples and material, and industrial processing of material. Many universities and government institutes use these facilities for conducting basic research programmes. In other cases, irradiation of samples may be performed as a service to other organizations on a fee basis.

This category of facilities includes many different types of reactor: pool or tank, homogeneous, TRIGA type, pulse, fast neutron, test and prototype. The range of power ratings can vary significantly (from several watts up to hundreds of megawatts), as can the complexity of the plant and of the actions to be undertaken for decommissioning.

Critical assemblies, also included in the research reactor category, are used for various research programmes and physics studies. They are a rather minor problem when it comes to decommissioning. Typically, activation levels are fairly low and pose a very minor risk for doses to workers performing the decommissioning activities.

Worldwide there are over 500 research reactor and critical assembly units that will eventually require decommissioning. A tabular listing of the research reactor and critical assembly facilities worldwide is given in Annex II. Table 2 provides a summary of this information, which is mainly based on the IAEA's Research Reactor Database (RRDB) [7].

3.3. FUEL CYCLE FACILITIES

Fuel cycle facilities include the facilities needed to extract and enrich uranium, to fabricate different kinds of fuel and, after its use, to reprocess it.

TABLE 2. STATUS OF RESEARCH REACTORS AND CRITICAL ASSEMBLIES (AS OF AUGUST 2003)

Operating	287
Under construction	8
Shut down or being decommissioned	214
Decommissioned	173

3.3.1. Uranium milling facilities

Uranium milling facilities are used to process uranium bearing ores in order to extract uranium. This section considers milling and processing facilities for this material. It does not include the closure of mine sites or the remediation of the tailings produced by milling and other processing activities.

With the generally depressed uranium markets, the amount of activity in these areas has been decreasing in some geographical areas. Exceptions to this include uranium mining activities in Australia, Canada, Kazakhstan and South Africa. Many of the countries in eastern Europe have already shut down or will soon be shutting down their mining and milling operations. Many of the uranium milling facilities will be decommissioned and the sites remediated. A recent European Commission (EC) assessment of the magnitude of the problem these sites will pose in the future in EU countries documented over 5500 individual or grouped uranium site liabilities, mostly concerned with the remediation of land [8].

Often mining facilities are collocated with milling facilities, or at least there must be a mill to process the ore in relatively close proximity to the mine, in order to eliminate the need to transport the ore long distances. In some cases, ore from several different mines is processed at one common uranium milling facility. The milling process produces a uranium oxide concentrate often referred to as yellowcake. The remainder of the ore, which contains most of the residual activity, and all of the rock material are left behind as a waste product of the milling process. These materials are often referred to as tailings. In addition to their radioactivity they also contain any of a variety of toxic substances, mainly heavy metals such as mercury, cadmium and lead. These materials require isolation from the environment.

3.3.2. Uranium conversion and recovery facilities

A uranium conversion plant takes the yellowcake that is produced at the mill and converts it into pure uranium hexafluoride (UF_6) gas that is suitable for use in enrichment operations. During this conversion, impurities are removed and the uranium is combined with fluorine to create the UF_6 gas, which is then pressurized and cooled to a liquid. In its liquid state it is drained into 14 t cylinders where it solidifies after cooling for approximately five days. The cylinder of UF_6, in the solid form, is then shipped to an enrichment plant. UF_6 is the only uranium compound that exists as a gas at a suitable temperature. Strong acids and alkalis are used in the conversion process, which involves converting the yellowcake (uranium oxide) powder to very soluble forms, leading to the possibility of uranium inhalation by workers. In addition,

the conversion process produces extremely corrosive chemicals that could cause fire and explosion hazards.

The uranium recovery facilities collect scrap uranium material and recycle it into a usable form. This scrap material may come from manufacturing facilities or other production plants. The recovered material is sent to an enrichment plant or manufacturing facility.

3.3.3. Enrichment facilities

The UF_6 from the conversion facility is transferred to a uranium enrichment plant where the uranium content of the gaseous form of UF_6 is progressively increased to a point where the desired level of enrichment is finally achieved. At that point, the fuel fabrication process can be started. Some reactors, namely the CANDU and the Magnox reactors, use natural uranium as their fuel and avoid the entire process described here. Most nuclear power reactors in operation and even many of those already shut down or decommissioned have used slightly enriched uranium fuels as their fuel source. For these reactors, the ^{235}U content of the uranium is of the order of 3–4%, versus the average of 0.7% found in nature.

The most widely used enrichment process is the gaseous diffusion process. Gaseous diffusion plants are typically very large in size and cover a large land area. Decommissioning of these types of facility usually is very labour intensive owing to their immense size, and it results in large volumes of waste. The large gaseous diffusion plants operated in the USA cover areas ranging from 750 to 1500 acres (1 acre = 4.05×10^3 m^2) [9, 10]. Many of the earlier plants of this type are reaching the end of their design life and their operators are evaluating the options as to how much longer they can remain in operation. The use of new enrichment processes, either centrifuge or laser enrichment, is being evaluated for future plants.

The centrifuge enrichment process has been developed on a commercial scale by a Russian/European industrial group (Urenco-Centec). The Russian Federation has plants at Seversk, Zelenogorsk and Novouralsk that use this technology, and Urenco has plants in Germany, the Netherlands and the United Kingdom. Both France and the USA are evaluating the use of gas centrifuges for their next generation enrichment plants. China and Japan both operate small centrifuge enrichment plants. There are also a few smaller plants elsewhere.

3.3.4. Fuel fabrication and heavy water production facilities

Fuel fabrication facilities take the final products from the uranium enrichment process and other feedstock and fabricate this material into fuel assemblies that can be used in nuclear power or research reactors. The reactor fuel is normally in the form of pellets which are pressed from the processed uranium oxide, sintered at a high temperature and packaged into fuel rods, which are then configured into fuel assemblies. Some experience has been gained in the decommissioning of these types of facility, particularly in Germany.

Heavy water is used as a moderator in some types of nuclear reactor. Its production is essentially a matter of extracting it from normal water. This can be accomplished using one of several methods, the most common being the treatment of normal water through distillation, electrolysis or isotopic exchange.

3.3.5. Fuel reprocessing facilities

Fuel reprocessing facilities are used in the back end of the nuclear fuel cycle. Irradiated or spent fuel (after an adequate cooling time) is sent to a reprocessing facility where the various recoverable materials (uranium and plutonium) and the waste material from the fuel are separated into their respective streams and then collected for either disposal or recovery for reuse in new fuel.[1] After processing, the uranium and plutonium can be refabricated into new reactor fuel, with the remaining material disposed of as waste. The decommissioning of fuel reprocessing facilities is much more difficult than that of other fuel cycle facilities since high dose rates and contamination levels are encountered and human access is often more limited than in the front end material processing facilities (i.e. fuel fabrication). In this category, there are a few very large facilities (e.g. Sellafield in the United Kingdom and La Hague in France) and a number of smaller facilities or pilot plants that pose many fewer problems during decommissioning.

A tabular listing of the fuel cycle facilities worldwide is given in Annex III. Table 3 provides a summary of this information.

[1] In some countries, a centralized spent fuel storage facility may be used to consolidate all the spent fuel from reactors in that country.

TABLE 3. STATUS OF FUEL CYCLE FACILITIES (AS OF AUGUST 2003)

	Operating	Under construction	Shut down or being decommissioned	Decommissioned
Uranium milling	294	8	231	149
Uranium conversion/ recovery	29	1	14	2
Uranium enrichment	21	2	7	5
Fuel fabrication/heavy water production	66	5	27	23
Fuel reprocessing	13	3	18	13

3.4. INDUSTRIAL FACILITIES

The industrial facilities category includes a variety of commercial facilities using radioactive material for different purposes. Large differences in size, complexity, type of contamination and level of contamination exist within this facility grouping.

There are three applications where unsealed sources are used in large quantities: manufacturing of sealed sources, use of naturally occurring radioactive material (NORM) and use of other unsealed radioactive material in manufacturing.

Sealed sources are used for various applications in industries such as thickness gauging, well logging, industrial radiography, smoke detection, humidity measurement, level measurement and density measurement. The process of manufacturing sealed sources is carried out in hot cells, gloveboxes or some other form of containment. The facilities involved may range from a single room to large factory complexes. Some of these facilities will require extensive decommissioning and remediation after termination of the work practice at a licensed site.

Some mineral sands contain useful constituents, such as monazite and zirconium, which are used widely in certain industries. As an example, monazite is used in the paint industry to make paint glossy. Besides monazite and zirconium, mineral sands also contain a small amount of NORM, i.e. uranium and thorium. In the process of extracting the useful constituents, the concentration of uranium and thorium and/or of the progeny of their respective decay series will be enhanced. The uranium and thorium may form a scale and

accumulate in piping systems. Problems occur when the facility is shut down for decommissioning, when the dismantling of piping may release the uranium and thorium if not properly controlled. Some other industries that produce NORM waste are the following:

— Uranium ore processing;
— Aluminium ore processing;
— Gold and silver processing;
— Titanium ore processing;
— Oil and gas petroleum production;
— Gas mantle manufacturing;
— Steel production;
— Phosphate ore processing;
— Copper ore processing;
— Rare earth processing;
— Zircon production;
— Aircraft engine manufacturing;
— Optical device manufacturing;
— Coal energy production.

There are also a number of other kinds of manufacturing facility that use radioactive material in their processes. These include instrument manufacturers, watchmakers, sign producers, pharmaceutical manufactures, etc. These industries use radionuclides such as tritium in the manufacture of their products. Facilities associated with these industries frequently become contaminated and require decommissioning. Worldwide there are approximately 1000 facilities using unsealed radioactive materials for various industrial activities [11].

3.5. RESEARCH FACILITIES

The research facilities category includes particle accelerators, industrial research and development centres, universities, and national laboratories and institutes. Many of these facilities use a wide variety of radioactive materials. General research laboratories use small quantities of various radiotracers in their research work, which includes medical and pharmaceutical research, veterinary research, environmental pathways research, basic research and agricultural research. The typical laboratory or research facility is a changing environment regardless of the type of institution in which it is situated. As programmes and research projects are completed, new ones are initiated and

the working environment changes, potentially posing new challenges to the decommissioning team when the entire facility eventually requires demolition or refitting for a new research programme.

The range in size and complexity of some of these types of facility and of their subsequent decommissioning is considerable. In the USA, there is one organization that is performing a large scale decommissioning of an entire suite of facilities, including not only research facilities but also research reactors, a fuel fabrication facility, hot cell facilities and a particle accelerator facility. Other facilities falling into this general category may consist simply of the typical research laboratories with fume hoods, sinks, gloveboxes, hot cells and the basic research laboratory furnishings.

3.5.1. Particle accelerators

Various types of particle accelerator can be found in research, medical and industrial settings. Some accelerator facilities are also used for the purpose of radioisotope production. Most of these machines are routinely upgraded or refurbished (an example of this is the CERN facility) over their operational lifetime. In some instances, entire units can be disassembled, transported to a new location, and reconfigured and operated there for some period for other purposes. At the same time, some portions of the particle accelerators may be disposed of while other parts are reused or cannibalized for use in a new machine at the same site.

Typical types of particle accelerator include linear accelerators, cyclotrons, synchrotrons and Van de Graaff generators, and there are also a number of other, sometimes unique devices of the particle accelerator type. Although very little is to be found in the technical literature about the decommissioning of these types of facility, there has been considerable decommissioning accomplished. Typically the decommissioning is done in a very straightforward manner using very simple techniques. Usually many of the components are reused at other facilities, with a minimal amount of waste arising from these decommissioning projects. A large quantity of waste is generated only in cases where the facility is extremely old and was not well operated [12, 13]. Even in these cases the activity content of the resulting waste is of very low concentration and is small in quantity.

Recently medical diagnostic processes which use cyclotron generated radioisotopes (e.g. SPECT (single photon emission computed tomography) and PET (positron emission tomography)) have become more commonplace. Unless the particle accelerator facility generates particles with energies greater than a few megaelectronvolts, decommissioning is not a major concern.

Table 4 provides a summary of the status of particle accelerators that might require decommissioning. This information is based on the data presented in Annex IV. It is difficult to obtain information regarding all of the accelerators worldwide, since there are a very large number and there is no set of documents that provides a complete listing. For this study, only facilities that have indicated startup dates have been included. This appears to be about half of the total number of facilities [14].

3.5.2. Medical facilities

There are approximately 37 000 medical facilities that use radioactive material in various activities worldwide, with about 6700 of these using radioactive material in an unsealed form [11]. Most of the unsealed radioactive isotopes used in medicine are radionuclides with short half-lives that will rapidly decay to background levels. There are a few exceptions to this rule, mainly ^{14}C and ^{3}H, which have half-lives of 5280 and 12.3 years, respectively. Teletherapy and brachytherapy treatment regimes use sealed sources of radioactive material for various treatment and therapeutic programmes. In the USA alone, there are on average about 10–12 million diagnostic and therapeutic clinical procedures performed annually using radioactive material, resulting in a large number of facilities that are very slightly contaminated. Individually they produce only a small quantity of waste, but when the volumes of waste and the number of sites are considered collectively, the figures are rather impressive. In some cases, because of the leakage of sources, some facilities may become contaminated and require extensive decommissioning.

Areas used in hospitals for the preparation of medical radioisotopes and patient rooms may also require decommissioning whenever renovations are made to these areas. Some recent IAEA Technical Reports Series publications detail experience in the decommissioning of areas used for radium and caesium needle storage in older hospitals [15, 16].

TABLE 4. SUMMARY OF THE STATUS OF PARTICLE ACCELERATORS (AS OF AUGUST 2003)

Operating	406
Under construction	9
Shut down or being decommissioned	5
Decommissioned	1

3.5.3. Laboratories

There are a large number (about 320 000 [11]) of research laboratories worldwide that use radioactive material. These range from small, one room facilities at smaller universities to large, multiroom laboratories at larger institutions or major research facilities, such as those of pharmaceutical companies or private corporate research centres. These laboratories vary in complexity from those using only sealed sources to those using loose fissile material or larger quantities of other radioactive material.

Industrial laboratories tend to use radioisotopes with short half-lives for various testing programmes and activities to assist with product development or with the processing of material, for example in measuring the thickness of a material or the liquid level in a container.

Universities tend to use a wider and more diverse variety of radioisotopes in their work. A wide range of radioisotopes in various forms in a variety of applications can be found in academic research laboratories.

Hot cells are used for the examination of irradiated material or other samples that require some containment and isolation for their handling. Often these can be found in conjunction with a research reactor; in other instances they may be found in a 'stand-alone' configuration or possibly in conjunction with other research facilities.

Pharmaceutical laboratories tend to use short lived isotopes, but they may also use ^{14}C and ^{3}H. Some of these facilities are major complexes and may be contaminated with organic material that could make waste disposal more difficult.

3.6. COLD WAR LEGACY

With the end of the Cold War, many former nuclear weapon production facilities (actually in some cases another variant of the industrial user facility) and research facilities have been identified for permanent closure and decommissioning. There has been a large increase in effort to safely shut down and remediate and/or decommission sites impacted by the former nuclear weapon production and research processes. These facilities include almost all the types of facility that have already been mentioned in this report, such as production reactors, reprocessing plants, waste management facilities, research laboratories, manufacturing plants and enrichment plants. They range in size from small prototype experiments in one room laboratories to uranium enrichment plants covering hectares of land. The radionuclides used include almost all that have been made or discovered.

4. EVALUATION OF DECOMMISSIONING COSTS

4.1. GENERAL

It is recognized that there can be a large variation in decommissioning costs depending on a number of factors such as:

— Size and complexity of the facility;
— Selected decommissioning strategy (e.g. immediate dismantling, deferred dismantling or entombment);
— Industrial framework in which the activity is performed (e.g. maturity of the industry, availability of experienced contractors);
— General industry conditions (e.g. labour costs, availability of appropriate technologies on the domestic market versus imported technologies);
— General technical conditions (e.g. a well established regulatory framework, the availability of proper infrastructure such as waste treatment, storage and disposal facilities, and past experience accumulated in the decommissioning field);
— Forms and quantities of radioactive material used (sealed sources or powders);
— Regulatory oversight and controls.

Because of all the above variables, the cost for the decommissioning of a specific type of facility may vary by as much as a factor of 2–3. The variation of the facility characteristics within the same facility type may also cause the associated costs to vary broadly.

Notwithstanding the considerations detailed above, an attempt has been made to estimate an average cost for each family of facilities. Actually, an estimate of the existing liability worldwide in the nuclear sector can be evaluated with sufficient accuracy also by adopting, for the sake of simplicity, data that are largely approximated. It should be remembered that some facilities will cost more than the average and some less; however, overall the selected average seems reasonable.

The cost data assumed in this publication are in no way meant to provide an accurate reference for any specific facility, but are to be used as a rough guide to estimate, in macroeconomic terms, the liability pending on the nuclear sector. A site specific cost estimate needs to be performed for each facility since it has been shown that generic cost estimates are not reliable.

Overall, if one evaluates the status of the various facilities reviewed in this survey, the overwhelming majority of the facilities can be classified as still

being in the 'operational' category. However, there is a slow accumulation of experience in the shutdown and decommissioning of all types of facility.

In order to assess the potential future liability for decommissioning, values for the decommissioning cost for various types of nuclear facility have been estimated. These values (presented in Table 5), which are intended to represent typical examples of the decommissioning cost for each type of nuclear facility, regardless of location, were used in making the projections for future decommissioning costs that are presented in this publication.

The assumed estimated costs, operational period and time to perform the decommissioning are based on the best estimates of experts in the field of decommissioning planning and implementation.

TABLE 5. ESTIMATED DECOMMISSIONING COST FOR VARIOUS TYPES OF FACILITY

Facility type	Estimated decommissioning cost (US 10^6 in 2003)	Operational period (a)	Time to decommission (a)
Power reactors	350	40	10, after a 5 year transition period
Research reactors	1/MW	40	3
Critical assemblies	0.050	40	1
Fuel cycle facilities			
Uranium milling	0.800	25	1
Uranium conversion/ recovery	150	30	3
Uranium enrichment	600	30	10
Fuel fabrication	250	30	2
Fuel reprocessing	800	30	15
Industrial facilities	0.200	20	1
Research facilities			
Particle accelerators	0.100	40	1
Medical facilities	0.050	20	<1
Laboratories	0.050	20	1

4.2. POWER REACTORS

Worldwide there are over 400 reactors in various States that will require decommissioning. A large fraction of these facilities remain in operation but some experience has been accumulated from the decommissioning of the first generation of reactor facilities (as well as some prototype facilities) that have been taken out of service or prematurely shut down.

For the purposes of this study, it is assumed that nuclear power reactors have a typical operational period of 40 years. Many countries have already extended or are seriously evaluating extensions to the current licences beyond the original 40 year operational period by up to an additional 20 years. A typical transition period between the permanent shutdown of the facility and the start of the implementation of the decommissioning strategy is about 5 years. This allows the spent fuel to cool and be sent off-site for reprocessing, temporary storage or disposal. It is also assumed that immediate dismantling will be the preferred option, which means that the implementation of the decommissioning strategy will be completed within 15 years of permanent shutdown of the facility. For nuclear power plants that have shut down but for which there is no indication that they have started implementing any decommissioning strategy, it is assumed that decommissioning of these facilities will be completed by 2010.

The decommissioning costs of nuclear power reactors situated in different countries and of different reactor types can vary over a wide range from US $250 million to $500 million. The median value of decommissioning costs for achieving licence termination for a typical power reactor is assumed to be $350 million. This figure includes the handling, packaging, transporting and disposal of waste generated during the decommissioning implementation process. It does not include the processing of operational waste, the removal and disposition of spent nuclear fuel or the draining of operational systems. These activities normally occur during the transition phase and are considered part of operations. The cost for these activities should be covered with operating dollars. It also does not include the development of a waste disposal facility.

4.3. RESEARCH REACTORS (INCLUDING CRITICAL ASSEMBLIES)

A large number of research reactors remain operational, but more appear to be approaching shutdown and implementation of the decommissioning process. This is a result of the decline in overall operational funding, and the use of these facilities has decreased dramatically over the last few years. Although some new research reactors are still being planned and constructed,

in many developed countries their use is decreasing. Some programmes in developing countries do continue to move forward using existing or recently constructed facilities.

It is assumed that a typical operational period for research reactors and critical assemblies is 40 years, with a typical decommissioning time of 3 years for research reactors and 1 year for critical assemblies. In some cases a period of 45 or 50 years has been assumed to take account of some of the very old research reactors that still have not been permanently shut down.

The average decommissioning cost for research reactors is assumed to be $1 million/MW of power rating [17]. For critical assemblies the cost for decommissioning is assumed to be $50 000. Critical assembly decommissioning is very similar to small particle accelerator decommissioning, with the whole process being performed rather quickly after some basic planning and preparation.

4.4. FUEL CYCLE FACILITIES

Fuel cycle facilities include uranium milling facilities, uranium conversion plants, uranium recovery plants, enrichment facilities, fuel fabrication facilities, heavy water production plants and fuel reprocessing facilities. The decommissioning costs are estimated for each subgroup.

When operations are terminated at one of these sites, a major industrial operation is brought to a stop and this can have a significant impact on the local economy. Most of these facilities occupy a very large area and have very large components and complex equipment and facility arrangements.

It is assumed that the following periods are typical operating lives for fuel cycle facilities: uranium milling facilities — 25 years; uranium conversion and recovery plants, uranium enrichment facilities, fuel fabrication facilities, heavy water production plants and fuel reprocessing plants — 30 years.

The following decommissioning times are assumed to be typical for fuel cycle facilities: uranium milling facilities — 1 year; uranium conversion and recovery plants — 3 years; uranium enrichment facilities — 10 years; fuel fabrication and heavy water production facilities — 2 years; and fuel reprocessing plants — 15 years.

The assumed costs for decommissioning of these facilities are $800 000 for a uranium milling facility, $150 million for a uranium conversion and recovery plant, $600 million for a uranium enrichment facility, $250 million for a fuel fabrication or heavy water production facility, and $800 million for a fuel reprocessing facility. Again, all waste management costs are included for these facilities, but no cost for building demolition and site restoration is included.

There is one area in which there has been a fair amount of decommissioning activity in this facility type grouping and that is the area of uranium mills. There are many such sites worldwide and many have already been decommissioned or are shut down and awaiting decommissioning. One unique aspect of this type of facility is the fact that when uranium prices drop, some milling sites may temporarily shut down until prices become more favourable, at which time the facilities will reopen and start processing ore again. Therefore it is not unusual to see extended operational periods interspersed with periods of inactivity at such a facility.

4.5. INDUSTRIAL FACILITIES

For the purposes of this publication, industrial facilities include unsealed source users and waste management facilities. It is assumed that an industrial facility has an operating life of about 20 years. After this period, an upgrade or total replacement of this type of facility would be expected to be required.

On the basis of typical regulatory experience, it can be assumed that on average about 2% of all licensees (approximately 1000, as mentioned above) will terminate their licences in a given year and undertake decommissioning. In any given year about 20 industrial users will complete their work, decommission their facility and terminate their licences.

It has been assumed that it will take about a year to decommission the average industrial facility. The cost can vary from $50 000 to a few million dollars; however, there are certainly more facilities at the lower end of this range. It has been assumed that the cost to decommission such a facility will be $200 000.

4.6. RESEARCH FACILITIES

4.6.1. Particle accelerators

Particle accelerators are found worldwide and range in size from small units that occupy a single room to large units that cover many square kilometres. The operational period for such facilities is assumed to be 40 years. The decommissioning is done rather quickly and generally can be completed in a year. For an average facility, a decommissioning cost of about $100 000 has been assumed. The cost may be larger for large accelerators such as those located at CERN, at some large North American facilities or at facilities in other industrialized regions. It is assumed that many of the components from

these facilities will be reused at other, similar institutions rather than disposed of as waste.

4.6.2. Medical facilities

For this study, it is assumed that an average of about 2% of the licences (the total being approximately 6700) are terminated each year, which equates to about 134 facilities that would undergo decommissioning annually. The decommissioning process normally takes less than a year and facilities of these types normally operate for 20 years before there is a major renovation of the facility. It is estimated that the decommissioning of one of these facilities will cost about $50 000.

4.6.3. Laboratories

Most of the research laboratories are in hospitals, universities and colleges, as well as in some private research and development centres. It is assumed that the typical operational period for a laboratory is 20 years, after which time the facility is normally renovated or its use is changed. It was assumed that it would take an average of one year to decommission such a facility.

If one assumes, again on the basis of typical regulatory experience, that on average about 2% of all licensees (the total being approximately 320 000) will terminate their licences in a given year and undertake decommissioning, it would mean that about 6500 facilities would require decommissioning annually. An average cost for decommissioning a laboratory of about $50 000 has been assumed. For large pharmaceutical research laboratories, the average cost may be in the range of a few hundred thousand dollars to a million dollars.

4.7. COLD WAR LEGACY

In the case of the USA, the US Department of Energy has over 7000 surplus radioactively contaminated facilities that may require some form of decommissioning. It has been estimated that the total cost could be over $200 billion [18].

For the purposes of this report, an assumption was made that a problem of the same magnitude from these activities exists in China and the Russian Federation, and to a lesser extent in other countries such as France, India, Pakistan and the United Kingdom. For China and the Russian Federation, a total cost for decommissioning of $200 billion was assumed for each country.

For France, India, Pakistan and the United Kingdom, it was assumed that the total cost for each country would be about $10 billion.

5. CONCLUSIONS

5.1. GENERAL

The results of this survey indicate that there is still a large liability in the form of the contaminated facilities located in various countries. Although there has been some decommissioning experience gained to date, there continue to be a large number of operational facilities and shut down facilities that will eventually require decommissioning. There is no indication that the situation will change very radically in the future.

5.2. TOTAL DECOMMISSIONING COSTS BY FACILITY TYPE

The total decommissioning costs by facility type are presented in Table 6. The table indicates the costs for the time period 2001–2050. Because of the uncertainties in the assumptions, this period has been divided into 5 year increments. Figure 1 shows the estimated liability for each 5 year period.

The total cost for the decommissioning of nuclear power plants during the reference time period is about $185 billion; for the decommissioning of research reactors and critical assemblies about $6320 million; for the decommissioning of fuel cycle facilities about $71 billion; for the decommissioning of industrial facilities about $40 million; for the decommissioning of research facilities about $3360 million; and for the decommissioning of facilities from the Cold War legacy about $640 billion. This leads to a total decommissioning liability for the period 2001–2050 of about $1000 billion.

TABLE 6. COSTS BY FACILITY TYPE AND TIME PERIOD (US 10^6)

	2001–2005	2006–2010	2011–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040	2041–2045	2046–2050	Total
Nuclear power plants	3 000	12 500	13 500	16 300	17 300	24 700	35 000	35 400	18 000	8 900	184 600
Research reactors	1 620	2 800	710	340	300	80	50	60	30	330	6 320
Critical assemblies	0.9	2	0.4	0.2	0.4	0.2	0.1	0.2	0	0	4.4
Fuel cycle facilities											
Uranium milling	37	40	35	2	6	1	2	0	0	0	123
Uranium conversion/ recovery	2 000	2 100	900	600	600	300	0	0	0	0	6 500
Uranium enrichment	4 200	4 800	2 400	1 500	1 200	1 200	1 200	300	0	0	16 800
Fuel fabrication/ heavy water production	4 800	7 900	2 800	2 500	2 000	1 300	300	0	0	0	21 600
Fuel reprocessing	7 200	8 300	5 100	1 300	800	1 100	800	500	300	500	25 900
Industrial facilities	4	4	4	4	4	4	4	4	4	4	40

	2001–2005	2006–2010	2011–2015	2016–2020	2021–2025	2026–2030	2031–2035	2036–2040	2041–2045	2046–2050	Total
Research facilities											
Particle accelerators	1	4	2	2	4	7	11	5	2	0	38
Medical facilities	7	7	7	7	7	7	7	7	7	7	70
Laboratories	325	325	325	325	325	325	325	325	325	325	3 250
Cold War legacy											640 000
Total											**905 250**

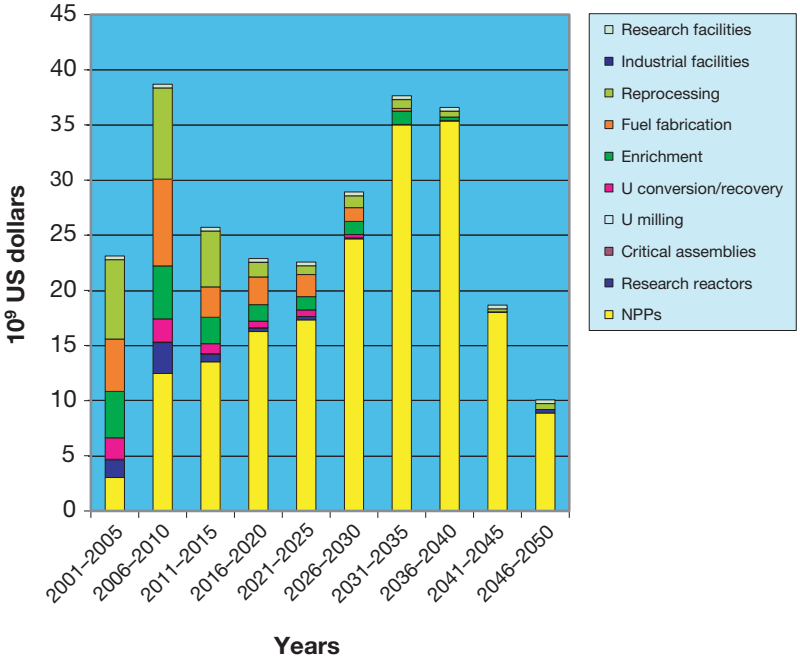

FIG. 1. Decommissioning liability by 5 year periods.

