

# List of nuclear reactors

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This **List of nuclear reactors** is an annotated list of all the nuclear reactors in the world, sorted by country, with operational status. The list includes military, commercial and research reactors, excludes nuclear marine propulsion reactors, except those at land installations, and excludes uncompleted nuclear reactors.

## Algeria

- Es Salam (The Peace), 15 MW reactor for research, located in Aïn Oussera, in service since 1993
- Nur, built by Argentine INVAP

## Antarctica

- McMurdo Station – PM-3A NNPU "Nukey Poo" US Navy power reactor (operational 1962, shut down 1972