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CONTRIBUTORS TO DRAFTING AND REVIEW

Boing, L.	Argonne National Laboratory, United States of America
Brusa, L.	SOGIN SpA, Italy
Chung, U.	Korea Atomic Energy Research Institute, Republic of Korea
Daniska, V.	DECOM Slovakia, Ltd, Slovakia
Laraia, M.	International Atomic Energy Agency
Mohd Sobari, M.	Atomic Energy Licensing Board, Malaysia
Rehs, B.	Bundesamt für Strahlenschutz, Germany
Reisenweaver, D.	International Atomic Energy Agency

Annex I

NUCLEAR POWER PLANTS

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Argentina	Atucha-1	Lima, Buenos Aires	PHW	Nucleoelectrica Argentina SA	335	1974/3	2014	Operating	
Argentina	Atucha-2	Lima, Buenos Aires	PHW	Nucleoelectrica Argentina SA	600			Under Construction	
Argentina	Embalse	Rio Tercero, Cordoba	PHW (CANDU)	Nucleoelectrica Argentina SA	692	1983/4	2023	Operating	
Armenia	Metsamor 1	Metsamor	PWR (WWER)	Armatomenergo	376	1976/12	1989/2	Permanemtly Shut Down	
Armenia	Metsamor 2	Metsamor	PWR (WWER)	Armatomenergo	376	1980/1	2020	Operating	
Belgium	Doel 1	Doel-Beveran	PWR	Electrabel	392	1974/8	2015	Operating	
Belgium	Doel 2	Doel-Beveran	PWR	Electrabel	392	1975/8	2015	Operating	
Belgium	Doel 3	Doel-Beveran	PWR	Electrabel	1006	1982/6	2022	Operating	
Belgium	Doel 4	Doel-Beveran	PWR	Electrabel	985	1985/4	2025	Operating	
Belgium	Tihange 1	Tihange-Huy	PWR	Electrabel	962	1975/3	2015	Operating	
Belgium	Tihange 2	Tihange-Huy	PWR	Electrabel	1055	1982/10	2022	Operating	
Belgium	Tihange 3	Tihange-Huy	PWR	Electrabel	1015	1985/6	2025	Operating	
Brazil	Angra 1	Itaorna, Rio de Janeiro	PWR	Electronuclear-Electrobras Termonuclear SA	626	1982/4	2022	Operating	
Brazil	Angra 2	Itaorna, Rio de Janeiro	PWR	Electronuclear-Electrobras Termonuclear SA	1275	2000/7	2040	Operating	
Brazil	Angra 3	Itaorna, Rio de Janeiro	PWR	Electronuclear-Electrobras Termonuclear SA	1275	2006	2046	Under Construction	
Bulgaria	Belene 1	Belene, Danube	PWR (WWER)	National Electric Co. (NEC)				Under Construction	
Bulgaria	Belene 2	Belene, Danube	PWR (WWER)	National Electric Co. (NEC)				Under Construction	
Bulgaria	Belene 3	Belene, Danube	PWR (WWER)	National Electric Co. (NEC)				Under Construction	
Bulgaria	Belene 4	Belene, Danube	PWR (WWER)	National Electric Co. (NEC)				Under Construction	
Bulgaria	Kozloduy 1	Kozloduy	PWR (WWER)	National Electric Co. (NEC)	408	1974/7	2002	Permanemtly Shut Down	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Bulgaria	Kozloduy 2	Kozloduy	PWR (WWER)	National Electric Co. (NEC)	408	1975/9	2002	Permanemtly Shut Down	
Bulgaria	Kozloduy 3	Kozloduy	PWR (WWER)	National Electric Co. (NEC)	408	1980/12	2020	Operating	
Bulgaria	Kozloduy 4	Kozloduy	PWR (WWER)	National Electric Co. (NEC)	408	1982/5	2022	Operating	
Bulgaria	Kozloduy 5	Kozloduy	PWR (WWER)	National Electric Co. (NEC)	953	1987/11	2027	Operating	
Bulgaria	Kozloduy 6	Kozloduy	PWR (WWER)	National Electric Co. (NEC)	953	1991/8	2031	Operating	
Canada	Bruce 1	Kincardine, Ont.	PHW (CANDU)	Bruce Power	769	1977/1	1997/10	Permanemtly Shut Down	In Lay-up
Canada	Bruce 2	Kincardine, Ont.	PHW (CANDU)	Bruce Power	769	1976/9	1995/10	Permanemtly Shut Down	In Lay-up
Canada	Bruce 3	Kincardine, Ont.	PHW (CANDU)	Bruce Power	790	1977/12	2017	Operating	
Canada	Bruce 4	Kincardine, Ont.	PHW (CANDU)	Bruce Power	790	1978/12	2018	Operating	
Canada	Bruce 5	Kincardine, Ont.	PHW (CANDU)	Bruce Power	790	1984/12	2024	Operating	
Canada	Bruce 6	Kincardine, Ont.	PHW (CANDU)	Bruce Power	790	1984/6	2024	Operating	
Canada	Bruce 7	Kincardine, Ont.	PHW (CANDU)	Bruce Power	790	1986/2	2026	Operating	
Canada	Bruce 8	Kincardine, Ont.	PHW (CANDU)	Bruce Power	790	1987/3	2027	Operating	
Canada	Darlington 1	Clarington, Ont.	PHW (CANDU)	Ontario Power Generation	881	1990/12	2030	Operating	
Canada	Darlington 2	Clarington, Ont.	PHW (CANDU)	Ontario Power Generation	881	1990/1	2030	Operating	
Canada	Darlington 3	Clarington, Ont.	PHW (CANDU)	Ontario Power Generation	881	1992/12	2032	Operating	
Canada	Darlington 4	Clarington, Ont.	PHW (CANDU)	Ontario Power Generation	881	1993/4	2033	Operating	
Canada	Douglas Point	Tiverton, Ont	PHW (CANDU)	AECL	206	1967/1	1984/5	Permanemtly Shut Down	In Safe Enclosure
Canada	Gentilly 1	Becancour, Quebec	PHW (CANDU)	AECL	250	1972/4	1977/6	Permanemtly Shut Down	In Safe Enclosure
Canada	Gentilly 2	Becancour, Quebec	PHW (CANDU)	Hydro-Quebec	635	1982/12	2022	Operating	
Canada	Pickering 1	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	515	1971/4	1997/12	Permanemtly Shut Down	
Canada	Pickering 2	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	515	1971/9	1997/10	Permanemtly Shut Down	In Lay-up

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Canada	Pickering 3	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	515	1972/4	1997/12	Permanemtly Shut Down	In Lay-up
Canada	Pickering 4	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	515	1973/5	2013	Operating	
Canada	Pickering 5	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	516	1982/12	2022	Operating	
Canada	Pickering 6	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	516	1983/11	2023	Operating	
Canada	Pickering 7	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	516	1984/11	2024	Operating	
Canada	Pickering 8	Pickering, Ont	PHW (CANDU)	Ontario Power Generation	516	1986/1	2026	Operating	
Canada	Point Lepreau	Point Lepreau, NB	PHW (CANDU)	New Brunswick Power	635	1982/9	2022	Operating	
Canada	Rolphton NPD	Rolphton, Ont	PHW (CANDU)	Ontario Power Generation/AECL	28	1962/4	1987/8	Permanemtly Shut Down	In Safe Enclosure
China	Daya Bay 1 (Guangdong 1)	Dakeng, Daya Bay	PWR	Guangdong Nuclear Power JVC	944	1993/8	2043	Operating	
China	Daya Bay 2 (Guangdong 2)	Dakeng, Daya Bay	PWR	Guangdong Nuclear Power JVC	944	1994/2	2044	Operating	
China	Ling Ao 1	Ling-ao/Yan Jiang	PWR	Ling Ao Nuclear Power	938	2002/2	2042	Operating	
China	Ling Ao 2	Ling-ao/Yan Jiang	PWR	Ling Ao Nuclear Power	938	2002/11	2042	Operating	
China	Qinshan 1	Qinshan, Zhejiang	PWR	Qinshan Nuclear Power	288	1991/12	2041	Operating	
China	Qinshan 2	Qinshan, Zhejiang	PWR	Qinshan Nuclear Power	610	2002/2	2042	Operating	
China	Qinshan 3	Qinshan, Zhejiang	PWR	Qinshan Nuclear Power	610	2002/9	2042	Operating	
China	Qinshan 4	Qinshan, Zhejiang	PHW (CANDU)	Qinshan Nuclear Power	650	2002/11	2042	Operating	
China	Qinshan 5	Qinshan, Zhejiang	PHW (CANDU)	Qinshan Nuclear Power	665	2003/6	2043	Under Construction	
China	Tianwan 1	Lianyungang, Jiangsu	PWR (WWER)	Jiangsu Nuclear Power	1000	2004/4	2044	Under Construction	
China	Tianwan 2	Lianyungang, Jiangsu	PWR (WWER)	Jiangsu Nuclear Power	1000	2005/4	2045	Under Construction	
China, Taiwan	Chin-shan 1	Shih Men Hsiang	BWR	Taiwan Power Co. (TPC)	604	1977/10	2017	Operating	
China, Taiwan	Chin-shan 2	Shih Men Hsiang	BWR	Taiwan Power Co. (TPC)	604	1978/11	2018	Operating	
China, Taiwan	Kuosheng 1	Wanit Hsiang	BWR	Taiwan Power Co. (TPC)	948	1981/2	2021	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
China, Taiwan	Kuosheng 2	Wanit Hslang	BWR	Taiwan Power Co. (TPC)	948	1982/3	2022	Operating	
China, Taiwan	Lungmen 1	Kungliao Hsiang, Taipei	BWR	Taiwan Power Co. (TPC)	1300	2006	2046	Under Construction	
China, Taiwan	Lungmen 2	Kungliao Hsiang, Taipei	BWR	Taiwan Power Co. (TPC)	1300	2007	2047	Under Construction	
China, Taiwan	Maanshan 1	Kenting	PWR	Taiwan Power Co. (TPC)	890	1984/3	2024	Operating	
China, Taiwan	Maanshan 2	Kenting	PWR	Taiwan Power Co. (TPC)	890	1985/2	2025	Operating	
Czech Rep	Dukovany 1	Dukovany	PWR (WWER)	Czech Power Co. (CEZ)	412	1985/2	2025	Operating	
Czech Rep	Dukovany 2	Dukovany	PWR (WWER)	Czech Power Co. (CEZ)	412	1986/1	2026	Operating	
Czech Rep	Dukovany 3	Dukovany	PWR (WWER)	Czech Power Co. (CEZ)	412	1986/11	2026	Operating	
Czech Rep	Dukovany 4	Dukavany	PWR (WWER)	Czech Power Co. (CEZ)	412	1987/6	2027	Operating	
Czech Rep	Temelin 1	Temelin	PWR (WWER)	Czech Power Co. (CEZ)	950	2000/12	2040	Operating	
Czech Rep	Temelin 2	Temelin	PWR (WWER)	Czech Power Co. (CEZ)	950	2002/12	2042	Operating	
Finland	Loviisa 1	Loviisa, Uusimaa	PWR (WWER)	Fortum Power & Heat Oy	488	1977/2	2017	Operating	
Finland	Loviisa 2	Loviisa, Uusimaa	PWR (WWER)	Fortum Power & Heat Oy	488	1980/11	2020	Operating	
Finland	Olkiluoto 1	Eurajoki, Turku-Pori	BWR	Teollisuuden Voima Oy (TVO)	840	1978/9	2018	Operating	
Finland	Olkiluoto 2	Eurajoki, Turku-Pori	BWR	Teollisuuden Voima Oy (TVO)	840	1980/2	2020	Operating	
France	Belleville 1	Glen	PWR	EdF	1310	1987/7	2027	Operating	
France	Belleville 2	Glen	PWR	EdF	1310	1988/10	2028	Operating	
France	Bugey 1	Lyon	Gas-graphite	EdF	540	1972/4	1994/6	Permanemtly Shut Down	
France	Bugey 2	Lyon	PWR	EdF	910	1978/5	2018	Operating	
France	Bugey 3	Lyon	PWR	EdF	910	1978/9	2018	Operating	
France	Bugey 4	Lyon	PWR	EdF	880	1979/3	2019	Operating	
France	Bugey 5	Lyon	PWR	EdF	880	1979/7	2019	Operating	
France	Cattenom 1	Thionville	PWR	EdF	1300	1986/11	2026	Operating	
France	Cattenom 2	Thionville	PWR	EdF	1300	1987/9	2027	Operating	
France	Cattenom 3	Thionville	PWR	EdF	1300	1990/7	2030	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
France	Cattenom 4	Thionville	PWR	EdF	1300	1991/5	2031	Operating	
France	Chinon A1	Avoine	Gas-graphite	EdF	70	1963/6	1973/4	Permanemtly Shut Down	Museum after partial dismantling.
France	Chinon A2	Avoine	Gas-graphite	EdF	210	1965/2	1985/6	Permanemtly Shut Down	Partially dismantled.
France	Chinon A3	Avoine	Gas-graphite	EdF	480	1966/8	1990/6	Permanemtly Shut Down	Partially dismantled-used for waste storage.
France	Chinon B1	Avoine	PWR	EdF	905	1982/11	2022	Operating	
France	Chinon B2	Avoine	PWR	EdF	905	1983/11	2023	Operating	
France	Chinon B3	Avoine	PWR	EdF	905	1986/10	2026	Operating	
France	Chinon B4	Avoine	PWR	EdF	905	1987/11	2027	Operating	
France	Chooz B1	Charleville-Mezienes	PWR	EdF	1500	1996/8	2036	Operating	
France	Chooz B2	Charleville-Mezienes	PWR	EdF	1500	1997/4	2037	Operating	
France	Chooza, SENA	Chooz	PWR	SENA	310	1967/4	1991/10	Permanemtly Shut Down	Partially dismantled-used for waste storage.
France	Civaux 1	Civaux	PWR	EdF	1495	1997/12	2037	Operating	
France	Civaux 2	Civaux	PWR	EdF	1495	1999/12	2039	Operating	
France	Cruas Meysse 1	Montelimar	PWR	EdF	915	1983/4	2023	Operating	
France	Cruas Meysse 2	Montelimar	PWR	EdF	915	1984/9	2024	Operating	
France	Cruas Meysse 3	Montelimar	PWR	EdF	915	1984/5	2024	Operating	
France	Cruas Meysse 4	Montelimar	PWR	EdF	915	1984/10	2024	Operating	
France	Dampierre 1	Glen	PWR	EdF	890	1980/3	2020	Operating	
France	Dampierre 2	Glen	PWR	EdF	890	1980/12	2020	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
France	Dampierre 3	Glen	PWR	EdF	890	1981/1	2021	Operating	
France	Dampierre 4	Glen	PWR	EdF	890	1981/8	2021	Operating	
France	Fessenheim 1	Mulhouse	PWR	EdF	880	1977/4	2017	Operating	
France	Fessenheim 2	Mulhouse	PWR	EdF	880	1977/10	2017	Operating	
France	Flamanville 1	Cherbourg	PWR	EdF	1330	1985/12	2025	Operating	
France	Flamanville 2	Cherbourg	PWR	EdF	1330	1986/7	2026	Operating	
France	Golfech 1	Valence d'Agen	PWR	EdF	1310	1990/6	2030	Operating	
France	Golfech 2	Valance d'Agen	PWR	EdF	1310	1993/6	2033	Operating	
France	Gravelines 1	Dunkerque	PWR	EdF	910	1980/3	2020	Operating	
France	Gravelines 2	Dunkerque	PWR	EdF	910	1980/8	2020	Operating	
France	Gravelines 3	Dunkerque	PWR	EdF	910	1980/12	2020	Operating	
France	Gravelines 4	Dunkerque	PWR	EdF	910	1981/6	2021	Operating	
France	Gravelines 5	Dunkerque	PWR	EdF	910	1984/8	2024	Operating	
France	Gravelines 6	Dunkerque	PWR	EdF	910	1985/8	2025	Operating	
France	Le Blayais 1	Bordeaux	PWR	EdF	910	1981/6	2021	Operating	
France	Le Blayais 2	Bordeaux	PWR	EdF	910	1982/7	2022	Operating	
France	Le Blayais 3	Bordeaux	PWR	EdF	910	1983/8	2023	Operating	
France	Le Blayais 4	Bordeaux	PWR	EdF	910	1983/5	2023	Operating	
France	Marcoule G1	Bagnois-sur-Ceze	Gas-graphite	CEA	2	1956/1	1968/10	Permanemtly Shut Down	
France	Marcoule G2	Bagnols-Sur-Ceze	Gas-graphite	CEA-EdF	38	1959/4	1980/2	Permanemtly Shut Down	
France	Marcoule G3	Bagnois-sur-Ceze	Gas-graphite	CEA-EdF	38	1960/4	1984/7	Permanemtly Shut Down	
France	Monts d'Arree (Brennills)	Brennilis	GCHWR	CEA	70	1967/7	1985/7	Permanemtly Shut Down	
France	Nogent 1	Troyes	PWR	EdF	1310	1987/10	2027	Operating	
France	Nogent 2	Troyes	PWR	EdF	1310	1988/12	2028	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
France	Paluel 2	Fecamp	PWR	EdF	1330	1984/9	2024	Operating	
France	Paluel 3	Fecamp	PWR	EdF	1330	1985/9	2025	Operating	
France	Paluel 4	Fecamp	PWR	EdF	1330	1986/4	2026	Operating	
France	Paluetl 1	Fecamp	PWR	EdF	1330	1984/6	2024	Operating	
France	Penly 1	Dieppe	PWR	EdF	1330	1990/5	2030	Operating	
France	Penly 2	Dieppe	PWR	EdF	1330	1992/2	2032	Operating	
France	Phenix	Avignon	FBR	CEA	233	1973/12	2013	Operating	
France	Saint Alban 1	Vienne	PWR	EdF	1335	1985/8	2025	Operating	
France	Saint Alban 2	Vienne	PWR	EdF	1335	1986/7	2026	Operating	
France	St Laurent A1	Orleans	Gas-graphite	EdF	480	1969/3	1990/4	Permanemtly Shut Down	
France	St Laurent A2	Orleans	Gas-graphite	EdF	515	1971/8	1992/5	Permanemtly Shut Down	
France	St Laurent B2	Blois	PWR	EdF	915	1981/6	2021	Operating	
France	St. Laurent B1	Blois	PWR	EdF	915	1981/1	2021	Operating	
France	Super-Phenix 1	Morestel, Isere	FBR	Nersa	1242	1985/7	1997	Permanemtly Shut Down	
France	Tricastin 1	St Paul 3 Chateaux	PWR	EdF	915	1980/5	2020	Operating	
France	Tricastin 2	St Paul 3 Chateaux	PWR	EdF	915	1980/8	2020	Operating	
France	Tricastin 3	St Paul 3 Chateaux	PWR	EdF	915	1981/2	2021	Operating	
France	Tricastin 4	St Paul 3 Chateaux	PWR	EdF	915	1981/6	2021	Operating	
Germany	AVR	Juelich	HTGR	AVR	13	1967/12	1988/12	Undergoing Decommissioning	
Germany	Biblis A	Biblis	PWR	RWE Energie	1167	1974/8	2006	Operating	
Germany	Biblis B	Biblis	PWR	RWE Energie	1240	1976/4	2008	Operating	
Germany	Brokdorf	Brokdorf	PWR	E. ON Kernkraft	1370	1986/10	2018	Operating	
Germany	Brunsbuttel	Brunsbuttel	BWR	Vattenfall Europe	771	1976/7	2008	Operating	
Germany	Emsland	Lingen	PWR	Kernkraftwerke Lippe-Ems GmbH	1329	1988/4	2020	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Germany	Grafenrheinfeld	Grafenrheinfeld	PWR	E. ON Kernkraft	1275	1981/12	2013	Operating	
Germany	Greifswald 1	Lubmin	PWR (WWER)	BMGB	408	1974/12	1990/12	Undergoing Decommissioning	
Germany	Greifswald 2	Lubmin	PWR (WWER)	BMGB	408	1974/12	1990/2	Undergoing Decommissioning	
Germany	Greifswald 3	Lubmin	PWR (WWER)	BMGB	408	1977/10	1990/2	Undergoing Decommissioning	
Germany	Greifswald 4	Lubmin	PWR (WWER)	BMGB	408	1979/9	1990/6	Undergoing Decommissioning	
Germany	Greifswald 5	Lubmin	PWR (WWER)	BMGB	408	1989/4	1989/11	Undergoing Decommissioning	
Germany	Grohnde	Emmerthal	PWR	E. ON Kernkraft	1360	1984/9	2016	Operating	
Germany	Grossweizheim HDR	Kahl Maim	BWR	KfK	23	1969/10	1971/4	Undergoing Decommissioning	
Germany	Gundremmingen A	Gundremmingen	BWR	KRB	237	1966/12	1977/1	Undergoing Decommissioning	
Germany	Gundremmingen B	Gundremmingen	BWR	Kernkraftwerk Gundremmingen GmbH	1284	1984/3	2016	Operating	
Germany	Gundremmingen C	Gundremminger	BWR	Kernkraftwerk Gundremmingen GmbH	1288	1984/11	2016	Operating	
Germany	Isar KKI 1	Essenbach	BWR	E. ON Kernkraft	878	1977/12	2009	Operating	
Germany	Isar KKI 2	Essenbach	PWR	E. ON Kernkraft	1400	1988/1	2020	Operating	
Germany	Julich		HTGR		15	1966/8	1988/12	Undergoing Decommissioning	
Germany	Kahl VAK	Karlstein	BWR	VAK	15	1961/6	1985/11	Undergoing Decommissioning	
Germany	Kompaky KNK		FBR		17	1978/4	1991/8	Undergoing Decommissioning	
Germany	Krummel	Geesthacht	BWR	Vattenfall Europe	1260	1983/9	2015	Operating	
Germany	Lingen KWL	Lingen, Darme	BWR	KWL	250	1968/7	1977/1	Undergoing Decommissioning	
Germany	Mulheim-Kaerlich	Koblenz, Rhein	PWR	RWE Energie	1219	1986/3	2001/6	Permanemtly Shut Down	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Germany	Neckar 1	Neckarwestheim	PWR	Gemeinschtskernkraftwerk Neckar GmbH	785	1976/6	2008	Operating	
Germany	Neckar 2	Neckarwestheim	PWR	Gemeinschtskernkraftwerk Neckar GmbH	1269	1989/1	2021	Operating	
Germany	Niederaichbach	Landshut, Bavaria	GCHWR	KfK	100	1973/1	1974/7	Decommissioned	
Germany	Obrigheim	Obrigheim	PWR	Kernkraftwerk Obrigheim GmbH	340	1968/10	2008	Operating	
Germany	Philippsburg 1	Phillippsburg, Rheinschanzinsel	BWR	EnBW Kraftwerke AG	890	1979/5	2011	Operating	
Germany	Philippsburg 2	Phillippsburg, Rheinschanzinsel	PWR	EnBW Kraftwerke AG	1392	1984/12	2016	Operating	
Germany	Rheinsberg	Rheinsberg	PWR (WWER)	BMGB	62	1966/5	1990/6	Undergoing Decommissioning	
Germany	Stade	Stade	PWR	E. ON Kernkraft	640	1972/1	2003/11	Permanemtly Shut Down	
Germany	THTR 300, Uentrop	Hamm-Uentrop	HTGR	HKG	296	1985/11	1988/9	Undergoing Decommissioning	
Germany	Unterwesser	Stadland	PWR	E. ON Kernkraft	1345	1978/9	2010	Operating	
Germany	Wuergassen	Beverungen	BWR	Preag	640	1971/12	1994/8	Undergoing Decommissioning	
Hungary	Paks 1	Paks	PWR (WWER)	Hungarian Power Companies Ltd.	437	1982/12	2022	Operating	
Hungary	Paks 2	Paks	PWR (WWER)	Hungarian Power Companies Ltd.	441	1984/9	2024	Operating	
Hungary	Paks 3	Paks	PWR (WWER)	Hungarian Power Companies Ltd.	433	1986/9	2026	Operating	
Hungary	Paks 4	Paks	PWR (WWER)	Hungarian Power Companies Ltd.	444	1987/8	2027	Operating	
Hungary	Paks 5	Paks	PWR (WWER)	Hungarian Power Companies Ltd.	1000			Under Construction	
Hungary	Paks 6	Paks	PWR (WWER)	Hungarian Power Companies Ltd.	1000			Under Construction	
India	Kaiga 1	Kaiga, Uttara Kannada	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	2000/10	2040	Operating	
India	Kaiga 2	Kaiga, Uttara Kannada	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	1999/12	2039	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
India	Kakrapar 1	Kakaprar, Gujarat	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	1992/11	2032	Operating	
India	Kakrapar 2	Kakrapar, Gujarat	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	1995/3	2035	Operating	
India	Kalakkam 1	Kalpakkam, Tammil Nadu	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	155	1983/7	2023	Operating	
India	Kalakkam 2	Kalpakkam, Tammil Nadu	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	1985/9	2025	Operating	
India	Koodankulam 1	Tamil Nadu	PWR	Dept. of Atomic Power, Nuclear Power Co. of India	917			Proposed	
India	Koodankulam 2	Tamil Nadu	PWR	Dept. of Atomic Power, Nuclear Power Co. of India	917			Proposed	
India	Narora 1	Narora, Uttar Pradesh	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	1989/7	2029	Operating	
India	Narora 2	Narora, Uttar Pradesh	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	1992/1	2032	Operating	
India	Rajasthan 1	Kota, Rajasthan	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	90	1972/11	2012	Operating	
India	Rajasthan 2	Kota, Rajasthan	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	187	1980/11	2020	Operating	
India	Rajasthan 3	Kota, Rajasthan	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	2000/3	2040	Operating	
India	Rajasthan 4	Kota, Rajasthan	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202	2000/11	2040	Operating	
India	Rajasthan 5	Kota, Rajasthan	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202			Under Construction	
India	Rajasthan 6	Kota, Rajasthan	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	202			Under Construction	
India	Tarapur 1	Tarapur, Maharashtra	BWR	Dept. of Atomic Power, Nuclear Power Co. of India	150	1969/4	2009	Operating	
India	Tarapur 2	Tarapur, Maharashtra	BWR	Dept. of Atomic Power, Nuclear Power Co. of India	150	1969/5	2009	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
India	Tarapur 3	Tarapur, Maharashtra	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	490	2006	2046	Under Construction	
India	Tarapur 4	Tarapur, Maharashtra	PHWR	Dept. of Atomic Power, Nuclear Power Co. of India	490	2005	2045	Under Construction	
Iran	Bushehr 1	Bushehr, Halileh	PWR (WWER)	Atomic Energy Organization of Iran	915	2006	2046	Under Construction	
Iran	Bushehr 2	Bushehr, Halileh	PWR (WWER)	Atomic Energy Organization of Iran	1096			Under Construction	
Italy	Caorso	Caorso, Piacenza	BWR	ENEL	860	1978/5	1990	Permanemtly Shut Down	
Italy	Garigliano	Sessa Aurunca	BWR	ENEL	150	1964/1	1982/3	Permanemtly Shut Down	
Italy	Latina	Borgo Sabottino	Magnox	ENEL	153	1963/5	1987/12	Permanemtly Shut Down	
Italy	Trino	Trino, Vercelli	PWR	ENEL	260	1964/10	1990/7	Permanemtly Shut Down	
Japan	Fugen ATR	Tsuruga-shi	HWLWR	JNC	148	1978/7	2003/3	Permanemtly Shut Down	
Japan	Fukushima Daiichi 2	Ohkuma, Fukushima	BWR	TEPCO	760	1973/12	2013	Operating	
Japan	Fukushima Daiichi 3	Ohkuma, Fukushima	BWR	TEPCO	760	1974/10	2014	Operating	
Japan	Fukushima Daiichi 4	Ohkuma, Fukushima	BWR	TEPCO	760	1978/2	2018	Operating	
Japan	Fukushima Daiichi 5	Ohkuma, Fukushima	BWR	TEPCO	760	1977/9	2017	Operating	
Japan	Fukushima Daiichi 6	Ohkuma, Fukushima	BWR	TEPCO	1067	1979/5	2019	Operating	
Japan	Fukushima Daiini 1	Ohkuma, Fukushima	BWR	TEPCO	439	1970/11	2010	Operating	
Japan	Fukushima Daini 1	Naraha, Fukushima	BWR	TEPCO	1067	1981/7	2021	Operating	
Japan	Fukushima Daini 2	Naraha, Fukushima	BWR	TEPCO	1067	1983/6	2023	Operating	
Japan	Fukushima Daini 3	Naraha, Fukushima	BWR	TEPCO	1067	1984/12	2024	Operating	
Japan	Fukushima Daini 4	Naraha, Fukushima	BWR	TEPCO	1067	1986/12	2026	Operating	
Japan	Genkai 1	Genkai, Saga	PWR	Kyushu Electric	529	1975/2	2015	Operating	
Japan	Genkai 2	Genkai, Saga	PWR	Kyushu Electric	529	1980/6	2020	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Japan	Genkai 3	Gankai, Saga	PWR	Kyushu Electric	1127	1993/6	2033	Operating	
Japan	Genkai 4	Genkai, Saga	PWR	Kyushu Electric	1127	1996/11	2036	Operating	
Japan	Hamaoka 1	Hamaoka-cho	BWR	Chubu Electric	515	1974/8	2014	Operating	
Japan	Hamaoka 2	Hamaoka-cho	BWR	Chubu Electric	806	1978/1	2018	Operating	
Japan	Hamaoka 3	Hamaoka-cho	BWR	Chubu Electric	1056	1987/1	2027	Operating	
Japan	Hamaoka 4	Hamaoka-cho	BWR	Chubu Electric	1092	1993/1	2033	Operating	
Japan	Hamaoka 5	Hamaoka-Cho	ABWR	Chuba Electric	1325	2004/4	2044	Operating	
Japan	Higashidori 1	Higashidori, Aomori	BWR	Tohoku Electric	1067	2004/9	2044	Under Construction	
Japan	Ikata 1	Ikata-cho	PWR	Shikoku Electric	538	1977/2	2017	Operating	
Japan	Ikata 2	Ikata-cho	PWR	Shikoku Electric	538	1981/8	2021	Operating	
Japan	Ikata 3	Ikata-cho	PWR	Shikoku Electric	846	1994/3	2034	Operating	
Japan	Kashiwazaki-Kariwa 2	Kashiwazaki-shi	BWR	TEPCO	1067	1990/2	2030	Operating	
Japan	Kashiwazaki-Kariwa 3	Kashiwazaki-shi	BWR	TEPCO	1067	1992/12	2032	Operating	
Japan	Kashiwazaki-Kariwa 4	Kashiwazaki-shi	BWR	TEPCO	1056	1993/12	2033	Operating	
Japan	Kashiwazaki-Kariwa 5	Kashiwazaki-shi	BWR	TEPCO	1067	1989/9	2029	Operating	
Japan	Kashiwazaki-Kariwa 6	Kashiwazaki-shi	BWR	TEPCO	1315	1996/1	2036	Operating	
Japan	Kashiwazaki-Kariwa 7	Kashiwazaki-shi	BWR	TEPCO	1315	1996/12	2036	Operating	
Japan	Kashiwazaki-Karlwa 1	Kashiwazaki-shi	BWR	TEPCO	1067	1985/2	2025	Operating	
Japan	Mihama 1	Mihama-cho	PWR	Kansai Electric	320	1970/8	2010	Operating	
Japan	Mihama 2	Mihama-cho	PWR	Kansai Electric	470	1972/4	2012	Operating	
Japan	Mihama 3	Mihama-cho	PWR	Kansai Electric	780	1976/2	2016	Operating	
Japan	Monju FBR	Tsuruga-shi	LMFBR	JNC	246	1994/8	2034	Operating	
Japan	Ohi 1	Ohi-cho	PWR	Kansai Electric	1127	1977/12	2017	Operating	
Japan	Ohi 2	Ohi-cho	PWR	Kansai Electric	1127	1978/10	2018	Operating	
Japan	Ohi 3	Ohi-cho	PWR	Kansai Electric	1127	1991/6	2031	Operating	
Japan	Ohi 4	Ohi-cho	PWR	Kansai Electric	1127	1992/6	2032	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Japan	Onagawa 1	Onagawa, Miyagi	BWR	Tohoku Electric	498	1983/11	2023	Operating	
Japan	Onagawa 2	Onagawa, Miyagi	BWR	Tohoku Electric	796	1994/12	2034	Operating	
Japan	Onagawa 3	Onagawa, Miyagi	BWR	Tohoku Electric	796	2001/5	2041	Operating	
Japan	Sendai 1	Sendai	PWR	Kyushu Electric	846	1983/9	2023	Operating	
Japan	Sendai 2	Sendai	PWR	Kyushu Electric	846	1985/4	2025	Operating	
Japan	Shika 1	Shika-machi, Ishikawa	BWR	Hokuriku Electric	505	1993/1	2033	Operating	
Japan	Shika 2	Shika-machi	PWR	Horkuriku Electric	1304	2005	2045	Under Construction	
Japan	Shimane 1	Kashima-cho	BWR	Chugoku Electric	439	1973/12	2013	Operating	
Japan	Shimane 2	Kashima-cho	BWR	Chugoku Electric	789	1988/7	2028	Operating	
Japan	Takahama 1	Takahama-cho	PWR	Kansa Electrici	780	1974/3	2014	Operating	
Japan	Takahama 2	Takahama-cho	PWR	Kansai Electric	780	1975/1	2015	Operating	
Japan	Takahama 3	Takahama-cho	PWR	Kansai Electric	830	1984/5	2024	Operating	
Japan	Takahama 4	Takahama-cho	PWR	Kansai Electric	830	1984/11	2024	Operating	
Japan	Tokai 1	Tokai-mura	PWR	JAPCO	159	1966/11	1998/3	Permanemtly Shut Down	
Japan	Tokai 2	Tokaimura	BWR	JAPCO	1056	1978/3	2018	Operating	
Japan	Tokai JPDR	Tokai-mura	PWR	JAERI	13	1963/10	1982/12	Decommissioned	
Japan	Tomari 1	Tomari, Hokkaido	PWR	Hokkaido Electric	550	1988/12	2028	Operating	
Japan	Tomari 2	Tomari, Hokkaidoo	PWR	Hokkaido Electric	550	1990/8	2030	Operating	
Japan	Tomari 3	Tomari, Hokkaido	PWR	Hokkaido Electric	866	2008	2048	Proposed	
Japan	Tsuruga 1	Tsuruga-shi	BWR	JAPCO	341	1969/11	2009	Operating	
Japan	Tsuruga 2	Tsuruga-shi	PWR	JAPCO	1115	1986/6	2026	Operating	
Kazakhstan	Aktau (Shevchenko)	Aktau, Mangyshlak	FBR	KATEP	135	1973/7	1999/6	Permanemtly Shut Down	
Korea, DPR	Sinpo 1	Kimbo	PWR	Korea Penisula Energy	1000			Under Construction	
Korea, DPR	Sinpo 2	Kimbo	PWR	Korea Penisula Energy	1000			Under Construction	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Korea, Rep	Kori 1	Kijang-gun, Pusan	PWR	KEPCO	556	1977/6	2017	Operating	
Korea, Rep	Kori 2	Kijang-gun, Pusan	PWR	KEPCO	605	1983/4	2023	Operating	
Korea, Rep	Kori 3	Kijang-gun, Pusan	PWR	KEPCO	895	1985/1	2025	Operating	
Korea, Rep	Kori 4	Kijang-gun, Pusan	PWR	KEPCO	895	1985/11	2025	Operating	
Korea, Rep	Ulchin 1	Ulchin-gun, Kyongsangbuk	PWR	KEPCO	920	1988/4	2028	Operating	
Korea, Rep	Ulchin 2	Ulchin-gun, Kyongsangbuk	PWR	KEPCO	920	1989/4	2029	Operating	
Korea, Rep	Ulchin 3	Ulchin-gun, Kyongsangbuk	PWR	KEPCO	960	1998/1	2038	Operating	
Korea, Rep	Ulchin 4	Ulchin-gun, Kyongsangbuk	PWR	KEPCO	960	1998/12	2038	Operating	
Korea, Rep	Ulchin 5	Ulchin-gun, Kyongsangbuk	PWR	KEPCO	960	2003/12	2043	Operating	
Korea, Rep	Ulchin 6	Ulchin-gun, Kyongsangbuk	PWR	KEPCO	960	2004	2044	Under Construction	
Korea, Rep	Wolsong 1	Kyongu-gun, Kyongsangbuk	PHW (CANDU)	KEPCO	629	1982/12	2022	Operating	
Korea, Rep	Wolsong 2	Kyongu-gun, Kyongsangbuk	PHW (CANDU)	KEPCO	650	1997/4	2037	Operating	
Korea, Rep	Wolsong 3	Kyongu-gun, Kyongsangbuk	PHW (CANDU)	KEPCO	650	1998/3	2038	Operating	
Korea, Rep	Wolsong 4	Kyongu-gun, Kyongsangbuk	PHW (CANDU)	KEPCO	650	1999/5	2039	Operating	
Korea, Rep	Yonggwang 1	Yonggwang-gun, Jeonnam	PWR	KEPCO	900	1986/3	2026	Operating	
Korea, Rep	Yonggwang 2	Yonggwang-gun, Jeonnam	PWR	KEPCO	900	1986/11	2026	Operating	
Korea, Rep	Yonggwang 3	Yonggwang-gun, Jeonnam	PWR	KEPCO	950	1994/10	2034	Operating	
Korea, Rep	Yonggwang 4	Yonggwang-gun, Jeonnam	PWR	KEPCO	950	1995/7	2035	Operating	
Korea, Rep	Yonggwang 5	Yonggwang-gun, Jeonnam	PWR	KEPCO	950	2001/12	2041	Operating	
Korea, Rep	Yonggwang 6	Yonggwang-gun, Jeonnam	PWR	KEPCO	950	2002/9	2042	Operating	
Lithuania	Ignalina 1	Visaginas	LWGR (RBMK)	Lithuanian Ministry of Energy	1185	1983/12	2005	Operating	
Lithuania	Ignalina 2	Visaginas	LWGR (RBMK)	Lithuanian Ministry of Energy	1185	1987/8	2009	Operating	
Mexico	Laguna Verde 1	Laguna Verde,Veracruz	BWR	Comision Federal de Electricidad	655	1989/4	2029	Operating	
Mexico	Laguna Verde 2	Laguna Verde, Veracruz	BWR	Comision Federal de Electricidad	655	1994/11	2034	Operating	
Netherlands	Borssele	Borssele	PWR	EPZ	449	1973/7	2013	Operating	
Netherlands	Dodewaard	Dodewaard	BWR	NVGKN	55	1968/10	1997/3	Permanemtly Shut Down	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Pakistan	Chasnupp	Mianwali, Punjab	PWR	Pakiston Atomic Energy Commission	300	2000/6	2040	Operating	
Pakistan	Kanupp	Karachi, Sind	PHW (CANDU)	Pakiston Atomic Energy Commission	125	1971/10	2011	Operating	
Romania	Cernavoda 1	Cernavoda, Constanta	PHW (CANDU)	Societatea Nationala Nucleoelectrica SA	655	1996/4	2036	Operating	
Romania	Cernavoda 2	Cernavoda, Constanta	PHW (CANDU)	Societatea Nationala Nucleoelectrica SA	620	2007	2047	Under Construction	
Romania	Cernavoda 3	Cernavoda, Constanta	PHW (CANDU)	Societatea Nationala Nucleoelectrica SA	620			Under Construction	
Romania	Cernavoda 4	Cernavoda, Constanta	PHW (CANDU)	Societatea Nationala Nucleoelectrica SA	620			Under Construction	
Romania	Cernavoda 5	Cernavoda, Constanta	PHW (CANDU)	Societatea Nationala Nucleoelectrica SA	620			Under Construction	
Russian Fed	Balakovo 1	Balakovo, Saratov	PWR (WWER)	Minatom/Rosenergoatom	950	1985/12	2025	Operating	
Russian Fed	Balakovo 2	Balakovo, Saratov	PWR (WWER)	Minatom/Rosenergoatom	950	1987/10	2027	Operating	
Russian Fed	Balakovo 3	Balakovo, Saratov	PWR (WWER)	Minatom/Rosenergoatom	950	1988/12	2028	Operating	
Russian Fed	Balakovo 4	Balakovo, Saratov	PWR (WWER)	Minatom/Rosenergoatom	950	1993/4	2033	Operating	
Russian Fed	Balakovo 5	Balakovo, Saratov	PWR (WWER)	Minatom/Rosenergoatom	1000			Under Construction	
Russian Fed	Beloyarsk Unit 1	Ekaterinburg	LWGR (EGP)	Minatom/Rosenergoatom	102	1964/4	1981/6	Decommissioned	
Russian Fed	Beloyarsk Unit 2	Ekaterinburg	LWGR (EGP)	Minatom/Rosenergoatom	146	1967/12	1989/9	Decommissioned	
Russian Fed	Beloyarsk Unit 3	Zarechnyy, Sverdlovsk	FBR	Minatom	560	1980/4	2020	Operating	
Russian Fed	Billbino 1	Billbino, Chukotka	LWGR (EGP)	Minatom/Rosenergoatom	11	1974/1	2014	Operating	
Russian Fed	Billbino 2	Billbino, Chukotka	LWGR (EGP)	Minatom/Rosenergoatom	12	1974/12	2014	Operating	
Russian Fed	Billbino 3	Billbino, Chukotka	LWGR (EGP)	Minatom/Rosenergoatom	11	1975/12	2015	Operating	
Russian Fed	Billbino 4	Billbino, Chukotka	LWGR (EGP)	Minatom/Rosenergoatom	11	1976/12	2016	Operating	
Russian Fed	Chelyabinsk 1	Chelyabinsk 40	Production	Minatom	100	1948/6	1989	Permanemtly Shut Down	
Russian Fed	Chelyabinsk 2	Chelyabinsk 40	Production	Minatom	100	1950/1	1989	Permanemtly Shut Down	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Russian Fed	Chelyabinsk 3	Chelyabinsk 40	Production	Minatom	100	1951/1	1989	Permanemtly Shut Down	
Russian Fed	Chelyabinsk 4	Chelyabinsk 40	Production	Minatom	100	1952/1	1990	Permanemtly Shut Down	
Russian Fed	Chelyabinsk 5	Chelyabinsk 40	Production	Minatom	100	1954/1	1990/11	Permanemtly Shut Down	
Russian Fed	Chelyabinsk 6	Chelyabinsk 40	Production	Minatom	100	1957/1	1990/11	Permanemtly Shut Down	
Russian Fed	Gomochimicheski Combinat 3	Krasnoyarsk-26, Siberia	Production	Minatom	100		1992	Permanemtly Shut Down	
Russian Fed	Gornochimicheski Combinat 1	Krasnoyark-26, Siberia	Production	Minatom	100	1962	1992	Permanemtly Shut Down	
Russian Fed	Gornochimicheski Combinat 2	Krasnoyark-26, Siberia	Production	Minatom	100		1992	Permanemtly Shut Down	
Russian Fed	Kalinin 1	Udomyla Tver, Volga	PWR (WWER)	Minatom/Rosenergoatom	950	1984/5	2024	Operating	
Russian Fed	Kalinin 2	Udomyla ver, Volga	PWR (WWER)	Minatom/Rosenergoatom	950	1986/12	2026	Operating	
Russian Fed	Kalinin 3	Udomyla, Tver, Volga	PWR (WWER)	Minatom/Rosenergoatom	950	2004	2044	Under Construction	
Russian Fed	Kola 1	Zori, Polyarnyye, Murmansk	PWR (WWER)	Minatom/Rosenergoatom	411	1973/6	2013	Operating	
Russian Fed	Kola 2	Zori, Polyarnyye, Murmansk	PWR (WWER)	Minatom/Rosenergoatom	411	1974/12	2014	Operating	
Russian Fed	Kola 3	Zori, Polyarnyye, Murmansk	PWR (WWER)	Minatom/Rosenergoatom	411	1981/3	2021	Operating	
Russian Fed	Kola 4	Zori, Polyarnyye, Murmansk	PWR (WWER)	Minatom/Rosenergoatom	411	1984/10	2024	Operating	
Russian Fed	Kursk 1	Kursk, Kurchatov	LWGR (RBMK)	Minatom/Rosenergoatom	925	1976/12	2016	Operating	
Russian Fed	Kursk 2	Kursk, Kurchatov	LWGR (RBMK)	Minatom/Rosenergoatom	925	1979/1	2019	Operating	
Russian Fed	Kursk 3	Kursk, Kurchatov	LWGR (RBMK)	Minatom/Rosenergoatom	925	1983/10	2023	Operating	
Russian Fed	Kursk 4	Kursk, Kurchatov	LWGR (RBMK)	Minatom/Rosenergoatom	925	1985/12	2025	Operating	
Russian Fed	Kursk 5	Kursk, Kurchatov	LWGR (RBMK)	Minatom/Rosenergoatom	925	2007	2047	Under Construction	
Russian Fed	Leningrad 1	Sosnovyy Bor, St Petersburg	LWGR (RBMK)	Minatom/Rosenergoatom	925	1973/12	2013	Operating	
Russian Fed	Leningrad 2	Sosnovyy Bor, St Petersburg	LWGR (RBMK)	Minatom/Rosenergoatom	925	1975/7	2015	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Russian Fed	Leningrad 3	Sosnovyy Bor, St Petersburg	LWGR (RBMK)	Minatom/Rosenergoatom	925	1979/12	2019	Operating	
Russian Fed	Leningrad 4	Sosnovyy Bor, St Petersburg	LWGR (RBMK)	Minatom/Rosenergoatom	925	1981/2	2021	Operating	
Russian Fed	Melekesa BOR60	Dimitrovgrad	FBR	Minatom/Rosenergoatom	11	1968/12	2008	Operating	
Russian Fed	Melekess VK50	Dimitrovgrad	BWR (VK)	Minatom/Rosenergoatom	62	1964/12	2004	Operating	
Russian Fed	Novovoronezh 1	Novovoronezhskiy, Voronezh	PWR (WWER)	Minatom/Rosenergoatom	197	1964/9	1988/2	Permanemtly Shut Down	
Russian Fed	Novovoronezh 2	Novovoronezhskiy, Voronezh	PWR (WWER)	Minatom/Rosenergoatom	365	1969/12	1990/8	Permanemtly Shut Down	
Russian Fed	Novovoronezh 3	Novovoronezhskiy, Voronezh	PWR (WWER)	Minatom/Rosenergoatom	385	1971/12	2011	Operating	
Russian Fed	Novovoronezh 4	Novovoronezhskiy, Voronezh	PWR (WWER)	Minatom/Rosenergoatom	385	1972/12	2012	Operating	
Russian Fed	Novovoronezh 5	Novovoronezhskiy, Voronezh	PWR (WWER)	Minatom/Rosenergoatom	950	1980/5	2020	Operating	
Russian Fed	Rostov 1	Volgodonsk, Rostov	PWR (WWER)	Minatom/Rosenergoatom	950	2001/3	2041	Operating	
Russian Fed	Rostov 2	Volgodonsk, Rostov	PWR (WWER)	Minatom/Rosenergoatom	1000			Under Construction	
Russian Fed	Sibchim Combinat NPP 1	Tomsk-7	Production	Minatom	100	1954	1990	Permanemtly Shut Down	
Russian Fed	Sibchim Combinat NPP 2	Tomsk-7	Production	Minatom	100	1959/1	1990	Permanemtly Shut Down	
Russian Fed	Sibchim Combinat NPP 3	Tomsk-7	Production	Minatom	100	1960/1	1992	Permanemtly Shut Down	
Russian Fed	Sibchim Combinat NPP 4	Tomsk-1	Production	Minatom	100	1965	2005	Operating	
Russian Fed	Sibchim Combinat NPP 5	Tomsk-2	Production	Minatom	100	1964	2004	Operating	
Russian Fed	Smolensk 1	Smolensk	LWGR (RBMK)	Minatom/Rosenergoatom	925	1982/12	2022	Operating	
Russian Fed	Smolensk 2	Smolensk	LWGR (RBMK)	Minatom/Rosenergoatom	925	1985/5	2025	Operating	
Russian Fed	Smolensk 3	Smolensk	LWGR (RBMK)	Minatom/Rosenergoatom	925	1990/1	2030	Operating	
Russian Fed	Sosnovy Bor 1	Sosnovy Bar	PWR (WWER)		600			Under Construction	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Russian Fed	South Ural 1	Chelyabinsk, Chelyabinsk	LMFBR	Minatom/Rosenergoatom	750			Under Construction	
Russian Fed	South Ural 2	Chelyabinsk, Chelyabinsk	LMFBR	Minatom/Rosenergoatom	750			Under Construction	
Russian Fed	VK-50	Dimitrovgrad, Ulyanovsk	BWR	Minatom/Rosenergoatom	50	1966/1	2006	Operating	
Slovakia	Bohunice 1	Trnava	PWR (WWER)	Slovenske Elektrarne (SEP)	408	1978/12	2018	Operating	
Slovakia	Bohunice 2	Trnava	PWR (WWER)	Slovenske Elektrarne (SEP)	408	1980/3	2020	Operating	
Slovakia	Bohunice 3	Trnava	PWR (WWER)	Slovenske Elektrarne (SEP)	408	1984/8	2024	Operating	
Slovakia	Bohunice 4	Trnava	PWR (WWER)	Slovenske Elektrarne (SEP)	408	1985/8	2025	Operating	
Slovakia	Bohunice A1	Jaslovske Bohunice	GCHWR	Slovenske Elektrarne (SEP)	110	1972/12	1979/5	Permanemtly Shut Down	
Slovakia	Mochovce 1	Mochovce	PWR (WWER)	Slovenske Elektrarne (SEP)	405	1998/7	2038	Operating	
Slovakia	Mochovce 2	Mochovce	PWR (WWER)	Slovenske Elektrarne (SEP)	405	1999/12	2039	Operating	
Slovakia	Mochovce 3	Mochovce	PWR (WWER)	Slovenske Elektrarne (SEP)	440			Under Construction	
Slovakia	Mochovce 4	Mochovce	PWR (WWER)	Slovenske Elektrarne (SEP)	440			Under Construction	
Slovenia	Krsko	Krsko	PWR	Nuklearna Elektrarna Krsko (NEK)	656	1981/10	2021	Operating	
South Africa	Koeberg 1	Melkbosstrand, Cape	PWR	ESKOM	900	1984/4	2024	Operating	
South Africa	Koeberg 2	Melkbosstrand, Cape	PWR	ESKOM	900	1985/7	2025	Operating	
Spain	Almaraz 1	Almaraz, Caceres	PWR	Almaraz-Trillo NPP AIE	947	1981/5	2021	Operating	
Spain	Almaraz 2	Almaraz, Caceres	PWR	Almaraz-Trillo NPP AIE	950	1983/10	2023	Operating	
Spain	Asco-1	Asco, Tarragona	PWR	Associacion Nuclear Asco AIE	996	1983/8	2023	Operating	
Spain	Asco-2	Asco, Tarragona	PWR	Associacion Nuclear Asco AIE	992	1985/10	2025	Operating	
Spain	Cofrentes	Cofrentes, Valencia	BWR	Iberdrola SA	1063	1984/10	2024	Operating	
Spain	Jose Cabrera, Sorita	Zorita, Guadalajara	PWR	Union Fenosa Generacion	143	1968/7	2008	Operating	
Spain	Santa Maria de Garona	S. M. de Garona, Burgos	BWR	Nuclenor SA	446	1971/3	2011	Operating	
Spain	Trillo 1	Trillo, Guadalajara	PWR	Almaraz-Trillo NPP AIE	1003	1988/5	2028	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Spain	Vandellos 1	Vandellos, Tarragona	Gas-graphite	Hifrensa	480	1972/5	1989/10	Undergoing Decommissioning	
Spain	Vandellos 2	Vandellos, Tarragona	PWR	Central Nuclear Vandellos II AIE	1045	1987/12	2027	Operating	
Sweden	Barseback 1	Barseback, Malmo	BWR	Barseback Kraft AB	600	1975/5	1999	Permanemtly Shut Down	
Sweden	Barseback 2	Barseback, Malmo	BWR	Barseback Kraft AB	600	1977/3	2017	Operating	
Sweden	Forsmark 1	Forsmark, Uppsala	BWR	Forsmark Kraftgrupp AB	968	1980/6	2020	Operating	
Sweden	Forsmark 2	Forsmark, Upps	BWR	Forsmark Kraftgrupp AB	964	1981/1	2021	Operating	
Sweden	Forsmark 3	Forsmark, Upps	BWR	Forsmark Kraftgrupp AB	1155	1985/3	2025	Operating	
Sweden	Oskarshamn 1	Oskarshamn, Kalmar	BWR	OKG Aktiebolag	467	1971/8	2021	Operating	
Sweden	Oskarshamn 2	Oskarshamn, Kalmar	BWR	OKG Aktiebolag	602	1974/10	2014	Operating	
Sweden	Oskarshamn 3	Oskarshamn, Kalmar	BWR	OKG Aktiebolag	1160	1984/3	2024	Operating	
Sweden	Ringhals 1	Varberg, Halland	BWR	Ringhals AB	830	1973/10	2013	Operating	
Sweden	Ringhals 2	Varberg, Halland	PWR	Ringhals AB	875	1974/8	2014	Operating	
Sweden	Ringhals 3	Varberg, Halland	PWR	Ringhals AB	915	1980/9	2020	Operating	
Sweden	Ringhals 4	Varberg, Halland	PWR	Ringhals AB	915	1982/6	2022	Operating	
Switzerland	Beznau 1	Dottingen, Aargau	PWR	Nordostschweizerische Kraftwerk (NOK)	365	1969/7	2009	Operating	
Switzerland	Beznau 2	Dottingen, Aargau	PWR	Nordostschweizerische Kraftwerk (NOK)	365	1971/10	2021	Operating	
Switzerland	Goesgen	Daeniken, Solothurn	PWR	Kraftwerk Goesgen-Daeniken AG	970	1979/2	2019	Operating	
Switzerland	Leibstadt	Leibstadt, Aargau	BWR	Kraftwerk Leibstadt AG	1165	1984/5	2024	Operating	
Switzerland	Lucens CNL	Lausanne	GCHWR	SNA	9	1967	1969/1	Decommissioned	
Switzerland	Muehleberg	Muehleberg	BWR	BKW FMB Energie AG	355	1971/7	2021	Operating	
UK	Berkeley 1	Gloucestershire	Magnox	BNFL	138	1961/8	1989/3	Permanemtly Shut Down	In Safe Enclosure
UK	Berkeley 2	Gloucestershire	Magnox	BNFL	138	1962/6	1988/10	Permanemtly Shut Down	In Safe Enclosure

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
UK	Bradwell 1	Essex	Magnox	BNFL	123	1962/6	2002/3	Permanemtly Shut Down	
UK	Bradwell 2	Essex	Magnox	BNFL	123	1962/7	2002/3	Permanemtly Shut Down	
UK	Calder Hall 1	Cumbria	Magnox	BNFL	50	1956/8	2003/3	Permanemtly Shut Down	
UK	Calder Hall 2	Cumbria	Magnox	BNFL	50	1957/2	2003/3	Permanemtly Shut Down	
UK	Calder Hall 3	Cumbria	Magnox	BNFL	50	1958/3	2003/3	Permanemtly Shut Down	
UK	Calder Hall 4	Cumbria	Magnox	BNFL	50	1959/4	2003/3	Permanemtly Shut Down	
UK	Chapelcross 1	Dumfriesshire	Magnox	BNFL	50	1959/2	2009	Operating	50 yrs
UK	Chapelcross 2	Dumfriesshire	Magnox	BNFL	50	1959/7	2005	Operating	
UK	Chapelcross 3	Dumfriesshire	Magnox	BNFL	50	1959/11	2009	Operating	50 yrs
UK	Chapelcross 4	Dumfriesshire	Magnox	BNFL	50	1960/1	2005	Operating	45 yrs
UK	Dounreay PFR	Thurso, Highland	FBR	UKAEA-GD	234	1975/1	1994/3	Undergoing Decommissioning	
UK	Dungeness A1	Kent	Magnox	British Energy (BE)	225	1965/9	2006	Operating	
UK	Dungeness A2	Kent	Magnox	British Energy (BE)	225	1965/11	2006	Operating	
UK	Dungeness B1	Kent	AGR	British Energy (BE)	225	1983/12	2023	Operating	
UK	Dungeness B2	Kent	AGR	British Energy (BE)	225	1985/12	2025	Operating	
UK	Hartlepool 1	Cleveland	AGR	British Energy (BE)	605	1983/8	2023	Operating	
UK	Hartlepool 2	Cleveland	AGR	British Energy (BE)	605	1984/10	2024	Operating	
UK	Haysham A2	Lancashire	AGR	British Energy (BE)	575	1983/10	2023	Operating	
UK	Heysham A1	Lancashire	AGR	British Energy (BE)	575	1983/7	2023	Operating	
UK	Heysham B1	Lancashire	AGR	British Energy (BE)	625	1988/7	2028	Operating	
UK	Heysham B2	Lancashire	AGR	British Energy (BE)	625	1988/11	2028	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
UK	Hinckley Point A1	Somerset	Magnox	BNFL	235	1965/2	2000/5	Permanemtly Shut Down	
UK	Hinckley Point A2	Somerset	Magnox	BNFL	235	1965/3	2000/5	Permanemtly Shut Down	
UK	Hinckley Point B1	Somerset	AGR	British Energy (BE)	610	1976/10	2016	Operating	
UK	Hinckley Point B2	Somerset	AGR	British Energy (BE)	610	1976/2	2016	Operating	
UK	Hunterston A1	Strathclyde	Magnox	BNFL	150	1964/2	1990/3	Permanemtly Shut Down	
UK	Hunterston A2	Strathclyde	Magnox	BNFL	150	1964/6	1989/12	Permanemtly Shut Down	
UK	Hunterston B1	Strathclyde	AGR	British Energy (BE)	595	1976/2	2016	Operating	
UK	Hunterston B2	Strathclyde	AGR	British Energy (BE)	595	1977/3	2016	Operating	
UK	Oldbury 1	Avon	Magnox	BNFL	217	1967/11	2008	Operating	
UK	Oldbury 2	Avon	Magnox	BNFL	217	1968/4	2008	Operating	
UK	Sizewell A1	Suffolk	Magnox	British Energy (BE)	210	1966/1	2006	Operating	
UK	Sizewell A2	Suffolk	Magnox	British Energy (BE)	210	1966/4	2006	Operating	
UK	Sizewell B	Suffolk	PWR	British Energy (BE)	1188	1995/2	2035	Operating	
UK	Torness 1	E. Lothian	AGR	British Energy (BE)	625	1988/5	2028	Operating	
UK	Torness 2	E. Lothian	AGR	British Energy (BE)	625	1989/2	2029	Operating	
UK	Trawsfynydd 1	Wales	Magnox	British Energy (BE)	195	1966/1	1993/7	Permanemtly Shut Down	
UK	Trawsfynydd 2	Wales	Magnox	British Energy (BE)	195	1965/2	1993/7	Permanemtly Shut Down	
UK	Windscale AGR	Sellafield, Cumbria	AGR	UKAEA-GD	32	1963/2	1981/4	Undergoing Decommissioning	
UK	Winfrith SGHWR	Winfrith, Dorset	SGHWR	UKAEA	92	1967/12	1990/9	Permanemtly Shut Down	
UK	Wylfa 1	Anglesey	Magnox	BNFL	490	1971/1	2009	Operating	
UK	Wylfa 2	Anglesey	Magnox	BNFL	490	1970/7	2009	Operating	

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Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Ukraine	Chernobyl 1	Kiev	LWGR (RBMK)	Energoatom	725	1977/9	1996/11	Permanemtly Shut Down	
Ukraine	Chernobyl 2	Kiev	LWGR (RBMK)	Energoatom	925	1978/12	1991/8	Permanemtly Shut Down	
Ukraine	Chernobyl 3	Kiev	LWGR (RBMK)	Energoatom	925	1981/12	2001	Permanemtly Shut Down	
Ukraine	Chernobyl 4	Kiev	LWGR (RBMK)	Energoatom	925	1983/12	1986/4	Permanemtly Shut Down	Accident-4/86
Ukraine	Khmelnitski 1	Neteshin, Khmelnitski	PWR (WWER)	Energoatom	950	1987/12	2027	Operating	
Ukraine	Khmelnitski 2	Neteshin, Khmelnitski	PWR (WWER)	Energoatom	950			Under Construction	
Ukraine	Khmelnitski 3	Neteshin, Khmelnitski	PWR (WWER)	Energoatom	950			Under Construction	
Ukraine	Khmelnitski 4	Neteshin, Khmelnitski	PWR (WWER)	Energoatom	950			Under Construction	
Ukraine	Rovno 1	Kuznetsovsk, Rovno	PWR (WWER)	Energoatom	381	1980/12	2020	Operating	
Ukraine	Rovno 2	Kuznetsovsk, Rovno	PWR (WWER)	Energoatom	376	1981/12	2021	Operating	
Ukraine	Rovno 3	Kuznetsovsk, Rovno	PWR (WWER)	Energoatom	950	1986/11	2026	Operating	
Ukraine	Rovno 4	Kuznetsovsk, Rovno	PWR (WWER)	Energoatom	950	2005	2045	Under Construction	
Ukraine	South Ukraine 1	Konstantinovka, Nikolaiev	PWR (WWER)	Energoatom	950	1982/12	2022	Operating	
Ukraine	South Ukraine 2	Konstantinovka, Nikolaiev	PWR (WWER)	Energoatom	950	1985/1	2025	Operating	
Ukraine	South Ukraine 3	Konstantinovka, Nikolaiev	PWR (WWER)	Energoatom	950	1989/9	2029	Operating	
Ukraine	South Ukraine 4	Konstantinovka, Nikolaiev	PWR (WWER)	Energoatom	950			Under Construction	
Ukraine	Zaporozhe 1	Energodar, Zaporozhye	PWR (WWER)	Energoatom	950	1984/12	2024	Operating	
Ukraine	Zaporozhe 2	Energodar, Zaporozhye	PWR (WWER)	Energoatom	950	1985/7	2025	Operating	
Ukraine	Zaporozhe 3	Energodar, Zaporozhye	PWR (WWER)	Energoatom	950	1986/12	2026	Operating	
Ukraine	Zaporozhe 4	Energodar, Zaporozhye	PWR (WWER)	Energoatom	950	1987/12	2027	Operating	
Ukraine	Zaporozhe 5	Energodar, Zaporozhye	PWR (WWER)	Energoatom	950	1989/8	2029	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
Ukraine	Zaporozhe 6	Energodar, Zaporozhye	PWR (WWER)	Energoatom	950	1995/10	2035	Operating	
USA	Arkansas Nuclear - Unit 1	London, AR	PWR	Entergy	846	1974/8	2014	Operating	
USA	Arkansas Nuclear - Unit 2	London, AR	PWR	Entergy	930	1978/12	2018	Operating	
USA	Beaver-Valley 1	Shippingport, PA	PWR	First Energy	810	1976/6	2016	Operating	
USA	Beaver-Valley 2	Shippingport, PA	PWR	First Energy	831	1987/8	2027	Operating	
USA	Bellefonte 1	Scottsboro, AL	PWR	TVA Nuclear				Under Construction	
USA	Bellefonte 2	Scottsboro, AL	PWR	TVA Nuclear				Under Construction	
USA	Big Rock Point	Charlevoix, MI	BWR	CPC	67	1962/12	1997/8	Undergoing Decommissioning	
USA	BONUS	Rincon, PR	BWR	USDOE	17	1964/8	1968/6	Decommissioned	Entombed
USA	Braidwood 1	Braidwood, IL	PWR	Exelon	1185	1987/7	2027	Operating	
USA	Braidwood 2	Braidwood, IL	PWR	Exelon	1177	1988/5	2028	Operating	
USA	Browns Ferry 1	Decatur, AL	BWR	TVA Nuclear	1065	1973/10	2013	Operating	
USA	Browns Ferry 2	Decatur, AL	BWR	TVA Nuclear	1118	1974/8	2014	Operating	
USA	Browns Ferry 3	Decatur, AL	BWR	TVA Nuclear	1113	1976/9	2016	Operating	
USA	Brunswick 1	Southport, NC	BWR	Progress Energy	820	1976/12	2016	Operating	
USA	Brunswick 2	Southport, NC	BWR	Progress Energy	811	1975/4	2015	Operating	
USA	Byron 1	Byron, IL	PWR	Exelon	1194	1985/3	2025	Operating	
USA	Byron 2	Byron, IL	PWR	Exelon	1162	1987/2	2027	Operating	
USA	Callaway 1	Fulton, MO	PWR	Ameren	1143	1984/10	2024	Operating	
USA	Calvert Cliffs 1	Lusby, MD	PWR	Constellation Nuclear	835	1975/1	2015	Operating	
USA	Calvert Cliffs 2	Lusby, MD	PWR	Constellation Nuclear	840	1976/12	2016	Operating	
USA	Carolinas CVTR	Parr, SC	PHWR	CVNPA	17	1963/12	1967/1	Permanemtly Shut Down	
USA	Catawba 1	Clover, SC	PWR	Duke Power	1129	1985/1	2025	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
USA	Catawba 2	Clover, SC	PWR	Duke Power	1129	1986/5	2026	Operating	
USA	Clinton	Clinton, IL	BWR	AmerGen Energy	990	1987/4	2027	Operating	
USA	Columbia	Richland, WA	BWR	Energy Northwest	1108	1984/5	2024	Operating	
USA	Comanche Peak 1	Glen Rose, TX	PWR	TXU Electric	1084	1990/4	2030	Operating	
USA	Comanche Peak 2	Glen Rose, TX	PWR	TXU Electric	1124	1993/4	2033	Operating	
USA	Cooper	Brownville, NB	BWR	NPPD	758	1974/5	2014	Operating	
USA	Crystal River 3	Crystal River, FL	PWR	Progress Energy	834	1977/1	2017	Operating	
USA	Davis Besse	Oak Harbor, Ohio	PWR	First Energy	873	1977/8	2017	Operating	
USA	Diablo Canyon 1	San Luis Obispo, CA	PWR	PG&E	1087	1984/11	2024	Operating	
USA	Diablo Canyon 2	San Luis Obispo, CA	PWR	PG&E	1087	1985/10	2025	Operating	
USA	Donald C Cook 1	Bridgman, MI	PWR	American Electric Power	1000	1975/2	2015	Operating	
USA	Donald C Cook 2	Bridgman, MI	PWR	American Electric Power	1060	1978/3	2018	Operating	
USA	Dresden 1	Morris, IL	BWR	Exelon	197	1960/4	1978/10	Permanemtly Shut Down	In Safe Enclosure
USA	Dresden 2	Morris, IL	BWR	Exelon	787	1970/4	2010	Operating	
USA	Dresden 3	Morris, IL	BWR	Exelon	784	1971/7	2011	Operating	
USA	Duane Arnold	Palo, IA	BWR	Nuclear Management Corp	520	1974/5	2014	Operating	
USA	Edwin I Hatch 1	Baxley, GA	BWR	Southern Nuclear	856	1974/11	2014	Operating	
USA	Edwin I Hatch 2	Baxley, GA	BWR	Southern Nuclear	965	1978/9	2018	Operating	
USA	Elk River	Elk River, MN	BWR	USDOE	22	1963/8	1968/2	Decommissioned	In Safe Enclosure
USA	Fermi 1	Monroe, MI	FBR	Detroit Edison	65	1966/8	1972/11	Permanemtly Shut Down	
USA	Fermi 2	Newport, MI	BWR	Detroit Edison	1111	1986/9	2026	Operating	
USA	Fort Calhoun	Ft. Calhoun, NB	PWR	OPPD	476	1973/8	2013	Operating	
USA	Fort St Vrain	Platteville, CO	HTGR	PSCC	330	1976/12	1989/8	Decommissioned	
USA	Grand Gulf	Port Gibson, MS	BWR	Entergy	1210	1984/10	2024	Operating	
USA	H B Robinson 2	Hartsville, SC	PWR	Progress Energy	683	1970/9	2010	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
USA	Haddam Neck	Haddam Neck, CT	PWR	CYAPC	560	1967/8	1996/12	Undergoing Decommissioning	
USA	Hallam	Hallam, NB	Sodium-graphite	USDOE/NPPD	75	1962	1964/9	Decommissioned	Entombed
USA	Hanford N Reactor	Richland, WA	LWGR	USDOE	860	1963	1987/1	Permanemtly Shut Down	
USA	Hope Creek 1	Salem, NJ	BWR	PSEG	1049	1986/8	2026	Operating	
USA	Humboldt Bay	Eureka, CA	BWR	PG&E	63	1963/4	1976/7	Permanemtly Shut Down	In Safe Enclosure
USA	Indian Point 1	Buchanan, NY	PWR	Entergy	257	1962/9	1974/10	Permanemtly Shut Down	In Safe Enclosure
USA	Indian Point 2	Buchanan, NY	PWR	Entergy	971	1973/6	2013	Operating	
USA	Indian Point 3	Buchanan, NY	PWR	Entergy	984	1976/4	2016	Operating	
USA	James A FitzPatrick	Oswego, NY	BWR	Entergy	840	1975/2	2015	Operating	
USA	Joseph M Farley 1	Dothan, AL	PWR	Southern Nuclear	833	1977/8	2017	Operating	
USA	Joseph M Farley 2	Dothan, AL	PWR	Southern Nuclear	842	1981/5	2021	Operating	
USA	Kewaunee Nuclear Power Plant	Kewaunee, WI	PWR	Nuclear Management Corp	498	1974/4	2014	Operating	
USA	La Salle 1	Seneca, IL	BWR	Exelon	1128	1982/9	2022	Operating	
USA	La Salle 2	Seneca, IL	BWR	Exelon	1131	1984/4	2024	Operating	
USA	Lacrosse	Genoa, WI	BWR	Dairyland Power Coop	48	1968/4	1987/4	Permanemtly Shut Down	In Safe Enclosure
USA	Limerick 1	Pottstown, PA	BWR	Exelon	1134	1985/4	2025	Operating	
USA	Limerick 2	Pottstown, PA	BWR	Exelon	1134	1989/9	2029	Operating	
USA	Maine Yankee	Wiscasset, ME	PWR	MYAPC	860	1972/11	1997/8	Undergoing Decommissioning	
USA	McGuire 1	Cornelius, NC	PWR	Duke Power	1100	1981/9	2021	Operating	
USA	McGuire 2	Cornelius, NC	PWR	Duke Power	1100	1983/5	2023	Operating	
USA	Millstone 1	Waterford, CT	BWR	CLP/WME	641	1970/11	1998/9	Permanemtly Shut Down	In Safe Enclosure

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
USA	Millstone 2	Waterford, CT	PWR	Dominion Energy	869	1975/11	2015	Operating	
USA	Millstone 3	Waterford, CT	PWR	Dominion Energy	1146	1986/2	2026	Operating	
USA	Monticello	Monticello MN	BWR	Nuclear Management Corp	597	1971/3	2011	Operating	
USA	Nine Mile Point 1	Scriba, NY	BWR	Constellation Nuclear	621	1969/11	2009	Operating	
USA	Nine Mile Point 2	Scriba, NY	BWR	Constellation Nuclear	1135	1987/8	2027	Operating	
USA	North Anna 1	Mineral, VA	PWR	Dominion Energy	925	1978/4	2018	Operating	
USA	North Anna 2	Mineral, VA	PWR	Dominion Energy	917	1980/8	2020	Operating	
USA	Oconee 1	Seneca, SC	PWR	Duke Power	846	1973/5	2013	Operating	
USA	Oconee 2	Seneca, SC	PWR	Duke Power	846	1973/12	2013	Operating	
USA	Oconee 3	Seneca, SC	PWR	Duke Power	846	1974/9	2014	Operating	
USA	Oyster Creek	Forked River, NJ	BWR	AmerGen Energy	619	1969/9	2009	Operating	
USA	Palisades	South Haven, MI	PWR	Nuclear Management Corp	760	1971/12	2021	Operating	
USA	Palo Verde 1	Wintersburg, AZ	PWR	Arizona Public Service	1243	1985/6	2025	Operating	
USA	Palo Verde 2	Wintersburg, AZ	PWR	Arizona Public Service	1243	1986/5	2026	Operating	
USA	Palo Verde 3	Wintersburg, AZ	PWR	Arizona Public Service	1247	1987/11	2027	Operating	
USA	Pathfinder	Sioux Falls, SD	BWR	Xcel Energy	59	1966/7	1967/10	Decommissioned	
USA	Peach Bottom 1	York, PA	HTGR	Exelon	40	1966/3	1974/11	Permanemtly Shut Down	In Safe Enclosure
USA	Peach Bottom 2	York, PA	BWR	Exelon	1093	1974/2	2014	Operating	
USA	Peach Bottom 3	York, PA	BWR	Exelon	1093	1974/9	2014	Operating	
USA	Perry	Perry, OH	BWR	First Energy	1238	1986/12	2026	Operating	
USA	Pilgrim	Plymouth, MA	BWR	Entergy	690	1972/7	2012	Operating	
USA	Piqua	Piqua, OH	OMR	USDOE	12	1963/1	1966/1	Decommissioned	Entombed
USA	Point Beach 1	Two Rivers, WI	PWR	Nuclear Management Corp	505	1970/11	2010	Operating	
USA	Point Beach 2	Two Rivers, WI	PWR	Nuclear Management Corp	507	1972/8	2012	Operating	
USA	Prairie Island 1	Red Wing, MN	PWR	Nuclear Management Corp	525	1973/12	2013	Operating	
USA	Prairie Island 2	Red Wing, MN	PWR	Nuclear Management Corp	524	1974/12	2014	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
USA	Quad Cities 1	Cordova, IL	BWR	Exelon	762	1972/4	2012	Operating	
USA	Quad Cities 2	Cordova, IL	BWR	Exelon	775	1972/5	2012	Operating	
USA	R E Ginna	Ontario, NY	PWR	RGE	498	1969/12	2009	Operating	
USA	Rancho Seco	Clay Station, CA	PWR	SMUD	873	1974/10	1989/6	Undergoing Decommissioning	
USA	River Bend	St Francisville, LA	BWR	Entergy	980	1985/12	2025	Operating	
USA	Salem 1	Salem, NJ	PWR	PSEG	1111	1976/12	2016	Operating	
USA	Salem 2	Salem, NJ	PWR	PSEG	1110	1981/6	2021	Operating	
USA	San Onofre 1	San Clemente, CA	PWR	SoCalEd	436	1967/7	1992/11	Undergoing Decommissioning	
USA	San Onofre 2	San Clemente, CA	PWR	SoCalEd	1070	1982/9	2022	Operating	
USA	San Onofre 3	San Clemente, CA	PWR	SoCalEd	1080	1983/9	2023	Operating	
USA	Saxton	Saxton, PA	Prototype	GPU Nuclear				Undergoing Decommissioning	
USA	Seabrook	Seabrook, NH	PWR	FPL Energy	1161	1990/5	2030	Operating	
USA	Sequoyah 1	Soddy-Daisy, TN	PWR	TVA Nuclear	1122	1980/7	2020	Operating	
USA	Sequoyah 2	Soddy-Daisy, TN	PWR	TVA Nuclear	1117	1981/12	2021	Operating	
USA	Shearon Harris	New Hill, NC	PWR	Progress Energy	900	1987/1	2027	Operating	
USA	Shippingport	Shippingport, PA	PWR/LWBR	USDOE	60	1957/12	1982/10	Decommissioned	
USA	Shoreham	Shoreham, NY	BWR	LILCO	820	1985/2	1986/8	Decommissioned	
USA	South Texas 1	Wadsworth, TX	PWR	Nuclear Operating Corp.	1264	1988/3	2028	Operating	
USA	South Texas 2	Wadsworth, TX	PWR	Nuclear Operating Corp.	1265	1989/4	2029	Operating	
USA	St Lucie 1	Ft. Pierce, FL	PWR	FPL	839	1976/5	2016	Operating	
USA	St Lucie 2	Ft. Pierce, FL	PWR	FPL	839	1983/6	2023	Operating	
USA	Surry 1	Surry, VA	PWR	Dominion Energy	810	1972/7	2012	Operating	
USA	Surry 2	Surry, VA	PWR	Dominion Energy	815	1973/3	2013	Operating	
USA	Susquehanna 1	Berwick, PA	BWR	PP&L	1190	1982/11	2022	Operating	
USA	Susquehanna 2	Berwick, PA	BWR	PP&L	1111	1984/7	2024	Operating	

Nuclear Power Plants

Country	Station Name	Location	Reactor Type	Owner	Capacity (MW(e))	Date of Operation	Date of Shutdown	Status	Comments
USA	Three Mile Island 1	Middletown, PA	PWR	AmerGen Energy	816	1974/6	2014	Operating	
USA	Three Mile Island 2	Middletown, PA	PWR	GPU Nuclear	880	1978/4	1979/3	Permanemtly Shut Down	Accident-3/79;In Safe Storage
USA	Trojan	Prescott, OR	PWR	PortGE	1095	1975/12	1992/11	Undergoing Decommissioning	
USA	Turkey Point 3	Miami, FL	PWR	FPL	693	1972/11	2012	Operating	
USA	Turkey Point 4	Miami, FL	PWR	FPL	693	1973/6	2013	Operating	
USA	Vallecitos EVSR	Pleasanton, CA	BWR	General Electric	5	1963	1967/1	Permanemtly Shut Down	In Safe Enclosure
USA	Vallecitos VBWR	Pleasanton, CA	BWR	General Electric	5	1957	1963/12	Permanemtly Shut Down	In Safe Enclosure
USA	Vermont Yankee	Vernon, VT	BWR	Entergy	506	1972/9	2012	Operating	
USA	Virgil C Sumner	Jenkinsville, SC	PWR	SCE&G	966	1982/11	2022	Operating	
USA	Vogtle 1	Waynesboro, GA	PWR	Southern Nuclear	1148	1987/3	2027	Operating	
USA	Vogtle 2	Waynesboro, GA	PWR	Southern Nuclear	1149	1989/4	2029	Operating	
USA	Waterford 3	Taft, LA	PWR	Entergy	1091	1985/3	2025	Operating	
USA	Watts Bar 1	Spring City, TN	PWR	TVA Nuclear	1128	1996/2	2036	Operating	
USA	WattsBar 2	Spring City, TN	PWR	TVA Nuclear	1177			Under Construction	
USA	Wolf Creek	Burlington, KS	PWR	WCNOC	1170	1985/6	2025	Operating	
USA	Yankee Rowe	Rowe, MA	PWR	YAEC	167	1960/11	1991/9	Decommissioned	
USA	Zion 1	Zion, IL	PWR	Exelon	1040	1973/6	1998/1	Undergoing Decommissioning	
USA	Zion 2	Zion, IL	PWR	Exelon	1040	1973/12	1998/1	Permanemtly Shut Down	In Safe Enclosure

Annex II

RESEARCH REACTORS

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Algeria	Es-Salam	Heavy water	15000	1992/2	2032	Operating	
Algeria	NUR	Pool	1000	1989/3	2029	Operating	
Argentina	RA-0	Tank	0.01	1965/1	2005	Operating	
Argentina	RA-1	Tank	40	1958/1	2008	Operating	50 years
Argentina	RA-2	Critical assembly	0.03	1966/7	1983/9	Permanently Shut Down	
Argentina	RA-3	Pool	5000	1968/8	2008	Operating	
Argentina	RA-4	Homogeneous (s)	0.001	1972/1	2012	Operating	
Argentina	RA-6	Pool	500	1982/9	2022	Operating	
Argentina	RA-8	Critical assembly	0.01	1997/6	2037	Operating	
Australia	CF	Critical assembly	0.0	1973/3	1975/9	Decommissioned	
Australia	HIFAR	Heavy water	10000	1958/1	2006	Operating	
Australia	HIFAR replacement	Pool	20000	2006	2046	Ordered/firmly planned	
Australia	Moata	Argonaut	100	1961/4	1998/5	Permanently Shut Down	
Austria	ASTRA	Pool	10000	1960/9	1999/7	Permanently Shut Down	
Austria	Sar-Graz	Argonaut	10	1965/5	2005	Operating	
Austria	Triga II, Vienna	Pool	250	1962/3	2007	Operating	45 years
Bangladesh	Triga MK II	Triga Mk II	3000	1986/9	2026	Operating	
Belarus	IRT-Minsk	Pool	4000	1962/4	1988/1	Decommissioned	
Belgium	BR-02	Pool	0.5	1959/12	1993/3	Permanently Shut Down	
Belgium	BR-1	Graphite	4000	1956/5	2006	Operating	50 years
Belgium	BR-2	Tank	100000	1961/6	2006	Operating	45 years
Belgium	BR-3	PWR	40900	1962/8	1987/6	Undergoing Decommissioning	
Belgium	Thetis RR-BN-1	Pool	250	1967/4	2007	Operating	
Belgium	Venus	Tank	0.5	1964/4	2004	Operating	
Brazil	Argonauta	Argonaut	0.2	1965/2	2005	Operating	
Brazil	IEA-R1	Pool	5000	1957/9	2007	Operating	50 years
Brazil	IPEN/MB-01	Critical assembly	0.1	1988/11	2028	Operating	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Brazil	IPR-R1	Triga Mk I	100	1960/11	2005	Operating	45 years
Bulgaria	IRT Sofia	Pool	2000	1961/9	1989/7	Permanently Shut Down	
Canada	Maple-1	Tank in pool	10000			Ordered/firmly planned	
Canada	Maple-2	Tank in pool	10000			Ordered/firmly planned	
Canada	MNR	Pool	5000	1959/4	2004	Operating	45 years
Canada	NRU	Heavy water	135000	1957/11	2005	Operating	
Canada	NRX	Heavy water	42000	1947/7	1993/3	Permanently Shut Down	
Canada	PTR	Pool	0.1	1957/11	1990/10	Permanently Shut Down	
Canada	Slowpoke Demo (SDR)	Heating	2000	1987/7	1993/6	Decommissioned	
Canada	Slowpoke, Alberta	Slowpoke	20	1977/4	2017	Operating	
Canada	Slowpoke, Saskatchewan	Slowpoke	20	1981/3	2021	Operating	
Canada	Slowpoke-2, Halifax	Slowpoke	20	1976/7	2016	Operating	
Canada	Slowpoke-2, Kanata	Slowpoke	20	1984/6	1989/4	Decommissioned	
Canada	Slowpoke-2, Montreal	Slowpoke	20	1976/5	2016	Operating	
Canada	Slowpoke-2, Ottawa	Slowpoke	20	1971/5	1984/1	Permanently Shut Down	
Canada	Slowpoke-2, RMC	Pool	20	1985/9	2025	Operating	
Canada	Slowpoke-2, Univ. of Toronto	Slowpoke	20	1971/6	1998/12	Decommissioned	
Canada	WR-1	Heavy water	60000	1965/11	1985/5	Permanently Shut Down	
Canada	ZED-2	Tank	0.2	1960/9	2005	Operating	45 years
Canada	ZEEP	Heavy water	0.0	1945/9	1970/10	Decommissioned	
Chile	La Rena, Rech-1	Pool	5000	1974/10	2014	Operating	
Chile	Rech-2	Pool	2000	1989/9	2029	Operating	
China	CFER	Fast breeder	65000			Under Construction	
China	HFETR	Tank	125000	1979/12	2019	Operating	
China	HFETR Critical	Critical assembly	0.0	1979/6	2019	Operating	
China	HTR-10	HTGR	10000	2000/2	2040	Operating	
China	HWRR-II	Heavy water	15000	1958/9	2008	Operating	50 years

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
China	LTHR (NHR-5)	Heating	5000	1989/11	2029	Operating	
China	MNSR IAE	Tank in pool	27	1984/3	2024	Operating	
China	MNSR-SD	Tank in pool	33	1989/5	2029	Operating	
China	MNSR-SH	Tank in pool	30	1991/12	2031	Operating	
China	MNSR-SZ	Tank in pool	30	1988/11	2028	Operating	
China	MTJR	Pool	5000	1991/3	2031	Operating	
China	PPR Pulsing	Pool	1000	1990/8	2030	Operating	
China	SPR	Pool	3500	1964/12	2004	Operating	
China	SPRR-300	Pool	3000	1979/6	2019	Operating	
China	TRR	Heavy water	40000	1973/1	1987	Permanently Shut Down	
China	Tsinghua Univ.	Pool - two cores	1000	1964/10	2004	Operating	
China	WBRL	Homogeneous (l)	100	1983/2	1989/2	Decommissioned	
China	Zero Power Reactor	Critical assembly	0.0	1966	1983	Permanently Shut Down	
China	ZPR Fast	Critical assembly	0.05	1970/6	2010	Operating	
China	ZPRL	Pool	30	1971/2	2011	Operating	
China, Taiwan	Thar	Argonaut	10	1974/4	1991/5	Decommissioned	
China, Taiwan	THMER	Mobile education	0.0	1975/11	1996	Permanently Shut Down	
China, Taiwan	Thor	Triga conversion	2000	1961/4	2006	Operating	45 years
China, Taiwan	TRR II	Tank	20000	2006	2046	Under Construction	
Colombia	IAN-R1	Pool	100	1965/1	2005	Operating	
Czech Rep	LR-0	Pool	5	1982/12	2022	Operating	
Czech Rep	LWR-15 Rez	Tank	10000	1957/9	2007	Operating	50 years
Czech Rep	SR-0	Pool	1	1971/1	1992	Decommissioned	
Czech Rep	TR-0	Tank	0.3	1972	1980/10	Decommissioned	
Czech Rep	VR-1 Vrabec	Pool	5	1990/3	2030	Operating	
Dem Rep Congo	Trico-1	Triga Mk I	50	1959/6	1970/6	Permanently Shut Down	
Dem Rep Congo	Trico-2	Triga Mk II	1000	1972/3	2012	Operating	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Denmark	DR-1	Homogeneous	2	1957/8	2003	Permanently Shut Down	
Denmark	DR-2	Tank	5000	1958/12	1975/11	Permanently Shut Down	
Denmark	DR-3	Heavy water	10000	1960/1	2000/9	Permanently Shut Down	
Egypt	ETRR-1	Tank	2000	1961/2	2006	Operating	45 years
Egypt	ETRR-2 (INSAS)	Pool	22000	1997/11	2037	Operating	
Finland	FIR-1	Triga Mk II	250	1962/3	2007	Operating	45 years
Finland	SCA	Subcritical assembly	0.0	1963/7	1975	Decommissioned	
France	Cabri	Pool	25000	1963	2008	Operating	45 years
France	Cesar	Critical assembly	10	1964/12	1977/8	Decommissioned	
France	EL 3	Heavy water	18000	1957	1979	Decommissioned	
France	EL 4	Heavy water	267000	1966/12	1985/7	Decommissioned	
France	EL1 (Zoe)	Tank	100	1948/12	1974	Permanently Shut Down	
France	EL2	Tank	2000	1952	1965	Permanently Shut Down	
France	Eole	Tank in pool	0.1	1965/12	2005	Operating	
France	Harmonie	Tank	1	1965/8	1996/1	Permanently Shut Down	
France	High Flux Reactor	Heavy water	58300	1971/7	2011	Operating	
France	Isis	Pool	700	1966/4	2006	Operating	
France	Marius	Critical assembly	0.4	1960/1	1983/4	Permanently Shut Down	
France	Masurca	Critical fast	3	1966/12	2006	Operating	
France	Melusine	Pool	8000	1958/7	1988/6	Permanently Shut Down	
France	Minerve	Pool	0.1	1959/9	2004	Operating	45 years
France	Mirene	Homogeneous	0.0	1975	1988/12	Decommissioned	
France	Nereide	Pool	500	1960/9	1982	Permanently Shut Down	
France	Orphee	Pool	14000	1980/12	2020	Operating	
France	Osiris	Pool	70000	1966/9	2006	Operating	
France	Pegase	Tank	30000	1963/4	1974	Permanently Shut Down	
France	Phebus	Pool	40000	1978/8	2018	Operating	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
France	Phenix	Fast breeder	563000	1973/8	2013	Operating	
France	Pile Azur	Critical assembly	0.1	1962/4	2007	Operating	45 years
France	Prototype Advanced Boiler	BWR	120000	1975/11	1996	Permanently Shut Down	
France	Rapsodie	LMFBR	40000	1963/1	1983/4	Permanently Shut Down	
France	Reactor Jules Horowitz	Tank in pool	100000	2008	2048	Under Construction	
France	Scarabee	Pool	100000	1982	2022	Operating	
France	Silene	Homogeneous	1	1974	2014	Operating	
France	Siloe	Pool	35000	1963/3	1997/12	Permanently Shut Down	
France	Siloette	Pool	100	1964/2	1985	Decommissioned	
France	Strasbourg Univ. Nuclear	Argonaut	100	1966/11	2006	Operating	
France	Triton	Pool	6500	1959/6	1982	Permanently Shut Down	
France	Ulysse	Argonaut	100	1961/7	2006	Operating	45 years
Georgia	IRT-M, Tbilisi	Pool	8000	1959/10	1990/10	Permanently Shut Down	
Germany	Adibka	Homogeneous	0.1	1967/3	1972/10	Decommissioned	
Germany	AEG Nullenergie	Tank	0.1	1967/6	1973	Decommissioned	
Germany	AKR	Homogeneous (s)	0.002	1978/7	2018	Operating	
Germany	ANEX	Critical assembly	0.1	1964/5	1979/3	Decommissioned	
Germany	BER-1	Pool/MTR	50	1958/7	1974/2	Decommissioned	
Germany	BER-II	Pool	10000	1973/12	2013	Operating	
Germany	FMRB	Pool	1000	1967/10	1995/12	Permanently Shut Down	
Germany	FR-2	Tank	44000	1961/3	1981/12	Permanently Shut Down	Safe Enclosure
Germany	FRF-1	Homogeneous	10	1958	1970	Decommissioned	
Germany	FRF-2	Triga conversion	1000	1977/10	1983	Decommissioned	
Germany	FRG-1	Pool	5000	1958/10	2008	Operating	50 years
Germany	FRG-2	Pool	15000	1963/3	1993/6	Permanently Shut Down	
Germany	FRH Hannover	Triga Mk I	250	1973/1	1997/1	Permanently Shut Down	Application for ecommissioning

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Germany	FRJ-1 (Merlin)	Pool	10	1962/2	1985/3	Permanently Shut Down	
Germany	FRJ-2	Heavy water	23000	1962/11	2007	Operating	45 years
Germany	FRM	Pool	4	1957/10	2000/7	Permanently Shut Down	
Germany	FRM II	Tank in pool	20000	2001/1	2041	Operating	
Germany	FRMZ	Triga Mk II	100	1965/8	2005	Operating	
Germany	FRN	Triga Mk III	1000	1972/8	1982/12	Permanently Shut Down	Safe Enclosure
Germany	Kahter	Critical assembly	0.1	1973/7	1985	Decommissioned	
Germany	Keiter	Critical assembly	0.001	1971/6	1982	Decommissioned	
Germany	KNK II	Sodium fast neutron	58000	1971	1991/8	Permanently Shut Down	
Germany	MZFR	Heavy water PWR	58000	1965/9	1984/5	Decommissioned	
Germany	NS Otto Hahn	PWR	38000	1968/8	1979/3	Decommissioned	
Germany	PR-10	Argonaut	0.18	1961/1	1976	Decommissioned	
Germany	RAKE	Tank	0.01	1969/10	1991/11	Decommissioned	
Germany	RFR	Tank	10000	1957/12	1991/6	Permanently Shut Down	
Germany	RRR	Argonaut	1	1962/12	1991/9	Decommissioned	
Germany	SAR	Argonaut	1	1959/6	1968	Decommissioned	
Germany	Sneak	Critical assembly	0.0	1966/12	1985/11	Decommissioned	
Germany	Stark	Argonaut	0.01	1963/1	1976/3	Decommissioned	
Germany	SUR 100 Hanover	Homogeneous (s)	0.0001	1971/12	2011	Operating	
Germany	SUR Aachen	Homogeneous (s)	0.0001	1965/9	2005	Operating	
Germany	SUR Berlin	Homogeneous (s)	0.001	1963/7	2008	Operating	45 years
Germany	SUR Bremen	Homogeneous (s)	0.0001	1967/10	1997/6	Decommissioned	
Germany	SUR Darmstadt	Homogeneous (s)	0.0001	1963/9	1989/11	Decommissioned	
Germany	SUR Furtwangen	Homogeneous (s)	0.001	1973/6	2013	Operating	
Germany	Sur Hamburg	Homogeneous (s)	0.0001	1965	1997	Decommissioned	
Germany	SUR Karlsruhe	Homogeneous (s)	0.0001	1966/3	1996/11	Decommissioned	
Germany	SUR Kiel	Homogeneous (s)	0.0001	1966/3	1997/12	Permanently Shut Down	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Germany	SUR Munchen	Homogeneous (s)	0.0001	1962/2	1981/8	Decommissioned	
Germany	SUR Stuttgart	Homogeneous (s)	0.0001	1964/4	2004	Operating	
Germany	SUR Ulm	Homogeneous (s)	0.0001	1965/12	2005	Operating	
Germany	Triga Heidelberg I	Triga Mk I	250	1966/8	1997/3	Permanently Shut Down	
Germany	Triga Heidelberg II	Triga Mk I	250	1978/2	1999/9	Permanently Shut Down	
Germany	ZLFR	Tank	0.01	1979/5	2019	Operating	Application for decommissioning
Ghana	Gharr-1	MNSR	30	1994/12	2034	Operating	
Greece	Demokritos, GRR-1	Pool	5000	1961/8	2006	Operating	45 years
Greece	GR-B	Critical assembly	0.0	1971/8	2011	Operating	
Greece	NTU	Pool	0.1	1970/10	1988	Permanently Shut Down	
Hungary	Budapest RR	Tank WWER	10000	1959/3	2004	Operating	
Hungary	Nuclear Training Reactor	Pool	100	1971/5	2011	Operating	
Hungary	ZR-6M	Critical assembly	0.0	1972/11	1990/12	Decommissioned	
India	Apsara	Pool	1000	1956/8	2006	Operating	50 years
India	Cirus	Heavy water	40000	1960/7	2005	Operating	45 years
India	Crit Fac for AHWR	Tank	0.1	2003/10	2043	Under Construction	
India	Dhruva	Heavy water	100000	1985/8	2025	Operating	
India	FBTR	LMFBR	40000	1985/10	2025	Operating	
India	Kamini	U233 fuel	30	1996/10	2036	Operating	
India	Purnima I	Fast	0.01	1972/5	1983	Decommissioned	
India	Purnima II	Homogeneous	0.01	1984/5	1986/6	Decommissioned	
India	Purnima III	Slowpoke	0.001	1990/9	1993/7	Decommissioned	
India	Zerlina	Tank	0.1	1961/1	1963	Decommissioned	
Indonesia	G A Siwabessy (RSG-GAS)	Pool	30000	1987/7	2027	Operating	
Indonesia	Kartini	Triga Mk II	100	1979/1	2019	Operating	
Indonesia	Triga II, Bandung	Triga Mk II	2000	1964/10	2004	Operating	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Iran	Esfahan GSCR	Subcritical assembly	0.0	1992	2032	Operating	
Iran	Esfahan HWZPR	Critical assembly	0.1	1995/6	2035	Operating	
Iran	Esfahan LWSCR	Subcritical assembly	0.0	1992	2032	Operating	
Iran	Esfahan MNSR	MNSR	30	1994/3	2034	Operating	
Iran	TRR	Pool	5000	1967/11	2007	Operating	
Iraq	IRT- 5000	Pool	5000	1967	1991/3	Permanently Shut Down	
Iraq	Tammuz-2	Pool	500	1987/3	1991/3	Permanently Shut Down	
Israel	IRR-1	Pool	5000	1960/6	2005	Operating	45 years
Israel	IRR-2	Heavy water	26000	1963/12	2008	Operating	45 years
Italy	AGN 201, Costanza	Homogeneous (s)	0.02	1960/2	2005	Operating	45 years
Italy	Essor	Heavy water	43000	1967/3	1983/6	Permanently Shut Down	
Italy	L-54M	Homogeneous	50	1959/11	1979/7	Decommissioned	
Italy	Lena, Pavia	Triga Mk II	250	1965/11	2005	Operating	
Italy	Rana	Pool	10	1965/2	1981	Permanently Shut Down	
Italy	RB-1	Critical graphite	20	1962/7	1981/2	Permanently Shut Down	
Italy	RB-2	Argonaut	10	1963/5	1980/12	Permanently Shut Down	
Italy	RB-3	Heavy water	0.1	1971/8	1989/11	Permanently Shut Down	
Italy	Ritmo, RC-4	Pool	0.01	1965/7	1978	Decommissioned	
Italy	Rospo 2	Pool	0.2	1963	1975	Decommissioned	
Italy	RSV Tapiro	Fast neutron	5	1971/4	2011	Operating	
Italy	RTS-1	Pool	5000	1963/4	1980/3	Decommissioned	
Italy	SM-1	Subcritical assembly	0.0	1961	2006	Operating	45 years
Italy	Struttura Sottocritti	Subcritical assembly	0.0	1962	1977/11	Decommissioned	
Italy	Triga, RC-1	Triga Mk II	1000	1960/6	2005	Operating	45 years
Jamaica	UWI ICENS-Slowpoke	Slowpoke	20	1984/3	2024	Operating	
Japan	DCA	Critical assembly	1	1969/12	2009	Operating	
Japan	FCA	Fast critical assembly	2	1967/4	2007	Operating	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Japan	HTR	Pool	100	1961/12	1975/2	Permanently Shut Down	
Japan	HTTR	HTGR	30000	1998/11	2038	Operating	
Japan	JMTR	Tank	50000	1968/3	2008	Operating	
Japan	JMTRC	Pool	0.10	1965/10	1995/12	Decommissioned	
Japan	Joyo	LMFBR	140000	1977/4	2017	Operating	
Japan	JRR-2	Heavy water	10000	1960/10	1996/12	Decommissioned	
Japan	JRR-3	Pool	10000	1962	1983	Permanently Shut Down	
Japan	JRR-3 (M)	Pool	20000	1990/3	2030	Operating	
Japan	JRR-4	Pool	3500	1965/1	2005	Operating	
Japan	KUCA	Critical assembly	0.1	1974/8	2014	Operating	
Japan	KUR	Tank	5000	1964/6	2009	Operating	45 years
Japan	MITRR	Triga Mk II	100	1963/1	1989/12	Permanently Shut Down	
Japan	NAIG (Toshiba)	Critical assembly	0.2	1963/12	2008	Operating	45 years
Japan	NSRR	Triga ACPR	300	1975/6	2015	Operating	
Japan	Stacy	Critical assembly	0.2	1995/2	2035	Operating	
Japan	TCA	Critical assembly	0.2	1962/8	2007	Operating	45 years
Japan	Tracy	Critical assembly	10	1995/12	2038	Operating	
Japan	Triga II, Rikkyo	Triga Mk II	100	1961/12	2000/3	Permanently Shut Down	
Japan	TTR	Pool	100	1962/3	2007	Operating	45 years
Japan	UTR Kinki	Modified Argonaut	0.001	1961/11	2006	Operating	45 years
Japan	VHTRC	Critical assembly	0.01	1985/5	2025	Operating	
Japan	Yayoi	Fast neutron	2	1971/4	2011	Operating	
Kazakhstan	EWG-1	Tank	60000	1972/1	2012	Operating	
Kazakhstan	IGR	Tank	10000	1961/1	2006	Operating	45 years
Kazakhstan	RA	Tank	400			Undergoing Decommissioning	
Kazakhstan	WWR-K	Tank	6000	1967/10	2007	Operating	
Korea, DPR	IRT DPRK	Pool	8000	1965/8	2005	Operating	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Korea, Rep	AGN-201 Suwon	Homogeneous (s)	0.001	1982/12	2022	Operating	
Korea, Rep	HANARO	Open pool	30000	1995/2	2035	Operating	
Korea, Rep	KRR-1	Triga Mk II	250	1962/3	1995/12	Undergoing Decommissioning	
Korea, Rep	KRR-2	Triga Mk III	2000	1972/4	1995/12	Undergoing Decommissioning	
Latvia	IRT-M	Pool	5000	1961/9	1998/6	Permanently Shut Down	
Latvia	RKS-25	Pool	0.03	1966/9	1993/2	Permanently Shut Down	
Libya	IRT-1	Pool	10000	1981/8	2021	Operating	
Malaysia	MINT Triga	Triga Mk II	1000	1982/6	2022	Operating	
Mexico	Chicago Model 9000	Subcritical assembly	0.0	1969/5	2009	Operating	
Mexico	Nuclear Chicago Mod 2000	Subcritical assembly	0.0	1969/1	2009	Operating	
Mexico	SUR-100, Unam	Homogeneous (s)	0.0	1972/9	1989/5	Permanently Shut Down	
Mexico	Triga Mark III	Triga Mk III	1000	1968/11	2008	Operating	
Morocco	MA-R1	Triga Mk II	2000	2001/12	2041	Operating	
Netherlands	BARN	Pool	100	1963/4	1980	Decommissioned	
Netherlands	HFR Petten	Tank	45000	1961/11	2006	Operating	45 years
Netherlands	HOR	Pool	2000	1963/4	2008	Operating	45 years
Netherlands	KSTR	Aqueous breeder	1000	1974/5	1977/5	Decommissioned	
Netherlands	LFR	Argonaut	30	1960/9	2005	Operating	45 years
Norway	Haiden	Heavy water	20000	1959/6	2004	Operating	45 years
Norway	Jeep II	Tank	2000	1966/12	2006	Operating	
Pakistan	Parr-1	Pool	10000	1965/12	2005	Operating	
Pakistan	PARR-2	MNSR	30	1989/11	2029	Operating	
Peru	PER-2 (RP-10)	Pool	10000	1988/11	2028	Operating	
Peru	RP-0	Critical assembly	0.001	1978/7	2018	Operating	
Philippines	PRR-1	Triga conversion	3000	1963/8	1988/1	Permanently Shut Down	
Poland	Agata	Pool	0.1	1973/5	1995	Permanently Shut Down	
Poland	Anna	Critical assembly	0.1	1963	1977/11	Decommissioned	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Poland	Ewa	Tank WWER	10000	1958/6	1995/2	Permanently Shut Down	
Poland	Maria	Pool	30000	1974/12	2024	Operating	
Poland	Maryla	Pool	100	1967/2	1973	Decommissioned	
Portugal	RPI	Pool	1000	1961/4	2006	Operating	45 years
Romania	RP-01	Tank	0.0	1976/2	1977	Decommissioned	
Romania	Triga Pitesti pulsed	Triga dual core	500	1979/11	2019	Operating	
Romania	Triga Pitesti SS	Triga dual core	14000	1979/11	2019	Operating	
Romania	VVR-S	Tank WWER	2000	1957/7	1997/12	Permanently Shut Down	
Russian Fed	1120	Critical assembly	0.0	1975	1996	Permanently Shut Down	
Russian Fed	1125	Critical assembly	0.6	1975	2015	Operating	
Russian Fed	27/BM	Tank	70000	1956		Permanently Shut Down	
Russian Fed	27/BT	Tank	70000	1961		Permanently Shut Down	
Russian Fed	659	Critical assembly	0.1	1963	2008	Operating	45 years
Russian Fed	659-L	Critical assembly	0.0	1979		Permanently Shut Down	
Russian Fed	AM-1	Uranium-graphite	10000	1954/6	2004	Operating	50 years
Russian Fed	AMBF-2	Critical assembly	0.1	1984	2024	Operating	
Russian Fed	Arbus	Tank	12000	1963	1988/5	Decommissioned	
Russian Fed	Argus	Homogeneous (l)	20	1981/12	2021	Operating	
Russian Fed	Argus 2	Homogeneous	50			Decommissioned	
Russian Fed	Astra	Critical assembly	0.1	1981	2021	Operating	
Russian Fed	B-1000	Critical assembly	0.2	1986	1998	Permanently Shut Down	
Russian Fed	B-6	Prompt burst	0.1	1996	2036	Operating	
Russian Fed	BARS-2	Prompt burst	0.0	1971	2011	Operating	
Russian Fed	BARS-3M	Critical assembly	0.0	1988	1996	Decommissioned	
Russian Fed	BARS-4	Prompt burst	0.0	1979	2019	Operating	
Russian Fed	BARS-5	Fast burst	10	1986/1		Decommissioned	
Russian Fed	BFS-1	Critical assembly	0.2	1961/1	2006	Operating	45 years

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Russian Fed	BFS-2	Critical assembly	1	1969/1	2009	Operating	
Russian Fed	BIGR	U-graphite reactor				Operating	
Russian Fed	BIR-2M	U-metal				Operating	
Russian Fed	BOR 60	Fast breeder	60000	1969/12	2009	Operating	
Russian Fed	BR-1	Critical assembly	0.05	1965	2005	Operating	
Russian Fed	BR-10	Fast neutron	8000	1958/6	2008	Operating	50 years
Russian Fed	CA MIR-M1	Critical assembly	0.01	1966	2006	Operating	
Russian Fed	CA-CM	Critical assembly	0.02	1970	2010	Operating	
Russian Fed	COBR	Critical assembly	0.3	1970		Permanently Shut Down	
Russian Fed	Delta	Critical assembly	0.1	1985	2025	Operating	
Russian Fed	EPHIR-2M	Critical assembly	0.1	1973	2013	Operating	
Russian Fed	F-1	Graphite uranium	24	1946/12	2006	Operating	60 years
Russian Fed	FBR-L	Fast burst	5	1981/7	2021	Operating	
Russian Fed	FG-5	Critical assembly	0.1	1967		Decommissioned	
Russian Fed	FM-MR	Critical assembly	0.1	1971		Permanently Shut Down	
Russian Fed	FS-1M	Critical assembly	0.002	1970/1	2010	Operating	
Russian Fed	G-1	Critical assembly	0.2	1964	2003	Permanently Shut Down	
Russian Fed	Gamma	Tank	125	1982/1	2022	Operating	
Russian Fed	Grog	Critical assembly	0.1	1980	2020	Operating	
Russian Fed	Hydra	Homogeneous (l)	10	1972	2012	Operating	
Russian Fed	IBR-1	Fast	6	1960/12	1969	Permanently Shut Down	
Russian Fed	IBR-2	Fast reactor	2000	1977/11	2017	Operating	
Russian Fed	IBR-30	Fast neutron	30	1969	2009	Operating	
Russian Fed	IFR	Fast neutron	6	1960/12	1969	Decommissioned	
Russian Fed	IGRIK	Homogeneous	30	1975/12	2015	Operating	
Russian Fed	IIN-3M	Prompt burst	0.0	1972	1982	Decommissioned	
Russian Fed	INN-3N	Prompt burst	0.0	1974	2000	Decommissioned	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Russian Fed	IR-50	Pool	50	1961/2	1993	Permanently Shut Down	
Russian Fed	IR-8	Pool	8000	1981/8	2021	Operating	
Russian Fed	IRT-M Moscow	Pool	8000	1957/11		Decommissioned	
Russian Fed	IRT-MEPhl	Open pool	2500	1967/5	2007	Operating	
Russian Fed	IRT-T Tomsk	Pool	6000	1967/7	2007	Operating	
Russian Fed	IRV-IM	Pool	2000	1974	1993	Permanently Shut Down	
Russian Fed	IVV-2M	Pool	15000	1966/4	2006	Operating	
Russian Fed	Kvant	Critical assembly	1	1990	2030	Operating	
Russian Fed	MAKET	Critical assembly	0.1	1976/1	2016	Operating	
Russian Fed	MATR-2	Critical assembly	0.4	1963	2008	Operating	45 years
Russian Fed	Mayak	Critical assembly	0.01	1967		Permanently Shut Down	
Russian Fed	Mer	Critical assembly	0.2	1970	2010	Operating	
Russian Fed	MIR- M1	Pool	100000	1966/12	2006	Operating	
Russian Fed	MIR-M1	Pool	100000	1966/12	2006	Operating	
Russian Fed	MR	Pool	50000	1963/12	1992	Permanently Shut Down	
Russian Fed	NART SISS	Critical assembly	0.01	1983	2023	Operating	
Russian Fed	NHUAR	Homogeneous	10	1990/6	2030	Operating	
Russian Fed	OP	Tank	300	1989/12	2029	Operating	
Russian Fed	P	Critical assembly	0.2	1987	2027	Operating	
Russian Fed	PIK	Tank	100000			Under Construction	
Russian Fed	PIK Physical	Tank	0.1	1983/12	2023	Operating	
Russian Fed	RBMK	Critical assembly	0.025	1981	2021	Operating	
Russian Fed	RBT-10/1	Pool	10000	1983/12	1994/3	Permanently Shut Down	
Russian Fed	RBT-10/2	Pool	7000	1984/12	2024	Operating	
Russian Fed	RBT-10/6	Pool	6000	1975/10	2015	Operating	
Russian Fed	RF-GS	Critical assembly	0.1	1962	2007	Operating	45 years
Russian Fed	RG-1M	Pool	100	1970/4	1998/6	Permanently Shut Down	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Russian Fed	Romashka	Homogeneous	40	1964/8	1966	Decommissioned	
Russian Fed	RPT	Graphite	10000	1952/4	1962	Decommissioned	
Russian Fed	S111	Critical assembly	0.0			Decommissioned	
Russian Fed	SBR-2	Fast neutron	150	1957/3	1957/4	Decommissioned	
Russian Fed	SF-1	Critical assembly	0.1	1972	2012	Operating	
Russian Fed	SF-3	Critical assembly	0.1	1979	1993	Decommissioned	
Russian Fed	SF-5	Critical assembly	0.1	1972	1993	Permanently Shut Down	
Russian Fed	SF-7	Critical assembly	0.1	1975	2015	Operating	
Russian Fed	SGO	Critical assembly	0.1	1969	1994	Permanently Shut Down	
Russian Fed	SK Physical	Critical assembly	0.6	1997	2037	Operating	
Russian Fed	SM	Pressurized	100000	1961/10	2006	Operating	45 years
Russian Fed	Stend-1	Critical assembly	2	1966	1998	Permanently Shut Down	
Russian Fed	Stend-2	Critical assembly	2	1969	2009	Operating	
Russian Fed	Stend-3	Critical assembly	2	1967	2007	Operating	
Russian Fed	Stend-4	Critical assembly	0.5	1967	2007	Operating	
Russian Fed	Stend-5	Critical assembly	0.5	1967	2007	Operating	
Russian Fed	Stend-6	Critical assembly	0.05	1968	1998	Permanently Shut Down	
Russian Fed	Stend-7	Critical assembly	0.7	1979	1994	Permanently Shut Down	
Russian Fed	Strela	Critical assembly	0.02	1968	2008	Operating	
Russian Fed	T-2	Critical assembly	0.0	1965		Permanently Shut Down	
Russian Fed	Tibr-1M	Prompt burst	0.0	1976	2016	Operating	
Russian Fed	Topaz	Tank	150	1966		Decommissioned	
Russian Fed	TVR	Heavy water	2500	1949/4	1986	Permanently Shut Down	
Russian Fed	U-3	Pool	50	1964/1	1992/9	Permanently Shut Down	
Russian Fed	UG	Critical assembly	0.1	1965	2002	Permanently Shut Down	
Russian Fed	VIR-2M	Homogeneous (l)				Operating	
Russian Fed	VK-50	BWR	200000	1965	2005	Operating	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Russian Fed	VRL-2	Pool	100	1959	1974	Permanently Shut Down	
Russian Fed	VRL-3	Pool	100	1961	1969	Permanently Shut Down	
Russian Fed	WWR-2	Tank	3000	1954/7		Decommissioned	
Russian Fed	WWR-C	Tank				Operating	
Russian Fed	WWR-M	Pool	18000	1959/12	2004	Operating	45 years
Russian Fed	WWR-TS	Tank	15000	1964/10	2004	Operating	
Serbia/Montenegro	RA	Heavy water	6500	1959/12	1984/6	Undergoing Decommissioning	
Serbia/Montenegro	RB	Heavy water	0.001	1958/4	2008	Operating	50 years
Slovenia	Triga	Triga Mk II	250	1966/5	2006	Operating	
South Africa	SAFARI-1	Tank in pool	20000	1965/3	2005	Operating	
Spain	ARBI	Argonaut	10	1962/6	1975/2	Decommissioned	
Spain	ARGOS	Argonaut	1	1961/6	1975/9	Decommissioned	
Spain	Coral-1	Critical assembly	0.05	1968/3	1988/6	Decommissioned	
Spain	JEN-1	Pool	3000	1958/10	1987/2	Permanently Shut Down	
Sweden	Kritz	Critical assembly	0.1	1969/10	1976	Decommissioned	
Sweden	R-1		600	1954/7	1976	Decommissioned	
Sweden	R-2	Tank	50000	1960/5	2005	Operating	45 years
Sweden	R-2 0	Pool	1000	1960/6	2005	Operating	45 years
Switzerland	AGN-201	Homogeneous (s)	0.02	1958/6	1987	Decommissioned	
Switzerland	AGN-211	Homogeneous (s)	2	1959/8	2004	Operating	45 years
Switzerland	Crocus	Critical assembly	0.1	1983/7	2023	Operating	
Switzerland	Diorit	Tank	30000	1960/10	1977/7	Undergoing Decommissioning	
Switzerland	Proteus	Critical assembly	1	1968/1	2008	Operating	
Switzerland	Saphir	Pool	10000	1957/4	1994/5	Permanently Shut Down	
Syria	SRR 1	MNSR	30	1996/3	2036	Operating	
Thailand	TRR-1/M1	Triga Mk III	2000	1977/11	2017	Operating	
Thailand	TRR-2	MPR10	5000	2001	2041	Operating	

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Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
Turkey	ITU-TRR	Triga Mk II	250	1979/3	2019	Operating	
Turkey	TR-1	Pool	1000	1962	1977/9	Permanently Shut Down	
Turkey	TR-2	Pool	5000	1981/12	1995/7	Permanently Shut Down	
UK	Bepo	Graphite	6500	1962	1968/12	Decommissioned	
UK	Berkeley Zero Energy	Graphite	1	1966/4	1988	Decommissioned	
UK	Daphne	Heavy water	0.1	1962	1967/12	Decommissioned	
UK	DFR	Fast breeder	65000	1959/11	1977/3	Undergoing Decommissioning	
UK	Dido	Heavy water	26000	1956/11	1990/3	Decommissioned	
UK	Dimple	Pool	0.1	1962	1995/6	Decommissioned	
UK	Dragon	Helium cooled	20000	1964	1976	Decommissioned	
UK	Gleep	Graphite	50	1947/8	1990/9	Permanently Shut Down	
UK	Hazel	Homogeneous (l)	0.0	1957	1958	Decommissioned	
UK	Hector	Zero power	0.1	1963/3	1977	Decommissioned	
UK	Hector, graphite	Graphite	0.1	1963/3	1976	Decommissioned	
UK	Herald	Pool	5000	1960	1988/9	Undergoing Decommissioning	
UK	Hero	Graphite	3	1962/6	1968/6	Decommissioned	
UK	Horace	Critical assembly	0.01	1958/5	1976	Decommissioned	
UK	ICI Triga Reactor	Triga Mk I	250	1971/8	1996/6	Decommissioned	
UK	Imperial College Reactor	Pool	100	1965/9	2005	Operating	
UK	Jason	Argonaut	10	1959/9	1996/10	Decommissioned	
UK	Juno	Critical assembly	0.1	1964/3	1973/12	Decommissioned	
UK	Lido	Pool	300	1956/9	1974/9	Decommissioned	
UK	Merlin	Pool	5000	1959/7	1976	Decommissioned	
UK	MTR - Dounreay	Heavy water	22500	1958/5	1969/5	Decommissioned	
UK	Neptune	Pool	0.1	1963	2008	Operating	45 years
UK	Nestor	Argonaut	30	1961	1995/6	Decommissioned	
UK	Pluto	Heavy water	26000	1957/10	1990/3	Decommissioned	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
UK	QMC UTR-B	Argonaut	100	1964/8	1982	Decommissioned	
UK	Universities Research Reactor	Argonaut	300	1964/7	1991/7	Decommissioned	
UK	UTR-300	Argonaut	300	1963/6	1995/9	Permanently Shut Down	
UK	Vera	Critical fast	0.1	1961	1971/12	Decommissioned	
UK	Viper	Fast burst	0.5	1967/5	2007	Operating	
UK	Vulcan	Tank		1987/7	2027	Operating	
UK	Vulcan, DS/M P	PWR	0	1961	1997/12	Permanently Shut Down	
UK	Windscale AGR	Graphite AGR	120000	1962/8	1981/4	Decommissioned	
UK	Zebra	Critical fast	1	1962/12	1982/9	Permanently Shut Down	
UK	Zenith I	Graphite	0.5	1959/12	1972/6	Decommissioned	
UK	Zenith II	Graphite	1	1972/3	1975	Decommissioned	
UK	Zephyr	Critical fast	0.002	1954/1	1963/6	Decommissioned	
UK	Zeus	Critical fast	0.1	1955	1957/9	Decommissioned	
Ukraine	SNI-IR-100	Pool	200	1967/4	1995	Permanently Shut Down	
Ukraine	SPh-IR-100	Critical assembly	0.0	1967/7	1995	Permanently Shut Down	
Ukraine	WWR-M	Tank WWER	10000	1960/12	2005	Operating	45 years
Uruguay	RU-1	Pool	1	1978/4	1986/9	Permanently Shut Down	
US	AF NETF	Tank	10000	1959	1971	Permanently Shut Down	
US	ATUTR	Triga Mk I	250	1989	1995/2	Permanently Shut Down	
US	FBR	Fast burst	10000	1964	2004	Operating	
US	SHEBA	Homogeneous	2	1980/9	2020	Operating	
USA	ACPR	Triga ACPR	4000	1967/6	2007	Operating	
USA	AFRRI	Triga Mk F	1000	1963	2008	Operating	45 years
USA	AFSR	Fast neutron	1	1959		Permanently Shut Down	
USA	AGN 201, Argonne	Homogeneous (s)	0.0	1957	1972	Permanently Shut Down	
USA	AGN-201, Brigham Young Univ.	Homogeneous (s)	0.005	1967/9	1982/5	Decommissioned	
USA	AGN-201, California Polytechnic	Homogeneous (s)	0.0	1973	1978/7	Decommissioned	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	AGN-201, Catholic Univ.	Homogeneous (s)	0.005	1957/11	1983/3	Decommissioned	
USA	AGN-201, Colorado State Univ.	Homogeneous (s)	0.0	1957	1974	Permanently Shut Down	
USA	AGN-201, Georgia Tech	Homogeneous (s)	0.0001	1968/1	1985	Decommissioned	
USA	AGN-201, Idaho State Univ.	Homogeneous (s)	0.01	1967/1	2007	Operating	
USA	AGN-201, Memphis State	Homogeneous (s)	0.005	1977	1985	Decommissioned	
USA	AGN-201, New York Univ.	Homogeneous (s)	0.0	1968/6	1973	Permanently Shut Down	
USA	AGN-201, Oklahoma State Univ.	Homogeneous (s)	0.005	1957/8	1974/3	Decommissioned	
USA	AGN-201, Oregon State Univ.	Homogeneous (s)	0.005	1959	1974/12	Permanently Shut Down	
USA	AGN-201, Polytechn. of New York	Homogeneous (s)	0.005	1967	1973	Permanently Shut Down	
USA	AGN-201, Texas A&M	Homogeneous (s)	0.01	1957	2007	Operating	50 years
USA	AGN-201, Tuskegee Univ.	Homogeneous (s)	0.0	1974	1982/6	Decommissioned	
USA	AGN-201, Univ. of Delaware	Homogeneous (s)	0.0	1958/7	1977	Decommissioned	
USA	AGN-201, Univ. of New Mexico	Homogeneous (s)	0.01	1966	2006	Operating	
USA	AGN-201, Univ. of Utah	Homogeneous (s)	0.01	1957/9	1988	Decommissioned	
USA	AGN-211, Rice Univ.	Homogeneous (s)	0.005	1959	1967	Decommissioned	
USA	AGN-211, Univ. of Oklahoma	Homogeneous (s)	0.01	1959/2	1989	Decommissioned	
USA	AGN-211, West Virginia Univ.	Homogeneous (s)	0.075	1959	1972	Decommissioned	
USA	ALRR Ames	Heavy water	5000	1964	1977	Decommissioned	
USA	AMRR	Pool	5000	1960/10	1970/10	Decommissioned	
USA	APFA-III	Critical assembly	1	1967	1973	Decommissioned	
USA	APRFR	Fast burst	10	1968	2008	Operating	
USA	ARMF	Pool	100	1960/10	1991	Permanently Shut Down	
USA	ARR (L-54)	Homogeneous (s)	75	1956	1967	Decommissioned	
USA	ARRR	Triga conversion	250	1964/7	2004	Operating	
USA	ATR	Tank	250000	1967/7	2007	Operating	
USA	ATRC	Pool	5	1964/5	2004	Operating	
USA	ATSR	Pool	10	1957	1988/9	Decommissioned	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	ATSR	Tank	10000	1954	1971	Permanently Shut Down	
USA	Battelle Research Reactor	Pool	2000	1956	1975	Permanently Shut Down	
USA	BAWTR	Pool	6000	1964	1971/12	Decommissioned	
USA	Berkeley Research Reactor	Triga Mk III	1000	1966/8	1987/2	Decommissioned	
USA	BGRR	Graphite	20000	1950	1969	Undergoing Decommissioning	
USA	Big Ten	Critical assembly	5	1972	2012	Operating	
USA	BMRC SUNY Buffalo	Pool	2000	1964/6	1994/7	Permanently Shut Down	
USA	Borax-1	Experimental	1400	1953/7	1954	Decommissioned	
USA	Borax-2	Experimental	5500	1954/10	1958	Decommissioned	
USA	Borax-3	Experimental	5500	1954/10	1958	Decommissioned	
USA	Borax-4	Experimental	5500	1954/10	1958	Decommissioned	
USA	Borax-5	Experimental	20000	1962	1964	Decommissioned	
USA	Brookhaven Medical Research Reactor	Tank	3000	1959/3	2002	Permanently Shut Down	
USA	BRTR, Univ. of Kansas	Pool	250	1961/6	1986/6	Decommissioned	
USA	Bulk Shielding Reactor	Pool	2000	1950/12	1991/9	Permanently Shut Down	
USA	Cavalier Reactor	Pool	0.1	1974	1987	Permanently Shut Down	
USA	CFRMF	Pool	100	1962/12	1991	Undergoing Decommissioning	
USA	Chicago Pile 1	Graphite pile	0.2	1942/12	1943	Decommissioned	
USA	Chicago Pile 11	Argonaut	10	1957/2	1972	Decommissioned	
USA	Chicago Pile 2	Graphite pile	2	1943	1954	Decommissioned	
USA	Chicago Pile 3	Heavy water	300	1944/5	1963	Decommissioned	
USA	Chicago Pile 5	Heavy water	5000	1954/2	1979/3	Decommissioned	
USA	Cintichem Nuclear Reactor	Pool	5000	1961/9	1990/10	Decommissioned	
USA	Clementine	Critical assembly	25	1947/11	1953	Permanently Shut Down	
USA	Comet	Critical assembly	0.0	1952		Permanently Shut Down	
USA	Curtiss-Wright	Pool	3000	1958/4	1959	Decommissioned	
USA	CX-10	Critical assembly	1	1958	1983/9	Decommissioned	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	D1G Destroyer Prototype	Pressurized		1962	2007	Operating	45 years
USA	Demo Reactor	Pool	10	1969	1969	Decommissioned	
USA	Diamond Ordnance Reactor Facility	Triga Mk F	250	1961	1970/10	Permanently Shut Down	
USA	Dow Triga	Triga Mk I	300	1967/7	2007	Operating	
USA	EAEP	Pool	10	1963	1969	Decommissioned	
USA	EBR I	Sodium fast neutron	1200	1951/12	1964	Decommissioned	Museum
USA	EBR II	Sodium fast neutron	62500	1961/9	1994/9	Permanently Shut Down	
USA	EBWR	BWR prototype	100000	1956/12	1967/7	Decommissioned	
USA	ETR	Tank	175000	1957/9	1981	Permanently Shut Down	
USA	ETRC	Tank	50	1957	1981	Permanently Shut Down	
USA	Fast Flux Test Facility	Sodium fast	400000	1980/2	1992/3	Permanently Shut Down	
USA	Flattop	Critical assembly	0.1	1957	2007	Operating	50 years
USA	Ford Nuclear Reactor	Pool	2000	1957/9	2007	Operating	50 years
USA	FRAN	Prompt burst	0.0	1962	1970/10	Permanently Shut Down	
USA	FS-1	Critical assembly	1	1967	1970/10	Decommissioned	
USA	Gas Cavity Reactor	Gas cavity	2200	1960	1962	Permanently Shut Down	
USA	General Atomics-Triga F	Triga Mk F	250	1960/7	1995/4	Permanently Shut Down	
USA	General Atomics-Triga I	Triga Mk I	250	1958/5	1997/10	Permanently Shut Down	
USA	General Atomics-Triga III	Triga Mk III	1500	1966	1975	Permanently Shut Down	
USA	GETR	Tank	50000	1958/12	1977/12	Permanently Shut Down	
USA	Godiva	Critical assembly	1	1967	2007	Operating	
USA	GSTR	Triga Mk I	1000	1969/2	2009	Operating	
USA	GTRR, Georgia Tech	Heavy water	5000	1964/12	1997/7	Decommissioned	
USA	Health Physics Research Reactor	Pulsing	10	1963/5	1991/2	Decommissioned	
USA	Heavy Water Components Treat Reactor	Heavy water	61000	1962/3	1964	Permanently Shut Down	
USA	HFIR	Tank in Pool	85000	1965/8	2005	Operating	
USA	High Flux Beam Reactor	Heavy water	60000	1965/10	1996/12	Permanently Shut Down	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	Honeycomb	Critical assembly	0.0	1956	2006	Operating	50 years
USA	HOTCE	Critical assembly	0.0	1956	1961	Permanently Shut Down	
USA	HST Rocky Flats	Critical assembly	0.0	1965	1989/10	Permanently Shut Down	
USA	HTLTR	Graphite	2	1967	1971	Permanently Shut Down	
USA	HTR	Graphite	0.03	1945/2	1976	Permanently Shut Down	
USA	HTRE-1	Air Cooled	20000	1956	1957	Decommissioned	Mobile
USA	HTRE-2	Air Cooled	14000	1957	1961	Decommissioned	Mobile
USA	HTRE-3	Air Cooled	32000	1958	1961	Decommissioned	Mobile
USA	Hydro	Critical assembly	0.0	1956	1970/10	Permanently Shut Down	
USA	Hypo	Homogeneous	6	1944/12	1950/10	Permanently Shut Down	
USA	IRL	Pool	5000	1958/12	1975	Permanently Shut Down	
USA	JANUS Reactor	Tank	200	1964	1992	Decommissioned	
USA	Jezebel	Critical assembly	0.0	1954	1987	Permanently Shut Down	
USA	Juggernaut Reactor	Argonaut	250	1962/1	1970/10	Permanently Shut Down	
USA	Kansas State Univ.	Triga Mk II	250	1962/10	2007	Operating	45 years
USA	Kinetic Energy Water Boiler	Homogeneous (l)	50	1956/7	1967	Permanently Shut Down	
USA	Kinglet	Homogeneous (l)	0.0	1972	1977	Permanently Shut Down	
USA	Kiwi	Space Test	0.0	1965	1965	Permanently Shut Down	
USA	Kukla	Prompt burst	0.0	1959	1964	Permanently Shut Down	
USA	L-47	Homogeneous (l)	0.0	1957/12	1958/8	Decommissioned	
USA	L-77, Rockwell	Homogeneous (l)	0.01	1960/10	1974/9	Decommissioned	
USA	L-77, Univ. of Nevada	Homogeneous (l)	10	1963	1974	Decommissioned	
USA	L-77, Univ. of Puerto Rico	Homogeneous (l)	10	1959/8	1979	Permanently Shut Down	
USA	L-77, Univ. of Wyoming	Homogeneous (l)	0.01	1959/2	1974	Decommissioned	
USA	L-85, Nuclear Examination	Homogeneous (l)	3	1952/4	1980/2	Decommissioned	
USA	Lattice Test Reactor	Heavy water	0.5	1967/1	1979/8	Permanently Shut Down	
USA	LIWB	Homogeneous (l)	0.5	1953	1961	Decommissioned	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	Loss of Fluid Test (LOFT) Reactor	Tank	50000	1978/2	1985/7	Decommissioned	
USA	Low Intensity Test Reactor	Tank	3000	1950/2	1968/10	Permanently Shut Down	
USA	LPTR	Tank	3000	1957/12	1980/10	Decommissioned	
USA	Ltr. Ground Test	Pool	10000	1952/4	1963	Permanently Shut Down	
USA	Lynchburg Pool Reactor	Pool	1000	1958/9	1981	Permanently Shut Down	
USA	MARF	PWR	0.0	1976	1997	Permanently Shut Down	
USA	Mars	Critical assembly	0.0	1974	2014	Operating	
USA	Material Test Reactor	Tank	40000	1952/3	1970/10	Permanently Shut Down	
USA	MCZPR	Pool	0.001	1964/3	1997	Undergoing Decommissioning	
USA	MITR-II	Tank	5000	1958/7	2008	Operating	50 years
USA	ML-1	Nitrogen cooled	3300	1961	1965	Permanently Shut Down	
USA	MURR	Tank in pool	10000	1966/10	2006	Operating	
USA	MUTR, Univ. of Maryland	Triga conversion	250	1960/12	2005	Operating	45 years
USA	Naval Research Reactor	Pool	1000	1956	1970/10	Decommissioned	
USA	NBSR	Heavy water	20000	1967/12	2007	Operating	
USA	Neutron Rad. Facility	Triga Mk I	1000	1977/3	1989	Permanently Shut Down	
USA	NRAD	Triga Mk II	250	1977/10	2017	Operating	
USA	NSCR, Texas A&M	Triga conversion	1000	1962/1	2007	Operating	45 years
USA	NTR	Graphite	100	1957/11	2007	Operating	50 years
USA	Nuclear Test Gauge	Subcritical assembly	0.0	1958/11	1987	Permanently Shut Down	
USA	Oak Ridge Graphite Reactor	Graphite	3500	1943/11	1963/11	Decommissioned	Museum
USA	Oak Ridge Research Reactor	Tank in pool	30000	1958/3	1987/3	Permanently Shut Down	
USA	Omega West Reactor	Tank	8000	1956/7	1992/11	Undergoing Decommissioning	
USA	Organic Moderated Reactor Experiment	Organic	12000	1957/9	1963	Permanently Shut Down	
USA	OSTR, Oregon State Univ.	Triga Mk II	1100	1967/3	2007	Operating	
USA	OSURR, Ohio State Univ.	Pool	500	1961/3	2006	Operating	45 years
USA	Parka	Critical assembly	0.0	1963	1987	Permanently Shut Down	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	Pawling Research Reactor	Heavy water	0.01	1958/11	1971	Decommissioned	
USA	PCA	Pool	10	1958/4	1991/9	Permanently Shut Down	
USA	PCTR	Pool	0.1	1955	1972	Permanently Shut Down	
USA	PDP	Heavy water	0.5	1953/10	1979/8	Permanently Shut Down	
USA	Penn State Breazeale Reactor	Triga Mk III	1000	1955/8	2005	Operating	50 years
USA	Phrenic	Pool	100	1965	1970/10	Decommissioned	
USA	Plasma Core Assembly	Critical assembly	0.1	1974	1987	Permanently Shut Down	
USA	Plumbrook Reactor	Tank	60000	1961	1973	Undergoing Decommissioning	
USA	Plumbrook Reactor Mock-Up (PBMUR)	Pool	100	1961	1973	Undergoing Decommissioning	
USA	PNL-CML	Homogeneous (l)	0.0	1961/1	1988/12	Decommissioned	
USA	Power Burst Facility	Tank	28000	1972/9	1992/8	Permanently Shut Down	
USA	PRCF	Critical assembly	0.0	1962/1	1976/3	Decommissioned	
USA	Pulstar, North Carolina State	Pool	1000	1972	2012	Operating	
USA	PUR-1	Pool	1	1962/1	2007	Operating	45 years
USA	R-63, North Carolina State	Pool	10	1960/10	1973	Decommissioned	
USA	Reed College	Triga Mk I	250	1968/7	2008	Operating	
USA	RER Lockheed	Pool	3000	1958	1970/10	Permanently Shut Down	
USA	Rhode Island Nuclear Science Center	Pool	2000	1964/7	2004	Operating	
USA	RPI	Critical assembly	0.1	1964/1	2004	Operating	
USA	RRR, Mississippi State Univ.	Pool	10	1960/10	1973	Permanently Shut Down	
USA	S1C Submarine Prototype	PWR		1959	2004	Operating	45 years
USA	S1W	PWR		1953	1989/10	Permanently Shut Down	
USA	S3G Submarine Prototype	PWR		1958	2008	Operating	50 years
USA	S5G	PWR		1965	1995/5	Permanently Shut Down	
USA	Schizo	Pool	100	1958	1970/10	Decommissioned	
USA	SER	Tank	5000	1961	1970/10	Permanently Shut Down	
USA	SKUA	Fast burst	1	1978	2018	Operating	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	SL-1	BWR	3000	1958	1961	Decommissioned	
USA	Snaptran-1	ZrH, Be-reflected	0.0	1968	1971	Permanently Shut Down	
USA	Snaptran-2	ZrH, Be-reflected	0.0	1965	1966	Permanently Shut Down	
USA	Snaptran-3	ZrH, Be-reflected	0.0	1964	1964	Permanently Shut Down	
USA	Sodium Reactor Exp. (SRE)	Sodium - graphite	256000	1957	1964/2	Decommissioned	
USA	Solution System	Critical assembly	0.0	1965	1989/10	Permanently Shut Down	
USA	Southeast Fast Oxide Reactor	Fast neutron	20000	1969	1970/10	Permanently Shut Down	
USA	SPERT-1	Tank	0.0	1955	1964	Permanently Shut Down	
USA	SPERT-2	Pool	0.0	1960	1965	Permanently Shut Down	
USA	SPERT-3	Pool	60000	1958	1968	Permanently Shut Down	
USA	SPERT-4	Pool	1000	1962	1970/10	Permanently Shut Down	
USA	SPR II	Fast burst	5	1967/3	2007	Operating	
USA	SPR, Stanford Univ.	Pool	10	1959/12	1973/7	Decommissioned	
USA	SPR-III	Fast burst	10	1975/8	2015	Operating	
USA	SR-305	Graphite	0.05	1953	1981/5	Decommissioned	
USA	Standard Pile	Graphite pile	10	1953/7	1979	Permanently Shut Down	
USA	Stir	Pool	1000	1961	1972	Permanently Shut Down	
USA	Super Kukla	Prompt burst	0.0	1964	1979	Permanently Shut Down	
USA	Supo	Homogeneous (l)	25	1951/3	1974	Permanently Shut Down	
USA	Suzie	Pool	0.0	1951	1957	Permanently Shut Down	
USA	Tank Reservoir	Critical assembly	0.0	1965	1989/10	Decommissioned	
USA	Treat Reactor	Graphite pulse	80	1959/2	1994/4	Permanently Shut Down	
USA	Triga Cornell	Triga Mk II	500	1962	2007	Operating	45 years
USA	Triga Mk I, Michigan State	Triga Mk I	250	1969/3	1988	Decommissioned	
USA	Triga Mk II, Columbia Univ.	Triga Mk II	250	1979	1985	Decommissioned	
USA	Triga, Northrup Corporation	Triga Mk F	1000	1963	1984	Decommissioned	
USA	Triga, Puerto Rico Nuclear Center	Triga conversion	2000	1960/8	1976	Permanently Shut Down	

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	Triga, Reactor Dept. of Veterans	Triga Mk I	20	1959/6		Permanently Shut Down	
USA	Triga, Univ. of Utah	Triga Mk I	100	1975/10	2015	Operating	
USA	TSR-I	Tank	500	1954	1958	Permanently Shut Down	
USA	TSR-II	Tank	1000	1960/3	1992/10	Permanently Shut Down	
USA	TTR-2	Pool	0.1	1955	1972	Permanently Shut Down	
USA	UC Davis	Triga Mk III	2000	1990	2030	Operating	
USA	UCI Nuclear Reactor Irvine	Triga Mk I	250	1969/11	2009	Operating	
USA	UCLA Reactor	Argonaut	100	1960/10	1984	Decommissioned	
USA	UCSB L-77 Reactor	Homogeneous (l)	0.01	1975/1	1986/9	Decommissioned	
USA	UFTR, Univ. of Florida Training	Modified Argonaut	100	1959/5	2004	Operating	45 years
USA	UML	Pool	1000	1975/1	2015	Operating	
USA	UMRR	Pool	200	1961/12	2006	Operating	45 years
USA	Univ. of Arizona Triga	Triga Mk I	100	1958/12	2008	Operating	50 years
USA	Univ. of Illinois - Lopra	Triga Mk II	10	1971/12	1995/8	Permanently Shut Down	
USA	Univ. of Illinois - Triga Mk I	Triga Mk I	100	1960/8	1968/8	Permanently Shut Down	
USA	Univ. of Illinois - Triga Mk II	Triga Mk II	1500	1969/7	1998/8	Permanently Shut Down	
USA	Univ. of Texas -Triga	Triga Mk II	1100	1992/3	2032	Operating	
USA	UTR-1	Argonaut	0.001	1958/6	1960/10	Permanently Shut Down	
USA	UTR-10, Iowa State Univ.	Argonaut	10	1959/10	1998/5	Permanently Shut Down	
USA	UVAR	Pool	2000	1960/6	1998/7	Permanently Shut Down	
USA	UWNR, Univ. of Washington	Argonaut	100	1961/4	1988	Permanently Shut Down	
USA	UWNR, Univ. of Wisconsin	Triga conversion	1000	1961/3	2006	Operating	45 years
USA	Vertical Split Table	Critical assembly	0.0	1965	1989/10	Permanently Shut Down	
USA	VPI	Argonaut	100	1959/12	1985/4	Permanently Shut Down	
USA	Washington State Univ.	Triga conversion	1000	1961/3	1998/7	Permanently Shut Down	
USA	WNTR	Tank	1	1972	1987/2	Permanently Shut Down	
USA	Worcester Polytechnic Institute	Pool	10	1959/12	2004	Operating	45 years

Research Reactors

Country	Name	Type	Steady Power (kW)	Date of Criticality	Actual or Expected Shutdown Date	Status	Comments
USA	WRRR L-54	Homogeneous	50	1962/9	1970/10	Permanently Shut Down	
USA	WTR	Tank	60000	1959	1963	Permanently Shut Down	
USA	Zero Power Reactor	Tank	0.1	1962	1997/5	Permanently Shut Down	
USA	ZPPR	Critical assembly	1	1969/4	1997	Permanently Shut Down	
USA	ZPR-6	Critical assembly	0.0	1963	1981	Permanently Shut Down	
USA	ZPR-9	Critical fast	0.0	1967	1982	Permanently Shut Down	
Uzbekistan	WWR-CM	Tank WWER	10000	1959/9	2004	Operating	45 years
Venezuela	RV-1	Pool	3000	1960/7	1994	Permanently Shut Down	
Vietnam	Dalat VNR-01	Pool	500	1963	2008	Operating	45 years

Annex III

FUEL CYCLE FACILITIES

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Argentina	Arroyito (Phase 1)	Heavy water production	100 t/y			Under Construction	
Argentina	Arroyito (Phase 2)	Heavy water production	150 t/y			Under Construction	
Argentina	Arroyito (Phase 3)	Heavy water production	200 t/y	1993	2023	Operating	
Argentina	Atucha	Heavy water production	2 t/y	1988		Permanently Shut Down	
Argentina	Cordoba (Phase 1)	Uranium refining & conversion			1991/1	Permanently Shut Down	
Argentina	Cordoba (Phase 2)	Uranium refining & conversion	150 tU/y	1982/11	2012	Operating	
Argentina	Ezeiza (FF)	Fuel fabrication	300 tU/y	1982/4	2012	Operating	
Argentina	Ezeiza (ZMP)	Zirconium metal production		1987	2017	Operating	
Argentina	La Estela	Uranium ore processing	20 tU/y	1985/10	1990/11	Permanently Shut Down	OP mine & heap leach
Argentina	Los Gigantes	Uranium ore processing	80 tu/y	1982/9	1989/6	Permanently Shut Down	Mill
Argentina	Malargue	Uranium ore processing	90 tU/y	1954/2	1988	Decommissioned	OP mine & mill, reclamation planned.
Argentina	Pilcaniyeu	Zirconium metal production				Under Construction	
Argentina	Pilcaniyeu (Phase 1)	Enrichment	20000 SWU/y	1990	2020	Permanently Shut Down	
Argentina	Pilcaniyeu (Phase 2)	Enrichment	100000 SWU/y			Under Construction	
Argentina	San Rafael	Uranium ore processing mill	120 tU/y	1979/9	2002	Permanently Shut Down	Mine & mill - OP & heap leach
Argentina	Sierra Pintada	Uranium ore processing	300 tU/y			Permanently Shut Down	OP - mine & mill
Australia	Beverly	Uranium ore processing		1998	2023	Operating	ISL
Australia	El Sherana	Uranium ore processing				Decommissioned	
Australia	Honeymoon	Uranium ore processing		1998	2023	Operating	ISL - field leach trials
Australia	Mary Kathleen	Uranium ore processing				Decommissioned	
Australia	Nabarlek	Uranium ore processing		1980	1989	Permanently Shut Down	
Australia	No 3 Orebody	Uranium ore processing	5000 tU/y	1997/7	2022	Under Construction	OP
Australia	Olympic Dam	Uranium ore processing	1600 tU/y	1988/8	2013	Operating	UG
Australia	Radium Hill	Uranium ore processing				Decommissioned	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Australia	Ranger	Uranium ore processing	3000 tU/y	1981/11	2006	Operating	OP
Australia	Rum Jungle	Uranium ore processing		1954	1971	Decommissioned	Copper mine
Australia	Silex	Enrichment		1992	2011	Operating	Lab
Belgium	Belgonucleaire Plant	Fuel fabrication		1973	2008	Operating	35 years
Belgium	Dessel, Belgonucleaire	Fuel fabrication	40 tHM/y	1985/1	2015	Operating	
Belgium	Dessel, FBFC	Fuel fabrication	500 tHM/y	1961	2006	Operating	45 years
Belgium	Eurochemic	Reprocessing	100 tHM/y	1966	1975	Undergoing Decommissioning	
Belgium	Mol	Spent fuel storage	370 tHM			Permanently Shut Down	
Belgium	Puurs and Engis	Uranium ore processing	50 tU/y	1980	1998	Undergoing Decommissioning	
Brazil	Ipero	Enrichment				Proposed	Pilot plant
Brazil	Lagoa Real/Caetite (Bahia)	Uranium ore processing		1999	2024	Operating	Mine
Brazil	Pilot Uranium Enrichment Plant	Enrichment		1969	1989	Undergoing Decommissioning	Pilot plant
Brazil	Plovdiv	Uranium ore processing			1995	Permanently Shut Down	
Brazil	Pocos de Caldas	Uranium ore processing	200 tU/y	1981/12	1997	Permanently Shut Down	Mine
Brazil	Resende	Fuel fabrication	100 tHM/y	1982	2012	Operating	
Brazil	Resende	Uranium refining & conversion	500 tU/y	2000	2030	Operating	
Brazil	Resende (Centrifuge)	Enrichment				Proposed	
Brazil	Sao Jose dos Campos	Enrichment		1981	2011	Operating	Lab
Brazil	Sao Paulo	Reprocessing	90 tU/y	1982	2000	Permanently Shut Down	Pilot plant
Brazil	Sao Paulo	Zirconium metal production	5 t/y			Under Construction	
Brazil	Sorocaba	Enrichment				Proposed	
Bulgaria	Belosem	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Buchovo	Uranium ore processing	600 tU/y		1994	Permanently Shut Down	Mill
Bulgaria	Byalata voda	Uranium ore processing				Permanently Shut Down	ISL & UG

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Bulgaria	Chucarovo	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Debra	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Dujba 1	Uranium ore processing				Permanently Shut Down	OP/UG/ISL
Bulgaria	Eleshniza	Uranium ore processing	380 tU/y		1995/12	Permanently Shut Down	Mill
Bulgaria	Gradeshnitca	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Igralishte	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Iskra	Uranium ore processing				Permanently Shut Down	UG, ISL
Bulgaria	Izgev	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Kozloduy	Spent fuel storage	600 tHM	1989/1	2019	Operating	
Bulgaria	Madrec	Uranium ore processing				Permanently Shut Down	Mill
Bulgaria	Momino	Uranium ore processing				Permanently Shut Down	OP,UG
Bulgaria	Narechen	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Navasen	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Okop	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Orlov dol	Uranium ore processing				Permanently Shut Down	UG, ISL
Bulgaria	Selishte	Uranium ore processing				Permanently Shut Down	OP
Bulgaria	Smolian 7	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Struma 1	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Trilistnik	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Troyan	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Tzarimir	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Tzeretelevo	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	Valdimirovo	Uranium ore processing				Permanently Shut Down	ISL
Bulgaria	V-ta shahta	Uranium ore processing				Permanently Shut Down	Open & UG
Canada	ABB - Moncton	Fuel fabrication			1986	Decommissioned	
Canada	Agnew Lake	Uranium ore processing			1983	Decommissioned	Mine
Canada	Beaver Lodge	Uranium ore processing		1953	1983	Decommissioned	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Canada	Blind River	Uranium refining & conversion	18000 tU/y	1983	2013	Operating	
Canada	Bruce Heavy Water Plant A	Heavy water production	106 kg/h	1969	1984/6	Decommissioned	
Canada	Bruce Heavy Water Plant B	Heavy water production	106 kg/h	1981	1997	Permanently Shut Down	
Canada	Chalk River Pu/Th Processing Facility	Fuel fabrication		1952	1957	Undergoing Decommissioning	
Canada	Cluff Lake	Uranium ore processing	2100 tU/y	1981	2002/5	Permanently Shut Down	Mine & mill
Canada	Cobourg	Zirconium tubing production	760 t/y	1981	2012	Operating	
Canada	Denison/Elliot Lake	Uranium ore processing	2700 tU/y	1957/6	1992	Undergoing Decommissioning	
Canada	Dubyna	Uranium ore processing				Decommissioned	
Canada	Earth Sciences Extraction Co.	Uranium refining & conversion	70 tU/y			Permanently Shut Down	Byproduct
Canada	Elliot Lake/Panel	Uranium ore processing	1000 tU/y	1979	1990	Decommissioned	
Canada	Elliot Lake/Quirke	Uranium ore processing	2000 tU/y	1968	1990	Decommissioned	
Canada	Elliot Lake/Stanleigh	Uranium ore processing	700 tU/y	1983	1996	Undergoing Decommissioning	
Canada	GE Canada - Arnprior	Zirconium tubing production	1600 km/y	1981	2011	Operating	
Canada	GE Canada - Tornoto	Fuel fabrication	1050 tHM/y	1967	2007	Operating	40 years
Canada	GE Canada, Peterborough	Fuel fabrication	100 tHM/y	1956	2006	Operating	50 years
Canada	Glace Bay	Heavy water production	250 t/y		1985/1	Decommissioned	
Canada	Key Lake	Uranium ore processing	8200 tU/y	1984/1	2009	Operating	Mine & mill - OP (mine closed)
Canada	Kiggavik	Uranium ore processing		2005	2030	Proposed	Mine
Canada	La Prade	Heavy water production	800 t/y		1976/1	Decommissioned	
Canada	Madawaska	Uranium ore processing			1982	Decommissioned	
Canada	Maritime Site	Heavy water production		1970	1985	Decommissioned	
Canada	McClean Lake	Uranium ore processing	2300 tU/y	1999/6	2004	Operating	Mine & mill
Canada	Port Hawkesbury/ Pt. Tupper	Heavy water production		1967	1986	Decommissioned	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Canada	Port Hope (U02)	Uranium refining & conversion	2500 tU/y	1980	2010	Operating	
Canada	Port Hope (UF6)	Uranium refining & conversion	10500 tU/y	1984	2014	Operating	
Canada	Port Hope Eldorado	Zirconium tubing production		1968	1970	Decommissioned	
Canada	Rabbit Lake	Uranium ore processing	4600 tU/y	1975/1		Permanently Shut Down	Mine & mill - OP
Canada	Recycle Fuel Fab Lab	Fuel fabrication		1979	2009	Operating	
Canada	Zircatec - Port Hope	Fuel fabrication	1200 tHM/y	1964	2004	Operating	40 years
China	Baimadong	Fuel fabrication		1965	1989	Permanently Shut Down	
China	CANDU Fuel Plant	Fuel fabrication		2003	2033	Under Construction	
China	Fac. No. 713	Fuel fabrication		1962	1990	Decommissioned	
China	Hengyang (Fuzhou) Jiangxi	Uranium ore processing	1100 tU/y	1962	1996	Permanently Shut Down	Mine, in stand by
China	Lanzhou	Reprocessing		1965	1985	Decommissioned	Pilot plant
China	Lanzhou	Reprocessing		2020	2050	Proposed	
China	Lanzhou	Uranium refining & conversion	400 t/y	1980	2010	Operating	
China	Lanzhou I	Enrichment	450000 SWU/yr	1980	2010	Operating	
China	Lanzhou II	Enrichment	250000 SWU/yr	2005	2035	Under Construction	
China	Shanxi	Enrichment	200000 SWU/yr	1997	2027	Operating	
China	Tengchong	Uranium ore processing		1991	2016	Operating	Mine, ISL
China	Yining	Uranium ore processing		1963	2008	Operating	ISL - 45 years
Czech Rep	Dolni Rozinka	Uranium ore processing				Permanently Shut Down	Mill
Czech Rep	Straz pad Ralshem	Uranium ore processing			1995	Permanently Shut Down	Mill & mine
Czech Rep	Straz/Hamr	Uranium ore processing	800 tU/y	1967	1995	Permanently Shut Down	ISL
Czech Rep	Mape Mydlovary	Uranium ore processing		1962	1991	Permanently Shut Down	
Dem Rep Congo	Shinkolobwe	Uranium ore processing				Permanently Shut Down	OP & UG mine
Denmark	Riso Nat. Lab MTR Fab Plant	Fuel fabrication		1988	2018	Operating	Pilot plant

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Egypt	Inchas Nuclear Fuel Laboratory	Fuel fabrication		1990	2020	Operating	
Estonia	Sillamae	Uranium ore processing		1948	1977	Permanently Shut Down	Mine & mill, processed imported ores
Finland	KPA Store, Olkiluoto	Spent fuel storage	1270 t	1987/9	2017	Operating	
France	Atelier	Reprocessing		1988	1996	Permanently Shut Down	Pilot plant
France	Attila	Reprocessing		1968	1975	Decommissioned	Pilot plant
France	Bertholene	Uranium ore processing	70 tU/y	1985	1994/1	Permanently Shut Down	OP/UG reclamation in progress
France	Bessines	Uranium ore processing		1958	1992	Decommissioned	
France	Building 18	Reprocessing		1968	1995	Undergoing Decommissioning	Lab
France	Building 19	Reprocessing		1957	1984	Decommissioned	Lab
France	Cadarache CFCa	Fuel fabrication	15 tHM/y	1961	2006	Operating	45 years
France	Cascad	Spent fuel storage	180 tHM	1987	2017	Operating	
France	Exp. Reprocess. Facility (Bldg. 211)	Reprocessing		1963	1994	Undergoing Decommissioning	
France	FBFC Pierrelatte	Fuel fabrication	400 tHM/y	1986	1999	Permanently Shut Down	
France	FBFC Romans	Fuel fabrication	800 tHM/y	1979	2009	Operating	
France	Georges Besse Plant	Enrichment	10800000 SWU/y	1979	2009	Operating	
France	Gueugnon	Uranium ore processing		1964	1980	Decommissioned	Mill reclaimed
France	Herault Mining Division	Uranium ore processing	1000 tU/y	1981/1	2006	Operating	OP/US/HL & mill, reclamation in prog.
France	Inguiniel, Calardieu	Uranium ore processing				Permanently Shut Down	
France	Jarrie	Zirconium metal production	2000 tHM/y	1982	2012	Operating	
France	La Crouzille Mining Division	Uranium ore processing	1000 tU/y		1996/7	Permanently Shut Down	OP/UG/HL & mill
France	La Hague	Spent fuel storage	14500 tHM			Operating	
France	La Hague (At 1)	Reprocessing	400 tHM/y	1969	1979	Undergoing Decommissioning	
France	La Hague (UP2)	Reprocessing	800 tHM/y	1967	2007	Operating	40 years

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
France	La Hague (UP3)	Reprocessing	800 tHM/y	1990	2020	Operating	
France	Laboratory RM2	Irradiated fuel inspection		1967	1980	Undergoing Decommissioning	
France	Lachaux/Rophin	Uranium ore processing			1955	Permanently Shut Down	UG & mill, reclaimed - 1985
France	LaRibiere	Uranium ore processing			1985	Permanently Shut Down	OP/HL & mill, reclaimed - 1992
France	Le Bernardan, Le Chebois	Uranium ore processing	550 tU/y	1979/5	2001/6	Permanently Shut Down	OP/UG/HL & mill, reclaimed - 1991
France	Le Cellier	Uranium ore processing	300 tU/y	1977	1987	Permanently Shut Down	Mined out.
France	L'Ecarpiere	Uranium ore processing		1957	1991	Permanently Shut Down	UG/HL & mill, reclamation in progress
France	Les Boix Noirs/St. Preist	Uranium ore processing			1980	Permanently Shut Down	UG/OP & mill, reclaimed
France	Lodeve	Uranium ore processing			1997	Permanently Shut Down	OP/UG/HL & mill, reclamation in progress
France	Maihac/Bernadan	Uranium ore processing	500 tU/y	1979	2004	Operating	
France	Malvesi	Uranium refining & conversion	14000 tU/y	1959	2009	Operating	50 years
France	Marcoule (UP1)	Reprocessing	400 tHM/y	1958	1997	Undergoing Decommissioning	
France	Melox (Marcoule)	Fuel fabrication	120 tHM/y	1995	2025	Operating	
France	Montreuil Juigne	Zirconium metal production	1200 tHM/y			Operating	
France	Paimboeuf	Zirconium tubing production	4500 t/y	1980/4	2010	Operating	
France	Pierrelatte - Gaseous Diffusion	Enrichment		1964	1982	Undergoing Decommissioning	
France	Pierrelatte - P	Enrichment				Proposed	
France	Pierrelatte (Comurhex) Rep U	Uranium refining & conversion	350 tU/y	1976	2006	Operating	
France	Pierrelatte (Comurhex) Nat U	Uranium refining & conversion	14000 tU/y	1959	1991	Permanently Shut Down	
France	Pierrelatte (Comurhex) UF4	U conversion	14,000 tU/y	1959	2004	Operating	45 years

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
France	Pierrelatte (Comurhex) UF6	U conversion	14,000 tU/y	1961	2006	Operating	45 years
France	PL4	Enrichment		1986	1988	Permanently Shut Down	
France	Rugles	Zirconium metal production	400 tHM/y			Operating	
France	Saclay	Enrichment		1988	2018	Operating	
France	SIGN - Annecy	Fuel fabrication		1957	1992	Permanently Shut Down	
France	SIGN - Veury-Voroise	Fuel fabrication		1960	2015	Operating	45 years
France	St. Martin Du Bosc	Reprocessing		1981	1998	Permanently Shut Down	
France	St. Pierre du Cantal	Uranium ore processing			1985	Permanently Shut Down	OP/HL & mill, reclamation in progress
France	TU2 Cogema Reprocess Line	U conversion		1988	2018	Operating	
France	Ugine	Zirconium metal production	3500 tHM/y			Operating	
France	W. Defluorinate (Depl. UF6)	U conversion	20000 tU/y	1984	2014	Operating	
Gabon	Mounana	Uranium ore processing	1100 tU/y	1977	1999	Permanently Shut Down	Mine. Op & UG
Germany	ALKEM Fuel Fab Plant	Fuel fabrication		1965	1972	Decommissioned	
Germany	ANF - Duisburg	Zirconium tubing production	1800 km	1981/1	2011	Operating	
Germany	Brennelement - Zwischenlager Ahaus	Spent fuel storage	3960 tU	1992/6	2022	Operating	
Germany	Ellweiler	Uranium ore processing	125 tU/y	1986	1989	Permanently Shut Down	
Germany	Gorleben	Spent fuel storage	3800 tHM	1984	2014	Operating	
Germany	Hellenthal	Zirconium tubing production	350 t/y	1972	1985	Decommissioned	
Germany	Karlsruhe	Spent fuel storage	55 tHM	1971		Permanently Shut Down	
Germany	Karlsruhe Jet Nozzle	Enrichment				Decommissioned	
Germany	Karlstein	Zirconium tubing production	400 t/y			Operating	
Germany	Koenigstein	Uranium ore processing		1970	1990	Permanently Shut Down	
Germany	Milli Test Facility	Reprocessing		1971	1991	Decommissioned	
Germany	NUKEM- Hobeg	Fuel fabrication		1972	1989	Decommissioned	
Germany	NUKEM, Hanau	Fuel fabrication		1960	1988	Undergoing Decommissioning	
Germany	Pu Test Extraction Facility	Reprocessing		1980	1991	Decommissioned	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Germany	Seelingstadt - Truenzig	Uranium ore processing		1960	1990	Decommissioned	
Germany	Siemens Lingen	Fuel fabrication	650 tHM/y	1979	2009	Operating	
Germany	Siemens MOX Fuel Demo	Fuel fabrication		1963	1992	Undergoing Decommissioning	Pilot plant
Germany	Siemens, Brennelementwerke Hanau	Fuel fabrication	120 tHM/y	1966	1995	Decommissioned	
Germany	Siemens, Brennelementwerke Karlstein	Fuel fabrication	25 tHM/y	1966	1995	Permanently Shut Down	
Germany	URENCO Gronau	Enrichment	1300000 SWU/y	1985	2015	Operating	
Germany	URENCO Juelich Lab	Enrichment		1964	2004	Operating	40 years
Germany	WAK	Reprocessing	40 tHM/y	1971/9	1990/12	Undergoing Decommissioning	
Hungary	Cserkut	Uranium ore processing	700 tU/y	1956	1999	Permanently Shut Down	OP/UG/HL
Hungary	Dinnyeberki	Uranium ore processing			1988	Permanently Shut Down	SL - small pilot scale only
Hungary	Pecs. P.S.D.	Uranium ore processing				Permanently Shut Down	
India	Advanced Fuel Fab Facility	Fuel fabrication		1993	2023	Operating	
India	Baroda	Heavy water production	67 t/y	1980	2010	Operating	
India	FACT	U recovery		1991	2021	Operating	
India	Hazira	Heavy water production	110 t/y	1991	2021	Operating	
India	Hyderabad (HWR) (Phase 1)	Fuel fabrication	300 tHM/y	1974	2009	Operating	35 years
India	Hyderabad (HWR) (Phase 1 - ZTP)	Zirconium tubing production	80 t/y	1980	2010	Operating	
India	Hyderabad (HWR) (Phase 2)	Fuel fabrication	600 tHM/y			Proposed	
India	Hyderabad (HWR) (Phase 2 - ZTP)	Zirconium tubing production	80 t/y			Proposed	
India	Hyderabad (LWR)	Fuel fabrication	25 tHM/y	1974	2009	Operating	35 years
India	Hyderabad (Pellets)	Fuel fabrication		1998	2028	Operating	
India	Hyderabad (ZMP)	Zirconium tubing production	210 t/y			Operating	
India	ITREC	Reprocessing		1975	1988	Undergoing Decommissioning	
India	Jaduguda	Uranium ore processing	200 tU/y	1968	2008	Operating	UG mine & mill - 40 years
India	Kalpakkam (Phase 1)	Reprocessing	125 tHM/y	1998	2028	Operating	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
India	Kota	Heavy water production	100 t/y	1985	2015	Operating	
India	Manuguru	Heavy water production	185 t/y	1991	2021	Operating	
India	Nangal	Heavy water production	14 t/y	1962	2007	Operating	45 years
India	NFC Hyderabad (UO2)	U conversion		1972	2007	Operating	35 years
India	Palayakal	Zirconium tubing production	300 t/y			Proposed	
India	Talcher (Phase 1)	Heavy water production	62 t/y	1985	2015	Operating	
India	Talcher (Phase 2)	Heavy water production	72 t/y			Proposed	
India	Tarapur	Reprocessing	100 tHM/y	1974	2004	Operating	
India	Thal-Vaishet	Heavy water production	110 t/y	1987	2017	Operating	
India	Trombay	U conversion		1960	2005	Operating	45 years
India	Trombay	Reprocessing	50 tHM/y	1964	2004	Operating	
India	Trombay (Carbide)	Fuel fabrication		1985	2015	Operating	
India	Trombay (HWR)	Fuel fabrication		1982	2012	Operating	
India	Trombay (URC)	Uranium ore processing		1960	2005	Operating	45 years
India	Tuticorin	Heavy water production	71 t/y	1978	2008	Operating	
Indonesia	Experimental Fuel Element Fac	Fuel fabrication		1986	2016	Operating	
Indonesia	Nuclear Material Processing Facility	Uranium ore processing		1981	1999	Permanently Shut Down	
Indonesia	Research Reactor Fuel Elem. Facility	Fuel fabrication		1986	2016	Operating	
Israel	Rotem Fertilizer Plant	U recovery		1984	1986	Permanently Shut Down	
Italy	Bosco - Marengo	Fuel fabrication	200 tHM/y	1974/5	2004	Operating	
Italy	Casaccia Plutonium Lab	Fuel fabrication		1968	1987	Decommissioned	Pilot plant
Italy	CONU Magnox Fuel Plant	Fuel fabrication		1960	1987	Decommissioned	
Italy	Eurex SFRE	Reprocessing	10 tHM/y	1970	1990	Permanently Shut Down	Pilot plant
Italy	Fabricazioni Nucleari Spa	Fuel fabrication		1974	1990	Permanently Shut Down	
Italy	IFEC-Saluggia - HEU Fuel	Fuel fabrication		1966	1989	Decommissioned	Pilot plant
Italy	IFEC-Saluggia - HWR Fuel	Fuel fabrication		1966	1989	Decommissioned	Pilot plant
Italy	IFEC-Saluggia - MTR Fuel	Fuel fabrication		1964	1987	Decommissioned	Pilot plant

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Italy	Saluggia	Fuel fabrication	60 tHM/y	1986	2016	Operating	
Japan	Asahi Enrich. Lab	Enrichment	2000 SWU/y	1986/12	1991	Permanently Shut Down	
Japan	Jaeri Reprocess. Test Facility	Reprocessing		1968	1970	Decommissioned	
Japan	Japan Nuclear Fuel Conversion	U conversion		1981	1999	Permanently Shut Down	
Japan	JNC Tokai	Reprocessing	200 tHM/y	1977	2007	Operating	
Japan	JNC Tokai (PCDF)	U conversion		1983	1997	Permanently Shut Down	
Japan	JNC Tokai (PFFF-ATR)	Fuel fabrication	10 tHM/y	1972	2007	Operating	Pilot plant, 35 years
Japan	JNC Tokai (PFFF-FBR)	Fuel fabrication	1 tMOX/y	1972	1988	Permanently Shut Down	Pilot plant
Japan	JNC Tokai (PFPF-FBR)	Fuel fabrication		1988	2018	Operating	Pilot plant
Japan	JNC Tokai (PFPF-LWR/ATR)	Fuel fabrication		1965	2005	Operating	Pilot plant, 40 years
Japan	JNFL Kanagawa	Fuel fabrication		1970	2005	Operating	35 years
Japan	JNFL Rokkasho	Enrichment		1992	2022	Operating	
Japan	Kobe	Zirconium tubing production	500 t/y	1975	2005	Operating	
Japan	Mitsubshi Nuclear Fuel Ltd.	U conversion		1972	2007	Operating	35 years
Japan	Mitsubshi Tube - Okegawa	Zirconium tubing production	900000 m/y	1973	2003	Operating	
Japan	MNF Tokai (MNF)	Fuel fabrication	440 tHM/y	1972	2007	Operating	35 years
Japan	Nagahama	Zirconium metal production	300 tHM/y	1986	1996	Decommissioned	
Japan	NFI Kumaton	Fuel fabrication	324 tHM/y	1972	2007	Operating	35 years
Japan	NFI Takeyama	Fuel fabrication			1979	Decommissioned	
Japan	NFI Tokai	Fuel fabrication	200 tHM/y	1980	2010	Operating	
Japan	Ningyo-Toge Conv. Plant	Uranium refining & conversion	120 tU/y	1964	1982/3	Permanently Shut Down	
Japan	Ningyo-Toge Enrich. Plant	Enrichment	200000 SWU/y	1989	2019	Operating	Centrifuge pilot plant
Japan	Ningyo-Toge Milling Test Facility	Uranium ore processing	50 tU/y		1981/1	Permanently Shut Down	
Japan	Ningyo-Toge U Pilot Plant	Enrichment		1979	1988	Permanently Shut Down	
Japan	NIURES	Uranium ore processing	10tU/y	1986/4	1988/3	Decommissioned	
Japan	Rokkasho Reprocessing Plant	Reprocessing	800 tU/y	2008	2038	Under Construction	
Japan	Sumitomo Tube - Amagasaki	Zirconium tubing production	350 t/y			Operating	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Japan	Tokai U Enrich Test Facility	Enrichment		1987	2027	Operating	Laser
Japan	Tokai-Mura	Spent fuel storage	237 tHM	1977	2007	Operating	
Japan	Tokai-Mura (Phase 1)	Spent fuel storage	97 tHM	1985	2015	Operating	
Japan	Tokai-Mura (Phase 2)	Spent fuel storage	140 tHM			Proposed	
Kazakhstan	Aktau, Shevchenko	Uranium ore processing	1000 tU/y		2001	Permanently Shut Down	Mine & mill
Kazakhstan	Kaskor (Prikaspisky)	U recovery		1950	1994	Permanently Shut Down	
Kazakhstan	Katko (Moynkum)	U recovery		2000	2030	Operating	
Kazakhstan	No. 6 Mining Co. - Chiili	Uranium ore processing		1985	2025	Operating	
Kazakhstan	No. 7 Mining Co. - Inkai	Uranium ore processing		2000	2025	Operating	ISL
Kazakhstan	Stepnogorsk	Uranium ore processing	3000 tU/y	1958	1995	Permanently Shut Down	
Kazakhstan	Stepnoye	Enrichment		1978	2008	Operating	
Kazakhstan	Tselinny	Uranium ore processing				Permanently Shut Down	
Kazakhstan	Tsentralnoe (Taukent)	U recovery		1982	2012	Operating	
Kazakhstan	Ust Kamenogorsk	Fuel fabrication				Operating	
Korea, DPR	Nuclear Fuel Fab. Plant	Fuel fabrication		1992	2022	Permanently Shut Down	
Korea, DPR	Radiochemistry Laboratory	Reprocessing		1993	2023	Operating	
Korea, Rep	DUPIC Fuel Dev. Facility	Fuel fabrication				Operating	Pilot plant
Korea, Rep	DUPIC Pilot Scale Facility	Fuel fabrication				Proposed	
Korea, Rep	Korea Nuclear Fuel Co.	Fuel fabrication	200 tHM/y	1989/1	2019	Operating	
Korea, Rep	Taejeon (PHWR)	Fuel fabrication	400 tHM/y	1987	2022	Operating	
Korea, Rep	Taejeon (PWR Fuel Fab Plant II)	Fuel fabrication	200 tHM/y	1997/12		Under Construction	
Korea, Rep	Taejeon (U02)	Uranium refining & conversion	200 tU/y	1990/1	2020	Operating	
Kyrgyz Rep	Ak-Tyuz-Bordunsky	Uranium ore processing				Permanently Shut Down	Rare earth processing assoc. w/Pb mine.
Kyrgyz Rep	Granitogovsk	Uranium ore processing				Permanently Shut Down	Rare earth processing assoc. w/Pb mine.
Kyrgyz Rep	Kara Balta	Uranium ore processing	2000 tU/y	Late 70's		Permanently Shut Down	Mill & mine

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Kyrgyz Rep	Kyzeyl-Dzhar	Uranium ore processing				Permanently Shut Down	Byproduct of gold mining.
Kyrgyz Rep	Mayli-Say	Uranium ore processing				Permanently Shut Down	UG mine
Mexico	Los Amoles	Uranium ore processing	200 tU/y			Permanently Shut Down	
Mexico	Pena Blanca	Uranium ore processing	200 tU/y	1969	1971	Decommissioned	
Mexico	Pilot Plant for Fab. Combustible (PPFC)	Fuel fabrication	2 tHM/y	1980	1996	Permanently Shut Down	
Mexico	Uranium Refining Pilot Plant	U conversion		1987	1990	Decommissioned	
Mexico	Villa Aldama	Uranium ore processing				Permanently Shut Down	
Mongolia	Dornod-Ernes	Uranium ore processing		1998		Permanently Shut Down	
Mongolia	Gurva-Saihan	Uranium ore processing			1999	Permanently Shut Down	
Morocco	Safi - Youssoufia	Uranium ore processing	470 tU/y	1986	2011	Operating	
Namibia	Rossing	Uranium ore processing	4000 tU/y	1976	2006	Operating	30 years
Netherlands	Flushing East	Spent fuel storage				Under Construction	
Netherlands	URENCO Netherlands	Enrichment	1500000 SWUy	1973	2008	Operating	Centrifuge, 35 years
Niger	Akouta	Uranium ore processing	2300 tU/y	1978	2008	Operating	UG mine - 30 years
Norway	Pilot Uranium Reprocess Plant	Reprocessing		1961	1968	Decommissioned	
Norway	Rjukan	Heavy water production		1980	1991	Permanently Shut Down	
Pakistan	BC-1	Uranium ore processing		1978	2008	Operating	30 years
Pakistan	Chashma	Fuel fabrication		1986	2016	Operating	
Pakistan	Islamabad	U conversion		1986	2016	Operating	
Pakistan	Issa Khel/Kubul Kel	Uranium ore processing		1990	2015	Operating	Mine & mill
Pakistan	Kahuta	Enrichment	5000 SWU/y	1986	2026	Operating	Centrifuge
Poland	Kowary	Uranium ore processing				Permanently Shut Down	
Poland	Okrzeszyn	Uranium ore processing				Permanently Shut Down	
Portugal	Mina de Quinta do Bispo	Uranium ore processing				Permanently Shut Down	Mine.HL/OP
Portugal	Urgeircia (heap)	Uranium ore processing	15 tU/y	1951		Permanently Shut Down	
Portugal	Urgeircia (in situ)	Uranium ore processing	15 tU/y	1951		Permanently Shut Down	
Portugal	Urgeiricia (acid)	Uranium ore processing	140 tU/y	1951		Permanently Shut Down	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Romania	Brasov/Feldiora	Uranium ore processing	900 tU/y	1978		Permanently Shut Down	Mill
Romania	Romaa	Heavy water production	360 t/y			Operating	
Russian Fed	Angarsk	Enrichment	2000000 SWU/y	1954	2004	Operating	Centrifuge
Russian Fed	Angarsk, Inkutsk	Uranium refining & conversion	20000 tU/y	1954	2004	Operating	50 years
Russian Fed	Chelyabinsk, South Urals	Spent fuel storage				Operating	
Russian Fed	Chepetsky Plant Glazov, Udmurtia	Zirconium tubing production	2000 t/y	1951	2006	Operating	55 years
Russian Fed	Ekaterinberg (Sverdiovsk-44)	Enrichment	9000000 SWU/y	1949	2004	Operating	Centrifuge
Russian Fed	Elektrostal	Uranium refining & conversion	700 tU/y			Operating	
Russian Fed	Elektrostal, FBR Line	Fuel fabrication	50 tHM/y			Operating	
Russian Fed	Elektrostal, LWR Line	Fuel fabrication	800 tHM/y	1996	2026	Operating	
Russian Fed	Elektrostal, RBMK Line	Fuel fabrication	900 tHM/y			Operating	
Russian Fed	Elektrostal, WWER Line	Fuel fabrication	620 tHM/y			Operating	
Russian Fed	Krasnokomensk/Priargunski	Uranium ore processing	4000 tU/y	1968	2008	Operating	Mill - 40 years
Russian Fed	Krasnoyarsk, Siberia	Fuel fabrication				Proposed	
Russian Fed	Krasnoyarsk, Siberia	Spent fuel storage	6000 tHM			Operating	
Russian Fed	Krasnoyarsk-45	Enrichment	5000000 SWU/y	1964	2004	Operating	Centrifuge, 40 years
Russian Fed	Leningrad	Spent fuel storage	1800 tHM	1986	2016	Operating	
Russian Fed	Mayak Paket	Fuel fabrication		1980	2010	Operating	Pilot plant
Russian Fed	Novosibirsk	Fuel fabrication	1000 tHM/y	1949	2004	Operating	55 years
Russian Fed	Novosibirsk	Fuel fabrication	100 tHM/y			Under Construction	
Russian Fed	Novosibirsk/Kemerovo	Uranium ore processing		2010	2035	Proposed	
Russian Fed	Novovoronezh	Spent fuel storage	600 tHM			Operating	
Russian Fed	RIAR FBR	Fuel fabrication		1980	2010	Operating	Pilot plant
Russian Fed	RIAR Molten Salt	Reprocessing	1 tHM/y	1965	2005	Operating	40 years
Russian Fed	RT-1, Chelyabinsk	Reprocessing	400 tHM/y	1971/1	2006	Operating	35 years
Russian Fed	RT-2, Krasnoyarsk	Reprocessing	1500 tHM/y			Under Construction	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
Russian Fed	Siberian Chemical Combine (Seversk)	Enrichment	1000000 SWU/y	1950	2010	Operating	
Russian Fed	Siberian Chemical Combine (Seversk)	Reprocessing		1956	2006	Operating	50 years
Russian Fed	Tomsk-7	Enrichment	3000000 SWU/y	1950	2005	Operating	
Russian Fed	Vitimsky	Uranium ore processing				Operating	ISL
Slovakia	Jaslovske Bohunice	Spent fuel storage (central)	600 tHM	1987/11	2017	Operating	
Slovenia	Zirovski vrh	Uranium ore processing		1985/1	1991/7	Decommissioned	UG mine & mill
South Africa	Beisa	Uranium ore processing		1967	1984	Decommissioned	
South Africa	Beva	Fuel fabrication		1988	1996	Permanently Shut Down	
South Africa	Blyvooruitzicht	Uranium ore processing	500 tU/y	1967	1984/12	Decommissioned	Byproduct of gold mining.
South Africa	Buffelsfontein	Uranium ore processing	400 tU/y	1957		Decommissioned	Byproduct of gold mining.
South Africa	Central Processing Plant	Uranium ore processing		1977	2007	Operating	30 years
South Africa	Chemwes	Uranium ore processing	550 t/y	1979	1988	Permanently Shut Down	Byproduct of gold mining.
South Africa	Driefontein	Uranium ore processing	500 tU/y	1956	1988	Decommissioned	Byproduct of gold mining.
South Africa	East Rand	Uranium ore processing	250 tU/y	1978/3	1989	Decommissioned	Byproduct of gold mining.
South Africa	Freegold	Uranium ore processing		1977	1980	Decommissioned	
South Africa	Harmony (Merriespruit)	Uranium ore processing	150 tU/y	1955	1988/1	Decommissioned	Byproduct of gold mining.
South Africa	Hartebeestfontein	Uranium ore processing	350 tU/y	1956		Decommissioned	Byproduct of gold mining.
South Africa	Metallurgical Scheme	Uranium ore processing	450 tU/y	1977	1990	Permanently Shut Down	Byproduct of gold mining.
South Africa	Palabora	Uranium ore processing	150 tU/y	1971		Permanently Shut Down	Byproduct of gold mining.
South Africa	Pelindaba	Fuel fabrication		1978	2008	Operating	Pilot plant
South Africa	Randfontein (Cooke)	Uranium ore processing		1954	1988	Decommissioned	
South Africa	Vaal Reefs	Uranium ore processing	1500 tU/y	1953/6	1997	Permanently Shut Down	Byproduct of gold mining.
South Africa	Valindaba	Uranium refining & conversion	700 tU/y	1986/10	1997	Permanently Shut Down	
South Africa	Valindaba - Laser	Enrichment				Deferred	
South Africa	Valindaba - Y Plant	Enrichment		1978	1990	Decommissioned	
South Africa	Valindaba (Pelindaba East)	Enrichment	3000000 SWU/y	1986	1995	Decommissioned	
South Africa	Virginia Uranium Plant	Uranium ore processing	150 tU/y	55	1988/1	Permanently Shut Down	Byproduct of gold mining.

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
South Africa	Vitim	Uranium ore processing		2010	2035	Proposed	
South Africa	West Rand Consolidated	Uranium ore processing	500 tU/y	1952/10	1981/8	Decommissioned	Byproduct of gold mining.
South Africa	Western Areas	Uranium ore processing	200 tU/y	1982	1988	Permanently Shut Down	Byproduct of gold mining.
South Africa	Stilfontein	Uranium ore processing		1978	1988	Decommissioned	
Spain	Fabrica de Urania de Andvjar	Uranium ore processing		1959	1981	Decommissioned	Remediated
Spain	Juzbado	Fuel fabrication	300 tHM/y	1985/8	2015	Operating	
Spain	La Haba	Uranium ore processing			1990/1	Decommissioned	
Spain	Planta Elephante	Uranium ore processing		1978	1983	Decommissioned	
Spain	Planta Lobo-G	Uranium ore processing		1989	1991	Decommissioned	
Spain	Saelices of Chico - Quercus	Uranium ore processing	800 tU/y	1993/6	2018	Operating	OP/HL mine
Sweden	ABB - Vasteras	Fuel fabrication	600 tU/y	1971	2006	Operating	35 years
Sweden	CLAB	Spent fuel storage	5000 tHM	1985/7	2015	Operating	
Sweden	Ranstad	Uranium ore processing		1965	1975	Permanently Shut Down	OP mine & mill, tailing piles restored.
Sweden	Sandviken	Zirconium tubing production	1200 t/y	1958	2008	Operating	50 years
Switzerland	Wurelingen	Spent fuel storage	8000 tHM			Under Construction	
Syria	Syrian Fertilizer Plant	U recovery				Proposed	
Tajikistan	Chkalovsk (Vostokredmet)	Uranium ore processing	2000 tU/y		1993	Permanently Shut Down	Mill
Turkey	CNRC Nuclear Fuel Pilot Plant	Uranium refining & conversion	1 tU/y	1986/10	2016	Operating	
Turkey	Koprubasi	U recovery		1974	1982	Permanently Shut Down	Pilot plant
Turkey	MTA Technology Lab	U recovery		1987	1990	Permanently Shut Down	Pilot plant
UK	BNFL A58 Pellet Plant	Fuel fabrication		1985	1998	Permanently Shut Down	
UK	BNFL B203	Reprocessing		1954	1987	Undergoing Decommissioning	
UK	BNFL B204	Reprocessing		1952	1973	Undergoing Decommissioning	
UK	BNFL B205	Reprocessing	1500 tHM/y	1964	2004	Operating	40 years

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
UK	BNFL B206 Solvent Regen	Reprocessing		1952	1963	Undergoing Decommissioning	
UK	BNFL B207 U Purification	Reprocessing		1952	1973	Undergoing Decommissioning	
UK	BNFL B209 Pu Finishing Line	Production		1962	1988	Undergoing Decommissioning	
UK	BNFL B2095 Dry Granulation Plant	Fuel fabrication			1988	Undergoing Decommissioning	
UK	BNFL B27 Storage Pond	Spent fuel storage	2300 tHM	1964/1	2004	Operating	40 years
UK	BNFL B30 Storage Pond	Spent fuel storage	1500 tHM	1962/1	1995/1	Permanently Shut Down	
UK	BNFL Capenhurst	Enrichment		1953	1982	Decommissioned	
UK	BNFL Coprecipitation Plant	Fuel fabrication		1969	1976	Undergoing Decommissioning	Powder production
UK	BNFL Dry Recovery Plant	Fuel fabrication		1974	1975	Decommissioned	
UK	BNFL Fuel Handling Plant 2	Spent fuel storage	1800 tHM	1986/1	2016	Operating	
UK	BNFL Mox Plant for FBR	Fuel fabrication		1970	1988	Permanently Shut Down	
UK	BNFL North End Facility – HEU Recovery	Reprocessing		1953	1985	Decommissioned	
UK	BNFL Pond 4	Spent fuel storage	1445 tHM	1981/1	2011	Operating	
UK	BNFL Springfields (PNR)	Fuel fabrication		1984	1995	Permanently Shut Down	
UK	BNFL Springfields AGR Plant	Fuel fabrication		1968	1999	Permanently Shut Down	
UK	BNFL Thorp AT & ST 1	Spent fuel storage	1900 tHM	1988/1	2018	Operating	
UK	BNFL Thorp RT & ST 2	Spent fuel storage	1900 tHM	1989/1	2019	Operating	
UK	Dounreay (Research Reactor Fuel 1)	Fuel fabrication	500 elements/y	1958	2002	Permanently Shut Down	
UK	Dounreay (Research Reactor Fuel 2)	Fuel fabrication	500 elements/y			Proposed	
UK	Dounreay (Research Reactor Fuel 3)	Fuel fabrication	500 elements/y			Under Construction	
UK	Dounreay Reprocessing Plant	Reprocessing	8 tHM/y	1980/1	2010	Permanently Shut Down	
UK	MOX Reprocessing Plant	Reprocessing		1980	1998	Permanently Shut Down	
UK	MTR Reprocessing Plant	Reprocessing		1959	1998	Permanently Shut Down	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
UK	NOFC Springfields (AGR)	Fuel fabrication	290 tHM/y	1996	2026	Operating	
UK	NOFC Springfields (LWR)	Fuel fabrication	330 tU/y	1996/10	2026	Operating	
UK	Sellafield (Magnox R)	Reprocessing	1500 tHM/y	1964/1	2004	Operating	40 years
UK	Sellafield (MDF)	Fuel fabrication	8 tHM/y	1993/10	2023	Operating	
UK	Sellafield (Oxide Plant 2)	Spent fuel storage	3000 tHM	1981/1	2011	Operating	
UK	Sellafield MOX Demo Fac	Fuel fabrication		1993	2000	Permanently Shut Down	Pilot plant
UK	Sellafield Mox Plant (SMP)	Fuel fabrication	120 tHM/y	1997/12	2027	Operating	
UK	Spend Fuel Handling Plant	Spent fuel storage	850 tHM	1986/1	2016	Operating	
UK	Springfields (AGR)	Fuel fabrication	300 tU/y	1995/1	1996/8	Permanently Shut Down	
UK	Springfields (Magnox)	Fuel fabrication	1300 tHM/y	1960	2005	Operating	45 years
UK	Springfields Enrich U Recovery Plant	Uranium refining & conversion	65 tU/y	1985/1	2015	Operating	
UK	Springfields IDR Plant	Production		1970	1999	Permanently Shut Down	
UK	Springfields Line 2 Hex Plant	Production		1960	1992	Undergoing Decommissioning	
UK	Springfields Line 3 Hex Plant	Production		2002	2032	Under Construction	
UK	Springfields Line 4 Hex Plant	Production		1999	2029	Operating	
UK	Springfields Main Line Chem Plant	U conversion		1960	2005	Operating	45 years
UK	Springfields OFC IDR UO2 Line	U conversion		1995	2025	Operating	
UK	Springfields U Metal Line	U conversion		1960	2005	Operating	45 years
UK	Springfields (U02)	Uranium refining & converison	710 tU/y	1995/1	2025	Operating	
UK	Springfields (UF6)	Uranium refining & converison	6000 tU/y	1974	2004	Operating	
UK	Throp	Reprocessing	850 tHM/y	1994/3	2024	Operating	
UK	UKAEA Conversion Plant	U conversion		1987	1990	Decommissioned	
UK	Urenco (Capenhurst)	Enrichment	2000000 SWU/y	1976	2006	Operating	
UK	Winfrith Fuel Manufacturing Facility	Fuel fabrication		1962	1992	Decommissioned	Pilot plant

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
UK	Wylfa	Spent fuel storage	700 tHM	1979/9	2009	Operating	
Ukraine	Zholtye Vody	Uranium ore processing	2000 tU/y	1959		Permanently Shut Down	Mill
USA	ABB - CE/Hematite, MO	Fuel fabrication	400 tHM/y	1974/1	2000	Permanently Shut Down	
USA	ABB/Windsor, CT	Fuel fabrication	300 tHM/y			Permanently Shut Down	
USA	Agrico	Uranium ore processing		1981	1999	Permanently Shut Down	
USA	Akron, OH	Zirconium metal production	500 t/y	1976		Permanently Shut Down	
USA	Ambrosia Lake, NM (Mill)	Uranium ore processing		1988	1990	Permanently Shut Down	Mill
USA	B&W/Apollo, PA	Fuel fabrication	360 tHM/y	1957	1986	Decommissioned	
USA	Barnwell AGNF	Reprocessing	1500 tHM/y	1974	1983	Decommissioned	
USA	Barnwell AGNF	Spent fuel storage	400 tHM	1980		Permanently Shut Down	
USA	Bartow, FL	Uranium ore processing		1980	1986	Decommissioned	
USA	Bingham Canyon	Uranium ore processing	50 tU/y	1980	1989/3	Permanently Shut Down	Byproduct
USA	Blanding, UT	Uranium ore processing	3000 tU/y	1980/5		Permanently Shut Down	Mill
USA	Bluewater, NM	Uranium ore processing			1982/3	Decommissioned	
USA	Boots/Brown, TX	Uranium ore processing				Decommissioned	ISL
USA	Bruni, TX	Uranium ore processing	330 tU/y	1977	1980	Decommissioned	ISL
USA	Burns/Moser, TX	Uranium ore processing		1977	1987	Decommissioned	ISL
USA	Canon City, CO	Uranium ore processing	330 tU/y	1958/5	1987	Permanently Shut Down	Mill
USA	Canonsburg, CO	Uranium ore processing				Decommissioned	
USA	Christensen Ranch, WY	Uranium ore processing		1989	2000	Permanently Shut Down	ISL
USA	Church Rock, NM	Uranium ore processing	1000 tU/y		1986	Permanently Shut Down	In reclamation
USA	Crow Butte, NE	Uranium ore processing	385 tU/y	1991/4		Permanently Shut Down	ISL
USA	Crownpoint, NM	Uranium ore processing		1997		Permanently Shut Down	ISL
USA	Delta	Uranium ore processing	10 tU/y	1980		Permanently Shut Down	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
USA	Donaldsonville, LA	Uranium ore processing	175 tU/y	1981		Permanently Shut Down	Byproduct
USA	Durango, CO	Uranium ore processing				Decommissioned	
USA	Edgemont, SD	Uranium ore processing				Decommissioned	
USA	El Mesquite/Holiday/O'Hern	Uranium ore processing	192 tU/y	1979	1997	Decommissioned	ISL
USA	Falls City, TX	Uranium ore processing			1983	Decommissioned	
USA	FC Fuels/Lynchburg Manufacturing Facility	Fuel fabrication	400 tHM/y	1982	2012	Operating	
USA	Ford, WA	Uranium ore processing	500 tU/y		1986	Decommissioned	
USA	Gardinier, WA	Uranium ore processing				Permanently Shut Down	Byproduct
USA	Gas Hill, UMETCO, WY	Uranium ore processing		1960	1986	Decommissioned	Mill, In reclamation
USA	Gas Hills, Federal, WY	Uranium ore processing	500 tU/y	1959	1986	Decommissioned	Mill
USA	GE Morris Facility	Spent fuel storage	750 MtU	1971	2006	Operating	35 years
USA	GE San Jose Fuel Fab Plant	Fuel fabrication		1962	1978	Decommissioned	
USA	GE Vallecitos Adv. Fuel Lab	Fuel fabrication		1962	1979	Decommissioned	
USA	GE Wilmington	Zirconium tubing production		1981	2011	Operating	
USA	GE/Wilmington, NC	Fuel fabrication	1100 tHM/y	1982	2012	Operating	
USA	Grand Junction CO (Climax)	Uranium ore processing				Decommissioned	
USA	Grants, Anaconda, NM	Uranium ore processing	3000 tU/y	1958	1986	Decommissioned	Mill
USA	Green River, UT	Uranium ore processing		1958	1961	Decommissioned	
USA	Gunnison, CO	Uranium ore processing				Decommissioned	
USA	Handford Purex	Reprocessing	2400 tHM/y	1956	1989	Permanently Shut Down	
USA	Highland Uranium Project	Uranium ore processing	1000 tU/y	1988/1		Permanently Shut Down	ISL
USA	Hobson Wellfield, TX	Uranium ore processing	400 tU/y	1979	1990	Decommissioned	ISL
USA	Idaho Falls - DOE	Reprocessing	100 tHM/y	1959	1992/6	Permanently Shut Down	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
USA	Idaho Falls (AFR)	Spent fuel storage				Operating	
USA	Kingsville Dome, TX	Uranium ore processing		1988	1999	Permanently Shut Down	ISL
USA	La Sal, UT	Uranium ore processing	500 tU/y	1972		Decommissioned	
USA	Lakeview, OR	Uranium ore processing				Decommissioned	
USA	Lamprecht	Uranium ore processing		1985	1988	Decommissioned	ISL
USA	Las Palmas	Uranium ore processing		1981	1984	Decommissioned	
USA	L-Bar, NM	Uranium ore processing	1000 tU/y	1976	1981/5	Decommissioned	Mill, reclamation on-going
USA	Lisbon, UT	Uranium ore processing	410 tU/y	1972	1988	Undergoing Decommissioning	Mill, reclamation on-going
USA	Lowman, ID	Uranium ore processing				Decommissioned	
USA	Lucky Mc (Pathfinder)	Uranium ore processing		1978	1985	Decommissioned	
USA	Maybell, CO	Uranium ore processing				Decommissioned	Mill
USA	McBryde	Uranium ore processing		1983	1985	Decommissioned	
USA	Metropolis Works/Converdyne	Uranium refining & converison	12700 tU/y	1959		Permanently Shut Down	
USA	Mexican Hat, UT	Uranium ore processing				Decommissioned	
USA	Midnite	Uranium ore processing		1957	1982	Permanently Shut Down	
USA	Moab, UT	Uranium ore processing	600 tU/y	1956/1	1984/3	Decommissioned	Mill
USA	Monument Valley, AZ	Uranium ore processing				Decommissioned	
USA	Mount Lucas, TX	Uranium ore processing	400 tU/y	1984	1988	Decommissioned	ISL
USA	Natrona County, WY	Uranium ore processing	500 tU/y		1986	Permanently Shut Down	
USA	Naturita, CO	Uranium ore processing				Decommissioned	
USA	New Wales, FL	Uranium ore processing		1980	1986	Permanently Shut Down	
USA	NFS MOX Fuel Fac.	Fuel fabrication		1965	1972	Decommissioned	
USA	Nikko/Allens Park, MI - Nikko	Zirconium tubing production	500 t/y	1981	2011	Operating	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
USA	Oak Ridge Gaseous Diffusion Plant	Enrichment	7700000 SWU/y	1945	1985	Undergoing Decommissioning	
USA	Paducah Gaseous Diffusion Plant	Enrichment	113000000 SWU/y	1954/12	2004	Operating	
USA	Palangana Dome, TX	Uranium ore processing		1969	1991	Permanently Shut Down	ISL
USA	Panna Maria, TX	Uranium ore processing	960 tU/y	1979/2	1992/6	Decommissioned	OP, stabilized
USA	Pawnee, TX	Uranium ore processing				Decommissioned	ISL
USA	Petrotomics, TX	Uranium ore processing		1962	1985	Permanently Shut Down	
USA	Plant City, FL	Uranium ore processing		1981	1992	Permanently Shut Down	
USA	Portsmouth Gaseous Diffusion Plant	Enrichment	7400000 SWU/y	1956	2001	Undergoing Decommissioning	
USA	Rhone Poulene	Rare earth processing				Operating	
USA	Rifle, CO	Uranium ore processing				Decommissioned	
USA	Riverton, WY	Uranium ore processing				Decommissioned	
USA	Rosita, TX	Uranium ore processing		1990	1999	Permanently Shut Down	Mill
USA	Sahuarita	Uranium ore processing		1980		Permanently Shut Down	Byproduct
USA	Salt Lake City, UT	Uranium ore processing				Decommissioned	
USA	Sandvik/Kennewick, WA	Zirconium tubing production	2200 t/y	1968/1	2008	Operating	40 years
USA	Savannah River Site	Reprocessing	2700 tHM/y	1954	1989	Permanently Shut Down	
USA	Savannah River Site - DOE	Heavy water production	190 t/y	1952		Permanently Shut Down	
USA	Sequoyah Fuels Conversion Facility	Uranium refining & converison	9090 tU/y	1970/5	1992/11	Permanently Shut Down	Closed
USA	Sequoyah Fuels Reduction Facility	Uranium refining & converison	3400 tU/y	1987/7	1993/7	Permanently Shut Down	

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
USA	Shiprock, NM	Uranium ore processing				Decommissioned	
USA	Shirley Basin, WY	Uranium ore processing	700 tU/y		1986	Permanently Shut Down	Mill, reclamation completed
USA	Shirly Basin (Pathfinder)	Uranium ore processing		1971	1992	Decommissioned	ISL
USA	Siemens ANF/Richland, WA	Fuel fabrication	700 tHM/y	1970	2005	Operating	35 years
USA	Slick Rock, CO	Uranium ore processing				Decommissioned	
USA	Smith Ranch, TX	Uranium ore processing	30 tU/y	1997		Permanently Shut Down	ISL
USA	Split Rock	Uranium ore processing		1973	1982	Decommissioned	
USA	Spook, WY	Uranium ore processing				Decommissioned	
USA	SSFL/ETEC Nuc Mat Dev Facility	Fuel fabrication		1967	1980	Decommissioned	
USA	Sweetwater, WY	Uranium ore processing		1981	1983	Permanently Shut Down	
USA	Tampa, TX	Uranium ore processing	200 tU/y		1983	Permanently Shut Down	
USA	Tex-1, TX	Uranium ore processing		1987	1990/3	Permanently Shut Down	ISL, inactive
USA	Trevino, TX	Uranium ore processing	150 tU/y	1981	1985	Decommissioned	
USA	Tuba City AZ	Uranium ore processing				Decommissioned	
USA	UNC Recovery, NM	Uranium ore processing				Permanently Shut Down	
USA	Uncle Sam, LA	Uranium ore processing	310 tU/y	1978	1999	Permanently Shut Down	Byproduct
USA	Uravan, CO	Uranium ore processing	1000 tU/y	1948	1984	Permanently Shut Down	Mill, shutdown
USA	Wah Chang	Zirconium metal production	2000 t/y	1956		Permanently Shut Down	
USA	Wellplint, TX	Uranium ore processing		1978	1984	Decommissioned	
USA	West Cole, TX	Uranium ore processing		1981	1989	Permanently Shut Down	ISL

Fuel Cycle Facilities

Country	Name	Type	Capacity	Start Date	Shutdown Date	Status	Comments
USA	West Valley - DOE	Reprocessing	300 tHM/y	1966	1972	Undergoing Decommissioning	
USA	Western Zirconium Plant	Zirconium metal production	300000 m/y	1980	2010	Operating	
USA	Westinghouse Columbia Plant	Fuel fabrication	1200 tHM/y	1986	2016	Operating	
USA	White Mesa, UT	Uranium ore processing	2100 tU/y	1980	1997	Permanently Shut Down	Mill
USA	Zamzow, TX	Uranium ore processing		1977	1986	Decommissioned	ISL
Uzbekistan	Navoi Hydrometallurigical	Uranium ore processing	4000 tU/y	1964	2004	Operating	Mill - 40 years

Annex IV

PARTICLE ACCELERATORS

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Argentina	Centro Atomico Bariloche	Bariloche	Linac 25 MeV	1969	2009	Operating	
Argentina	Commission Nacional Energia Atomica	Buenos Aires	CP-42	1994	2034	Operating	
Argentina	Fundacion Escuela de Medicina Nuclear	Mendoza	RDS-112	1997	2037	Operating	
Armenia	Electronica U-003	Yerevan	Electronic linac 5 MeV	1989	2029	Operating	
Armenia	Electronica U-006	Yerevan	Electronic linac 10 MeV	1990	2030	Operating	
Armenia	LAE-4 Electronics	Yerevan	Electronic linac 4 GeV	1984	2024	Operating	
Armenia	LAE-8 Electronics	Yerevan	Electronic linac 8 MeV	1986	2026	Operating	
Armenia	YerPhI Synchrotron	Yerevan	Electronic linac 120 MeV	1965	2005	Operating	
Australia	Austin & Repatriation Medical Center	Melbourne	Cyclone 10/5	1992	2032	Operating	
Australia	Australian Nuclear Science & Technology Organization	Mensai, NSW	Cyclone 30	1991	2031	Operating	
Australia	Peter McCallum Cancer Institute	East Melbourne	Oxford 12 MeV	1998	2038	Operating	
Austria	Argos Zyklotron	Klagenfurt	PET Trace	1999	2039	Operating	
Austria	Osterreichisches Forschungzentrum Seibersdorf	Seibersdorf	PET Trace	1999	2039	Operating	
Belgium	Erasme Hospital	Brussels	Cyclone 30	1990	2030	Operating	
Belgium	GELINA	Geel	Electronic linac 200 MeV	1965	2005	Operating	
Belgium	Gent Univ. Electron linac	Gent	Electronic linac 15 MeV	1984	2024	Operating	
Belgium	MDS Nordion SA	Fleurus	Cyclone 30	1992	2032	Operating	
Belgium	Uiversity of Leuven	Leuven	Cyclone 10/5	1990	2030	Operating	
Belgium	Universite Catholique de Louvain	Louvain-la-Neuve	Cyclone	1969	2009	Operating	
Belgium	Universite Catholique de Louvain	Louvain-la-Neuve	Cyclone 30	1987	2027	Operating	
Belgium	University de Liege	Liege	Cyclone 18/9	1999	2039	Operating	
Belgium	University of Gent	Gent	CGR-MeV 520	1977	2017	Operating	
Belgium	VRIJE Universitait Brussel	Brussels	CGR-560	1983	2023	Operating	
Brazil	CTA	San Jose dos Campas	Linac 30 MeV			Under Construction	
Brazil	Instituto de Engenharia Nuclear	Rio de Janiero	CV-28	1975	2015	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Brazil	Instituto de Pesquisas Energeticas e Nucleares	Sao Paulo	CV-28	1981	2021	Operating	
Brazil	Instituto de Pesquisas Energeticas e Nucleares	Sao Paulo	Cyclone-30	1998	2038	Operating	
Brazil	LNLS	Campinas	Linac 100 MeV	1987	2027	Operating	
Canada	Atlas Wireline Services	Calgary, Alberta	Neutron Generator			Operating	
Canada	Cancer Corteal Agency of BC	Vancouver, BC				Operating	1 Linear accelerator
Canada	Cancer Corteal Agency of BC	Vancouver, BC				Operating	4 Linear accelerator
Canada	Clarke Institute of Psychiatry	Toronto, Ontario	MC-17	1991	2031	Operating	
Canada	Computalog Gearhart Ltd.	Calgary, Alberta	Neutron Generator			Operating	
Canada	Cross Cancer Center	Edmonton, Alberta	TR-19	2001	2041	Operating	
Canada	Defence Research Establishment	Ottawa, Ontario	Neutron Generator			Permanently Shut Down	
Canada	Defence Research Establishment	Ottawa, Ontario	Van de Graaff			Operating	
Canada	Halliburton Services	Calgary, Alberta	Neutron Generator			Operating	
Canada	Hospital Notre-Dame	Montreal, Quebec	Linac			Operating	
Canada	Hotel-Dieu de Quebec	Quebec, Quebec	Betatron			Operating	
Canada	Jewish General Hospital	Montreal, Quebec	Linac			Operating	
Canada	McGill University	Montreal, Quebec	Synchrocyclotron			Operating	
Canada	McMaster University	Hamilton, Ontario	Tandem Vande Graaff			Decommissioned	
Canada	Manitoba Cancer Treatment and Research Foundation	Winnipeg, Manitoba				Operating	2 lines
Canada	Montreal General Hospital	Montreal, Quebec	Linac			Operating	
Canada	Montreal Neurological Institute, McGill University	Montreal, Quebec	Cyclone 18/9	1993	2033	Operating	
Canada	National Research Council	Ottawa, Ontario	Van de Graaff			Operating	
Canada	Ontario Cancer Foundation	Toronto, Ontario				Operating	7 Lines
Canada	Ontario Cancer Foundation	Hamilton, Ontario	Van de Graaff			Operating	
Canada	Ontario Cancer Treatment & Research Foundation	Kingston, Ontario	Linac			Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Canada	Ontario Cancer Treatment & Research Foundation	Thunder Bay, Ontario	Linac			Operating	
Canada	Ontario Cancer Treatment & Research Foundation	Ottawa, Ontario	Linac			Operating	2 at site
Canada	Ontario Cancer Treatment & Research Foundation	Sudbury, Ontario	Linac			Operating	2 at site
Canada	Ontario Cancer Treatment & Research Foundation	Windsor, Ontario	Linac			Operating	2 at site
Canada	Ontario Cancer Treatment & Research Foundation	London, Ontario	Linac			Operating	3 at site
Canada	Queens University	Kingston, Ontario	Van de Graaff			Operating	
Canada	Saskatoon Cancer Clinic	Saskatoon, Sask.	Linac			Operating	
Canada	Saskatoon Cancer Foundation	Regina, Sask.	Linac			Operating	
Canada	Schlumberger of Canada	Calgary, Alberta	Neutron Generator			Operating	
Canada	St. John Regional Hospital	St. John, NB	Neutron Generator			Operating	
Canada	St. Johns General Hospital	St. Johns, Newfoundland	Linac			Operating	
Canada	Tom Baker Cancer Center	Calgary, Alberta				Operating	2 Linacs
Canada	TRIUMF	Vancouver, BC	TRIUMF	1962	2007	Operating	45 years
Canada	TRIUMF	Vancouver, BC	CP42	1980	2020	Operating	
Canada	TRIUMF	Vancouver, BC	TR30	1990	2030	Operating	
Canada	TRIUMF	Vancouver, BC	1.5 MeV			Planned	
Canada	TRIUMF PET Programme	Vancouver, BC	TR13	1994	2034	Operating	
Canada	Universite de Laval	Ste. Foy, Quebec	Van de Graaff			Operating	
Canada	Universite de Montreal	Montreal, Quebec	Tandem Van de Graaff			Operating	
Canada	University of Guelph	Guelph, Ontario	Van de Graaff			Operating	
Canada	University of Manitoba	Winnipeg, Manitoba	Cyclotron			Operating	
Canada	University of New Brunswick	Fredericton, NB	Neutron Generator			Operating	
Canada	University of Ottawa Heart Institute	Ottawa, Ontario	RDS-111	2001	2041	Operating	
Canada	University of Saskatchewan	Saskatoon	Linac 310 MeV	1965	2005	Operating	
Canada	University of Toronto	Toronto, Ontario	Neutron Generator			Operating	
Canada	University of Western Ontario	London, Ontario	Van de Graaff			Operating	
Canada	Victoria General Hospital	Halifax, NS	Linac			Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
China	Beijing 35 MeV Proton Linac	Beijing	proton linac 35.5 MeV	1985	2025	Operating	
China	Beijing Electron - Positron Linac	Beijing	Electronic linac 1.8 GeV	1987	2027	Operating	
China	Beijing FEL Facility Linac	Beijing	Electronic linac 30 MeV	1991	2031	Operating	
China	Beijing Normal University	Beijing	CS 30	1986	2026	Operating	
China	Beijing Normal University	Beijing	CS 22	1997	2037	Operating	
China	China Institute of Atomic Energy	Beijing	Cyclone 30	1995	2035	Operating	
China	Guangdong Province People's Hospital	Guangzhou	RDS-111	1999	2039	Operating	
China	Hefei Light Source Injector linac	Anhui	Electronic linac 225 MeV	1987	2027	Operating	
China	Hong Kong Sanatorium & Hospital Limited	Hong Kong	RDS-111	1998	2038	Operating	
China	Peking Union Medical College Hospital	Beijing	RDS-111	1998	2038	Operating	
China	Shanghai Institute of Nuclear Research	Shanghai	Cyclone 30	1996	2036	Operating	
China	The PLA General Hospital	Beijing	RDS-111	1999	2039	Operating	
China	Zibo Wanije Hospital	Shandong	PET Trace	1995	2035	Operating	
China	Zibo Wanji Hospital	Shanghai	PET Trace	1995	2035	Operating	
China, Taiwan	Synchroton Radiation Research Center	Hsinchu	Electronic linac 50 MeV	1992	2032	Operating	
Czech Rep	Nuclear Physics Institute	Rez	U-120 M	1977	2017	Operating	
Czech Rep	Nuclear Physics Institute	Rez	Cyclone 18/9	1979	2019	Operating	
Denmark	Aarhus PET Centre	Aarhus	PET Trace	1993	2033	Operating	
Denmark	University Hospital of Copenhagen	Copenhagen	MC 32-NI	1992	2032	Operating	
Egypt	Atomic Energy Authority, Nuclear Research Center	Cairo	MGC-20	1997	2037	Operating	
Finland	Turku PET Centre	Turku	MGC-20	1974	2014	Operating	
Finland	Turku PET Centre	Turku	Cyclone 3	1992	2032	Operating	
Finland	University of Helsinki	Helsinki	Cyclone 10/5	1997	2037	Operating	
Finland	University of Jyraskyla	Jyraskyla	JYFL	1990	2030	Operating	
France	CANDELA	Orsay	Electronic linac 3.5 MeV	1993	2033	Operating	
France	Center Laser Infra-rouge Orsay	Orsay	Electronic linac 70 MeV	1991	2031	Operating	
France	Centre Antoine Lacassagne	Nice		1991	2031	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
France	Centre d'Exploration et de Recherche Medicales par Emmision	Lyon	Cypris 325	1987	2027	Operating	
France	Centre National de la Recherche Scientifique	Orleans	CGR	1974	2014	Operating	
France	CERMEP - Hospital Neurocardiologique	Lyon	Cyclone 18/9	1999	2039	Operating	
France	Electron Positron Linac Ulterior for SOLEIL	Orsay	Electronic linac 340 MeV			Planned	
France	ELSA	Bruyeres-le-Chatel	Electronic linac 20 MeV	1991	2031	Operating	
France	ESRF Preinjector	Grenoble	Electronic linac 200 MeV	1991	2031	Operating	
France	Laser a Electrons Libres on Induction Accelerator	Le Barp	Electronic linac 3 GeV	1992	2032	Operating	
France	MACSE	Gif-sur-Yvette	Electronic linac 25 MeV	1991	2031	Operating	
France	Nouvelle Experience de Physique des Accelerateurs Linearies	Orsay	Electronic linac 100 MeV	1988	2028	Permanently Shut Down	
France	Orsay Linac	Orsay	Electronic linac 2.3 GeV	1968	2008	Operating	
France	Prototype d'Installation pour Valider l'Accelerateur a Induction de Radiography	Le Barp	Electronic linac 8 MeV			Under Construction	
France	Service Hospitalier Frederic Joliot	Orsay	CGR-520 MeV	1975	2015	Operating	
Germany	DELTA Injector Linac	Dortmund	Electronic linac 100 MeV	1994	2034	Operating	
Germany	Euro-PET GmbH	Freiburg	PETTrace	1996	2036	Operating	
Germany	Forschungszentrum Julich GmbH	Julich	CV 28	1976	2016	Operating	
Germany	Forschungszentrum Julich GmbH	Julich	BC-1710	1987	2027	Operating	
Germany	Forschungszentrum Julich GmbH	Julich	PETTrace	1997	2037	Operating	
Germany	Forschungszentrum Karlsruhe GmbH, Cyclotron Lab	Karlsruhe	AEG	1964	2009	Operating	45 years
Germany	Forschungszentrum Karlsruhe GmbH, Cyclotron Lab	Karlsruhe	CP42H	1984	2024	Operating	
Germany	Forschungszentrum Rossendorf	Dresden	U-120	1958	2008	Operating	50 years
Germany	Forschungszentrum Rossendorf	Dresden	Cyclone 18/9	1996	2036	Operating	
Germany	German Cancer Research Center (DKFZ)	Heidelberg	MC 32 NI	1991	2031	Operating	
Germany	GSI Heavy Ion Linac Wideroe	Darmstadt	Ion linac 1.4 MeV	1975	2015	Operating	
Germany	Heidelberg Postaccelerator	Heidelberg	Ion linac	1979	2019	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Germany	Institute for Medical Radiation Physics	Essen	CV 28	1975	2015	Operating	
Germany	Institute of Radiology and Nuclear Medicine	Frankfurt am Main	RDS-111	1998	2038	Operating	
Germany	J W Goethe University	Frankfurt	Cyclone 18/9			Operating	
Germany	Linac	Berlin	Electronic linac 15 MeV	1969	2009	Operating	
Germany	Linac 1	Bonn	Varian V-7720 20 MeV	1966	2006	Operating	
Germany	Linac 2	Hamburg	Electronic linac 900 MeV	1971	2011	Operating	
Germany	Linac 2	Bonn	Electronic linac 30 MeV	1995	2035	Operating	
Germany	Linac 3	Hamburg	Proton linac 50 MeV	1988	2028	Operating	
Germany	Mainz Microtron	Mainz	Electronic linac 3.5 MeV	1988	2028	Operating	
Germany	Max Planck Institut fur Neurologische Forschung	Koln	MC 16	1987	2027	Operating	
Germany	Medizinische Hochschule Hannover (MHH)	Hannover	MC 35	1976	2016	Operating	
Germany	Rheinisch-Westfalische Technische Hochschule	Aachen	RDS 111	1997	2037	Operating	
Germany	RQ13	Berlin	Ion linac	1997	2037	Operating	
Germany	S - Band Test Facility	Hamburg	Electronic linac 450 MeV			Under Construction	
Germany	S - DALINAC	Darmstadt	Electronic linac 130 MeV	1987	2027	Operating	
Germany	SchweIN	Garching	Ion linac	1976	2016	Operating	
Germany	Technische Universitat Munchen	Munich	RDS 112	1992	2032	Operating	
Germany	TESLA Test Facility Linac	Hamburg	Electronic linac 600 MeV			Under Construction	
Germany	UKE Cyclotron	Hamburg	140/IV	1968	2008	Operating	
Germany	Universitatsklinik der Ruhr-Universitat Bochum	Bad Oeynhausen	Cyclone 18/9	1994	2034	Operating	
Germany	Universitatsklinikum Tubingen (UKT)	Tubingen	PETTrace	1995	2035	Operating	
Germany	University Hospital Ulm	Ulm	Cyclone 18/9	1994	2034	Operating	
Germany	Westfalische Wilhelms Universitat	Munster	RDS-111	1999	2039	Operating	
Germany	Zentralklinik Bad Berka GmbH	Bad Berka	RDS 111	1997	2037	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Hungary	Institute of Nuclear Research, Hungarian Academy of Science	Debrecen	MGC 20E	1985	2025	Operating	
India	Bhabha Atomic Research Center (BARC) Radiation Medicine Center	Mumbai	PET Trace	2001	2041	Operating	
India	Variable Energy Cyclotron Centre (VECC)	Calcutta	VECC	1997	2037	Operating	
Indonesia	National Atomic Energy Agency, BATAN	Serpong	CS 30	1990	2030	Operating	
Iran	Nuclear Research Centre for Agriculture and Medicine	Karaj	Cyclone 30	1995	2035	Operating	
Israel	Hadassah Medical Organization	Jerusalem	Cyclone 18/9	1997	2037	Operating	
Israel	Soreq Nuclear Research Center	Yavne	Cyclone 10/5	2000	2040	Operating	
Italy	Acceleratore Lineare per Ioni Superconducting Linac	Legnaro	Ion linac	1994	2034	Operating	
Italy	Azienda Ospedaliera di Bologna	Bologna	PET Trace	2001	2041	Operating	
Italy	Azienda Ospedaliera, Nuclear Medicine	Reggio Emilia	GE-10	2001	2041	Operating	
Italy	CNR Institute of Clinical Physiology	Pisa	PETTrace	1996	2036	Operating	
Italy	Consiglio Nazional delle Richerche	Naples	MC 17	1991	2031	Operating	
Italy	DAPNE - Linac	Frascati	Electronic linac 800 MeV	1995	2035	Operating	
Italy	ELETTRA	Trieste	Electronic linac 1.2 GeV	1993	2033	Operating	
Italy	European Commission	Ispra	MC-40	1980	2020	Operating	
Italy	HS Raffaele Institute	Milan	RDS 112	1988	2028	Operating	
Italy	Instituto Nazionale per lo Studio e la Cura dei Tumori (INT)	Milan	MC 17F			Operating	
Italy	Ospedale Civile de Castelfranco Veneto		RDS 112	1994	2034	Operating	
Italy	Ospedale Maggiore di Milano	Milan	PET Trace	2000	2040	Operating	
Italy	Ospedale San Raffaele, Universita Degli Studi	Milan	Cyclone 18/9	2000	2040	Operating	
Italy	Universita di Padova	Padova	RDS 112	1994	2034	Operating	
Japan	45 MeV Electron Linear Accelerator Laboratory	Sapporo	Electronic linac 45 MeV	1974	2014	Operating	
Japan	Accelerator Test Facility	Oho	Electronic linac 2 GeV	1995	2035	Operating	
Japan	Daiichi Radioisotope Laboratories Ltd	Chiba	MC-40	1984	2024	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Japan	Daiichi Radioisotope Laboratories Ltd	Chiba	Cyclone 30	1991	2031	Operating	
Japan	Electron Injector for NIJI-III	Hyogo	Electronic linac 120 MeV	1993	2033	Operating	
Japan	Free Electron Laser Research Institute	Osaka	Electronic linac 165 MeV	1994	2034	Operating	
Japan	Fukui Medical University, Biomedical Imaging Research Center	Matsuoka	OSCAR 5	1994	2034	Operating	
Japan	Gunma University School of Medicine	Maebashi	BC 1700	1983	2023	Operating	
Japan	HIMAC Injector	Chiba	Ion linac	1993	2033	Operating	
Japan	HIMEDIC Imaging Centre at Lake Yamanaka	Yamanakako	HM 18	1993	2033	Operating	
Japan	Hokkaido University Hospital, Graduate School of Medicine	Sapporo	Cypris HM-18	1998	2038	Operating	
Japan	Hyogo Institute for Aging Brain & Cognitive Disorders	Himeji	OSCAR-2	1992	2032	Operating	
Japan	ICR Electron linac	Kyoto	Electronic linac 100 MeV	1995	2035	Operating	
Japan	ICR Proton linac	Kyoto	Proton linac 7 MeV	1992	2032	Operating	
Japan	Institute for Biofunctional Research	Osaka	HM 18	1992	2032	Operating	
Japan	Institute for Nuclear Study - ES	Tokyo	Electronic linac 15 MeV	1974	2014	Operating	
Japan	International Medical Centre of Japan	Tokyo	BC 2010N	1994	2034	Operating	
Japan	ISIR L - Band Linac	Osaka	Electronic linac 38 MeV	1978	2018	Operating	
Japan	ISIR S Band Linac	Osaka	Electronic linac 150 MeV	1989	2029	Operating	
Japan	Isotope Separator On-Line	Tokyo	Ion linac 1.05 MeV	1997	2037	Operating	
Japan	JAERI 2 MeV RFQ	Tokai	Proton linac 2 MeV	1994	2034	Operating	
Japan	JAERI Tandem-Booster	Tokai	Ion linac	1993	2033	Operating	
Japan	Japan Atomic Energy Research Institute	Takasaki	AVF Cyclotron	1990	2030	Operating	
Japan	Kanazawa Cardiovascular Hospital	Kanazawa	BC 1710	1991	2031	Operating	
Japan	KEK H- Linac Test Stand	Oho	Proton linac 5.4 MeV	1997	2037	Operating	
Japan	KEK linac	Ibaraki	Proton linac 40.3 MeV	1974	2014	Operating	
Japan	KEK Photon Factory	Ibaraki	Electronic linac 3 GeV	1982	2022	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Japan	Kyoto Univ. Research Reactor Institute linac	Osaka	Electronic linac 46 MeV	1967	2007	Operating	
Japan	Kyoto University Hospital	Kyoto	Cypris 325	1982	2022	Operating	
Japan	Kyushu University	Fukuoka	BC 1710	1983	2023	Operating	
Japan	Nagoya City Rehabilitation Centre	Nagoya	Cypris 370	1989	2029	Operating	
Japan	Nagoya University School of Medicine	Nagoya	BC 2211	1989	2029	Operating	
Japan	National Cardiovascular Centre	Osaka	Cypris 370	1989	2029	Operating	
Japan	National Centre of Neurology and Psychiatry	Tokyo	OSCAR SCC12P	1997	2037	Operating	
Japan	National Institute for LonGeVity Sciences	Aichi	HM-18	1995	2035	Operating	
Japan	National Institute of Radiological Sciences	Anagawa	AVF-930	1973	2013	Operating	
Japan	National Institute of Radiological Sciences	Anagawa	HM-18	1994	2034	Operating	
Japan	National Institute of Radiological Sciences	Anagawa	BC-2010	2000	2040	Operating	
Japan	National Research Institute for Metals	Tsukuba	BC 1710	1986	2026	Operating	
Japan	Nihon Medi-Physics Co Ltd, Chiba Facility	Sodegaura City	480 P	1985	2025	Operating	
Japan	Nihon Medi-Physics Co Ltd, Chiba Facility	Sodegaura City	750 PV	1986	2026	Operating	
Japan	Nihon Medi-Physics Co Ltd. Hyogo Facility	Sanda City	Cyclone 30	1990	2030	Operating	
Japan	Nikko Memorial Hospital	Muroran	RDS 111	1996	2036	Operating	
Japan	Nishidai Clinic Diagnostic Imaging Center	Tokyo	HM-18	2000	2040	Operating	
Japan	Nishijin Hospital	Kyoto	BC 1710	1985	2025	Operating	
Japan	Nishina Memorial Cyclotron Centre	Takizawa	MCY 1750	1989	2029	Operating	
Japan	Osaka City University Medical School Hospital	Osaka	OSCAR SCC12P	1992	2032	Operating	
Japan	PNC Linac	Oarai	Electronic linac 10 MeV	1996	2036	Operating	
Japan	Research Institute for Brain & Blood Vessels Akita	Akita City	BC-168	1983	2023	Operating	
Japan	Riken Linear Accelerator	Saitama	Ion linac 5 MeV	1981	2021	Operating	
Japan	Scarlet	Tokai	Electronic linac 23 MeV	1993	2033	Operating	
Japan	Spring - 8 Linac	Hyogo	Electronic linac 1.15 GeV	1996	2036	Operating	
Japan	Subpicosecond Twin Linac	Tokai	Electronic linac 2 GeV	1977	2017	Operating	
Japan	TIT - IH-2 Linac	Tokyo	Ion linac 3.4 MeV	1987	2027	Operating	

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Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Japan	Tohohu University (Cyric PET Center)	Aramaki	Cyric 680	1977	2017	Operating	
Japan	Tohoku linac	Sendai	Electronic linac 200 MeV	1967	2007	Operating	
Japan	Tokyo Metropolitan Institute of Gerontology	Tokyo	Cypris 370	1990	2030	Operating	
Japan	Tsukuba Electrotechnical Laboratory Linac	Ibaraki	Electronic linac 500 MeV	1980	2020	Operating	
Japan	University of Tokyo, Dept of Radiology	Tokyo	Cypris 370	1988	2028	Operating	
Kazakhstan	Institute of Nuclear Physics	Almaty	U-150	1965	2005	Operating	
Korea, Rep	Pohang Accelerator Laboratory	Pohang	Electronic linac 2.34 GeV	1994	2034	Operating	
Korea, Rep	Asan Medical Center	Seoul	Cyclone 18/9	2001	2041	Operating	
Korea, Rep	Korea Cancer Center Hospital - KAERI	Seoul	MC 50	1987	2027	Operating	
Korea, Rep	Korea Cancer Center Hospital - KAERI	Seoul	KCCH-13	2001	2041	Operating	
Korea, Rep	Samsung Medical Centre	Seoul	PETTrace	1994	2034	Operating	
Korea, Rep	Seoul National University Hospital	Seoul	TR-13	1994	2034	Operating	
Mexico	Universidad Nacional Autonoma de Mexico	Del Coyocaen	RDS-111	2000	2040	Operating	
Netherlands	Eindhoven University of Technology/Accrec BV	Eindhoven	AVF	1963	2008	Operating	45 years
Netherlands	Eindhoven University of Technology/Accrec BV	Eindhoven	ILEC	1989	2029	Operating	
Netherlands	Eindhoven University of Technology/Accrec BV	Eindhoven	Cyclone 30			Planned	
Netherlands	Free Electron Laser for Infrared Experiments	Nieuwegein	Electronic linac 45 MeV	1991	2031	Operating	
Netherlands	Groningen University Hospital	Groningen	MC 17F	1991	2031	Operating	
Netherlands	Mallinckrodt Medical BV	Petten	AVF	1966	2006	Operating	
Netherlands	Mallinckrodt Medical BV	Petten	Cyclone 30	1992	2032	Operating	
Netherlands	Medium Energy Electron Accelerator	Amsterdam	Electronic linac 800 MeV	1978	2018	Operating	
Netherlands	Twente Eindhoven Urenco Free Electron Laser	Ebschede	Electronic linac 7 MeV	1993	2033	Operating	
Netherlands	Vrije University	Amsterdam	AVF	1965	2005	Operating	
Netherlands	Vrije University	Amsterdam	Cyclone 18/9	1997	2037	Operating	
Norway	University of Oslo	Oslo	MC35	1979	2019	Operating	
Philippines	St Lukes Medical Center	Quezon City	Minitrace	2001	2041	Operating	
Poland	Henryk Niewodniczanski Institute of Physics	Krakow	AIC-144	1994	2034	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Poland	S-20	Otwock - Swierk	Electronic linac 22 MeV			Under Construction	
Poland	Warsaw University	Warsaw	AVF	1994	2034	Operating	
Romania	Natl Institute for R&D for Nuclear Physics & Engineering	Bucharest	U-120	1957	2007	Operating	50 years
Russian Fed	Bakoulev Scientific Centre for Cardiovascular Surgery	Moscow	RDS-111	1998	2038	Operating	
Russian Fed	Central Research Institute of Roentgenology & Radiology	St Petersburg	MGC-20P	1991	2031	Operating	
Russian Fed	Cyclotron Co Ltd	Obninsk	U-150-1	1963	2008	Operating	45 years
Russian Fed	Cyclotron Co Ltd	Obninsk	RIC-14	1999	2039	Operating	
Russian Fed	I-100	Moscow	Proton linac 103 MeV	1966	2006	Operating	
Russian Fed	I-2	Moscow	Ion linac	1966	2006	Operating	
Russian Fed	Institute of the Human Brain	St Petersburg	MC-17	1990	2030	Operating	
Russian Fed	ISTRA-36	Moscow	Proton linac 36 MeV	1989	2029	Operating	
Russian Fed	ITEP	Moscow	Ion linac	1986	2026	Operating	
Russian Fed	Kurchatov Institute of Atomic Energy	Moscow		1976	2016	Operating	
Russian Fed	Linac-60 RRC	Moscow	Electronic linac 60 MeV	1973	2013	Operating	
Russian Fed	LU-20	Moscow	Ion linac	1973	2013	Operating	
Russian Fed	LU-50	Nizhnii Novgorod	Electronic linac 75 MeV	1981	2021	Operating	
Russian Fed	Moscow Meson Factory Linac	Moscow	Proton linac 600 MeV	1990	2030	Operating	
Russian Fed	Nuclear Physics Institute	Tomsk	R-7M	1959	2009	Operating	50 years
Russian Fed	Race Track Microtron	Moscow	Electronic linac 11.5 MeV	1991	2031	Operating	
Russian Fed	Research Institute of Nuclear Physics/St Petersburg Technical University	St Petersburg	MGC-20	1985	2025	Operating	
Russian Fed	URAL - 30	Moscow	Proton linac 30 MeV	1983	2023	Operating	
Russian Fed	V.G. Khlopin Radium Institute	St Petersburg	MGC 20	1988	2028	Operating	
Russian Fed	VEPP - 5	Novokhatski	Electronic linac 510 MeV			Under Construction	

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Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
Saudi Arabia	King Faisal Specialist Hospital & Research Center	Riyadh	CS30	1981	2021	Operating	
Slovakia	Cyclotron Center of the Slovak Republic	Bratislava	Cyclone 18/9	2001	2041	Operating	
South Africa	National Accelerator Centre	Faure	NAC	1986	2026	Operating	
Spain	Barnatron	Barcelona	PET Trace	2001	2041	Operating	
Spain	Centro Andaluz de Diagnostic PET (CADPET)	Seville	PET Trace	2001	2041	Operating	
Spain	Centro PET Complutense	Madrid	OSCAR	1994	2034	Operating	
Spain	Clinica Universitaria de Navarra	Pamplona	Cyclone 18/09	1996	2036	Operating	
Spain	Molypharma	Madrid	GE Minitrace	2001	2041	Operating	
Sweden	Uppsala University	Uppsala	MC 17	1991	2031	Operating	
Switzerland	CERN Linac 2	Geneva	Proton linac 50 MeV	1978	2018	Operating	
Switzerland	CERN Linac 3	Geneva	Ion linac	1994	2034	Operating	
Switzerland	Compact Linear Collider Test Facility	Geneva	Electronic linac 320 MeV	1990	2030	Operating	
Switzerland	LEP Injector linac	Geneva	Electronic linac 750 MeV	1986	2026	Operating	
Switzerland	Paul Scherer Institute	Villigen	PSI Design	1974	2014	Operating	
Switzerland	PL2 RFQ Linac	Geneva	Proton linac 1.85 MeV	1990	2030	Operating	
Switzerland	University Hospital of Geneva	Geneva	Cyclone 18/9	2001	2041	Operating	
Switzerland	University Hospital of Zurich - PET Center	Zurich	PET Trace	1994	2034	Operating	
Syria	Atomic Energy Commission of Syria	Damascus	Cyclone 30	2001	2041	Operating	
Turkey	Monol Isotope Services	Okmeydani	RDS-111	2000	2040	Operating	
UK	Douglas Cyclotron Unit	Bebington	MC-62	1984	2024	Operating	
UK	Imaging Research Solutions Ltd.	London	MC40 Mark II	1986	2026	Operating	
UK	Imaging Research Solutions Ltd.	London	3D	1991	2031	Operating	
UK	ISIS Injector	Chilton	Proton linac 70.4 MeV	1983	2023	Operating	
UK	St Thomas Hospital	London	RDS 112	1991	2031	Operating	
UK	Synchrotron Radiation Source	Warrington	Electronic linac 15 MeV	1978	2018	Operating	
UK	University of Aberdeen	Aberdeen	CS-30	1988	2028	Operating	
UK	University of Aberdeen	Aberdeen	RDS 111	1997	2037	Operating	

Particle Accelerators

Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
UK	University of Birmingham	Birmingham	Radial ridge	1957	2007	Operating	50 years
UK	University of Birmingham	Birmingham	60" Nuffield	1948	2008	Operating	60 years
UK	Wolfson Brain Imaging Centre	Cambridge	PETTrace	1994	2034	Operating	
Ukraine	Kharkov Heavy Ion Linac	Kharkov	Ion linac	1958	2008	Operating	50 years
Ukraine	Kharkov Material Test Accelerator	Kharkov	Proton linac 22.5 MeV			Under Construction	
Ukraine	Laser Injector Complex	Kharkov	Electronic linac 20 MeV	1993	2033	Operating	
Ukraine	LUE 2000	Kharkov	Electronic linac 2 GeV	1964	1992	Permanently Shut Down	
Ukraine	LUE 40	Kharkov	Electronic linac 40 MeV	1964	1992	Permanently Shut Down	
Ukraine	LUE 60	Kharkov	Electronic linac 60 MeV	1990	1992	Permanently Shut Down	
Ukraine	MLUD-3	Kharkov	Ion linac	1975	2015	Operating	
USA	22 MeV Chemistry	Argonne, IL	Electronic linac 22 MeV	1968	2008	Operating	
USA	Accelerator Test Facility	Upton, NY	Electronic linac 70 MeV	1991	2031	Operating	
USA	AccSys Technology	Bloomington, IN	Model PL-7 Proton linac 7 MeV	1998	2038	Operating	
USA	Advanced Free Electron Laser (AFEL)	Los Alamos, NM	Electronic linac 20 MeV	1992	2032	Operating	
USA	Advanced Photon Source	Argonne, IL	Electronic linac 200 MeV	1993	2033	Operating	
USA	ALS Injector	Berkeley, CA	Electronic linac	1991	2031	Operating	
USA	Argonne National Laboratory Linac	Argonne, IL	Proton linac 50 MeV	1962	2007	Operating	45 years
USA	Argonne Tandem Linac Accelerator System (ATLAS)	Argonne, IL	Ion linac 20 MeV	1978	2018	Operating	
USA	Argonne Wakefield Accelerator	Argonne, IL	Electronic linac 18 MeV	1994	2034	Operating	
USA	AXF-0	Livermore, CA	Electronic linac 5 MeV	2004	2044	Under Construction	
USA	Biomedical Research Institute	Shreveport, LA		1995	2035	Operating	
USA	Boeing Linac	Seattle, WA	Electronic linac 100 MeV	1997	2037	Operating	
USA	Brookhaven 200 MeV H- linac	Upton, NY	Proton linac 200 MeV	1970	2010	Operating	

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Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
USA	Brookhaven National Laboratory, Chemistry Div	Upton, NY	60"	1958	2008	Operating	50 years
USA	Brookhaven National Laboratory, Chemistry Div	Upton, NY	BC-1710	1981	2021	Operating	
USA	Carolinas Medical Center	Charlotte, NC	RDS 112	1993	2033	Operating	
USA	Case Western Reserve University	Cleveland, OH	MC-17	1985	2025	Operating	
USA	Center for Advanced Microstructures and Devices	Baton Rouge, LA	Electronic linac 200 MeV	1991	2031	Operating	
USA	CERN for Buffalo, PET, State University of New York at Buffalo	Buffalo, NY	Cyclone-30	1992	2032	Operating	
USA	CESR	Ithaca, NY	Electronic linac 350 MeV	1966	2006	Operating	
USA	Children's Hospital of Michigan	Detroit, MI	RDS 112	1993	2033	Operating	
USA	Christ Hospital	Cincinnati, OH	RDS 112	1989	2029	Operating	
USA	Columbia Presbyterian Medical Center	New York, NY	RDS 112	1992	2032	Operating	
USA	Continuous Electron Beam Accelerator Facility	Newport News, VA	Electronic linac 4 GeV	1994	2034	Operating	
USA	Creighton University Medical Center	Omaha, NE	RDS 112	1989	2029	Operating	
USA	CRITS RFQ	Los Alamos, NM	Proton linac 1.25 MeV			Planned	
USA	Crocker Nuclear Laboratory	Davis, CA	76" Isuchurous	1964	2009	Operating	45 years
USA	Dept. of Materials and Nuc. Engineering	College Park, MD	Electronic linac 9 MeV	1985	2025	Operating	
USA	Dual-Axis Radiographic Hydrodynamic Test Facility	Los Alamos, NM	Electronic linac 20 MeV	1999	2039	Operating	
USA	Dual-Axis Radiographic Hydrodynamic Test Facility Integrated Test Stand	Los Alamos, NM	Electronic linac 6 MeV	1991	2031	Operating	
USA	Duke Linac	Durham, NC	Electronic linac 295 MeV	1994	2034	Operating	
USA	Duke University Medical School	Durham, NC	CS-30	1985	2025	Operating	
USA	Electron/Positron Linac	Livermore, CA	Electronic linac 165 MeV	1969	2009	Operating	
USA	Emory University Hospital PET Center	Atlanta, GA	RDS 112	1995	2035	Operating	
USA	ETA-II	Livermore, CA	Electronic linac	1989	2029	Operating	
USA	FAA AccSys DL-1	Cambridge, MA	Ion linac	1989	2029	Operating	
USA	Fermilab 400 MeV H - Linac	Batavia, IL	Proton linac 400 MeV	1970	2010	Operating	
USA	Florida State University Superconducting Linac	Tallahasse, FL	Ion linac 5 MeV	1987	2027	Operating	

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Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
USA	FXR	Livermore, CA	Electronic linac 19 MeV	1982	2022	Operating	
USA	Gaerttner	Troy, NY	Electronic linac 90 MeV	1960	2005	Operating	45 years
USA	Gershenson Radiation Oncology Center	Detroit, MI	K 100-Harper	1990	2030	Operating	
USA	Good Samaritan Hospital	Phoenix, AZ	RDS 112	1990	2030	Operating	
USA	Hospital of University of Pennsylvania	Philadelphia, PA	BC 3015	1986	2026	Operating	
USA	Indiana University Cyclotron Facility	Bloomington, IN	K16	1972	2012	Operating	
USA	Indiana University Cyclotron Facility	Bloomington, IN	K200	1975	2015	Operating	
USA	Indiana University School of Medicine VA Medical Center	Indianapolis, IN	RDS 112	1992	2032	Operating	
USA	Johns Hopkins Medical Institutions	Baltimore, MD	RNP-16	1981	2021	Operating	
USA	Kettering Medical Center	Kettering, OH	RDS 112	1989	2029	Operating	
USA	Linac Coherent Light Source	Stanford, CA	Electronic linac 15 MeV	2001	2041	Operating	
USA	Los Alamos Neutron Source Center	Los Alamos, NM	Proton linac 800 MeV	1972	2012	Operating	
USA	Low Energy Demonstration Accelerator	Los Alamos, NM	Proton linac 20 MeV			Under Construction	
USA	Mallinckrodt Institute of Radiology, Washington University, DC	Saint Louis, MO	CS-15	1977	2017	Operating	
USA	Massachusetts General Hospital, Harvard Medical School	Boston, MA	MC-17F	1989	2029	Operating	
USA	Medical Industrial Radiation Facility	Gaithersburg, MD	Eelectronic linac 32 MeV	1974	2014	Operating	
USA	Medi-Physics Inc.	So. Plainfield, NJ	CS-22	1973	2013	Operating	
USA	Medi-Physics Inc.	Arlington Hts., IL	MC-40	1979	2019	Operating	
USA	Medi-Physics Inc.	Arlington Hts., IL	PV-750	1986	2026	Operating	
USA	Medi-Physics Inc.	So. Plainfield, NJ	Cyclone-30	1989	2029	Operating	
USA	Memorial Sloan-Kettering Cancer Center	New York, NY	CS-15	1967	2007	Operating	
USA	Methodist Medical Center of Illinois	Peoria, IL	RDS 112	1990	2030	Operating	
USA	MIT Linac	Middleton, MA	Electronic linac 1.06 GeV	1971	2011	Operating	
USA	MKIII FEL linac driver	Durham, NC	Electronic linac 45 MeV	1984	2024	Operating	

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Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
USA	Mount Sinai Medical Center	Miami Beach, FL	CS 30	1972	2012	Operating	
USA	National Institute of Drug Abuse (NIDA)	Baltimore, MD	RDS 111	1997	2037	Operating	
USA	National Institutes of Health	Baltimore, MD	CS 30	1985	2025	Operating	
USA	National Institutes of Health, Clinical Center	Bethesda, MD	JSW-1710	1985	2025	Operating	
USA	National Superconducting Cyclotron Laboratory	East Lansing, MI	Superconducting	1980	2020	Operating	
USA	National Synchrotron Light Source Injector Linac	Upton, NY	Electronic linac 120 MeV	1980	2020	Operating	
USA	Naval Postgraduate School	Monterey, CA	Electronic linac 100 MeV	1967	2007	Operating	
USA	Next Linear Collider Test Accelerator	Stanford, CA	Electronic linac 630 MeV	2002	2042	Operating	
USA	North Shore University Hospital	Manhasset, NY	M-17F	1987	2027	Operating	
USA	Northern California PET Imaging Center	Sacramento, CA	RDS 112	1992	2032	Operating	
USA	Notre Dame Radiation Laboratory	Notre Dame, IN	Electronic linac 9.5 MeV	1994	2034	Operating	
USA	Oak Ridge Electron Linear Accelerator	Oak Ridge, TN	Electronic linac 178 MeV	1969	2009	Operating	
USA	PET - Net Chicago	Des Plaines, IL	RDS 112	1995	2035	Operating	
USA	PET - Net/VA Medical Center-Palo Alto	Palo Alto, CA	RDS 112	1996	2036	Operating	
USA	PL - 2 RFQ	Los Alamos, NM	Proton linac 1.75 MeV	1994	2034	Operating	
USA	Proton RFQ	Pocatello, ID	Protron linac 2 MeV	1991	2031	Operating	
USA	Pulsed High Energy Machine Emitting X-rays (Phermex)	Los Alamos, NM	Electronic linac 30 MeV	1963	2008	Operating	45 years
USA	Relativistic Klystron Two - Beam Accelerator	Berkeley, CA	Electronic linac 4 GeV	2002	2042	Operating	
USA	Saint Louis University Hospital/Medical Center	St. Louis, MO	RDS 112	1991	2031	Operating	
USA	Sandia Tandem Booster	Albuquerque, NM	Ion linac	1995	2035	Operating	
USA	Saturnus	Los Angeles, CA	Electronic linac 15 MeV	1993	2033	Operating	
USA	SLAC 3 - km	Stanford, CA	Electronic linac 13 MeV	1966	2006	Operating	
USA	St Josephs Hospital-Position Center	Tampa, FL	RDS 112	1989	2029	Operating	
USA	Stanford Synchrotron Radiation Lab Injector	Stanford, CA	Electronic linac 120 MeV	1990	2030	Operating	
USA	Stoney Brook Superconducting Heavy-Ion Linac	Stoney Brook, NY	Ion linac	1983	2023	Operating	
USA	Subpicosecond High - Brightness Accelerator Facility	Los Alamos, NM	Electronic linac 8 MeV	1995	2035	Operating	

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Country	Facility	Location	Model/Machine Type	Startup Date	Shutdown Date	Status	Comments
USA	Sunshine	Stanford, CA	Electronic linac 33 MeV	1993	2033	Operating	
USA	Superconducting Linear Accelerator	Stanford, CA	Electronic linac 50 MeV	1971	2011	Operating	
USA	Superconducting Linac	Manhattan, KS	Ion linac 130 MeV	1989	2029	Operating	
USA	Texas A&M Cyclotron Institute	College Station, TX	K500	1989	2029	Operating	
USA	Queens Medical Center	Honolulu, HI	RDS 111	1998	2038	Operating	
USA	Theragenics Corporation	Norcross, GA	Cyclone 18+	1992	2032	Operating	
USA	Theragenics Corporation	Norcross, GA	Cyclone 18+	1994	2034	Operating	
USA	Theragenics Corporation	Norcross, GA	Cyclone 18+	1996	2036	Operating	
USA	Univ. of Washington Superconducting Booster	Seattle, WA	Ion linac 15 MeV	1987	2027	Operating	
USA	University of Iowa Hospital & Clinics	Iowa City, IA	MC-17F	1990	2030	Operating	
USA	University of Michigan Hospital VA Medical Center	Ann Arbor, MI	CS-30	1982	2022	Operating	
USA	University of Pittsburgh Medical Center, PET Facility	Pittsburgh, PA	RDS 112	1991	2031	Operating	
USA	University of Southern California, Health Sciences Campus	Los Angeles, CA	RDS 111	1990	2030	Operating	
USA	University of Tennessee Medical Centre	Knoxville, TN	RDS 112	1987	2027	Operating	
USA	University of Texas Health Center at Houston	Houston, TX	MC-40	1983	2023	Operating	
USA	University of Texas Health Science Center, Research Imaging	San Antonio, TX	MC 17F	1991	2031	Operating	
USA	University of Washington Medical Center	Seattle, WA	MC-50	1983	2023	Operating	
USA	University of Wisconsin Hospitals & Clinics-Middleton VA Hospitals	Madison, WI	RDS 112	1986	2026	Operating	
USA	VA Medical Center	Minneapolis, MN	MC 40	1985	2025	Operating	
USA	Vanderbilt University School of Medicine	Oak Ridge, TN	RDS 112	1989	2029	Operating	
USA	Wake Forest University, Bowman Gray School of Medicine	Winston-Salem, NC	RDS 112	1991	2031	Operating	
USA	West Virginia University PET Center	Morgantown, WV	PET Trace	1995	2035	Operating	
USA	William Beaumont Hospital	Royal Oak, MI	RDS 112	1991	2031	Operating	
USA	Yale University School of Medicine PET Center	New Haven, CT	RDS 121	1990	2030	Operating	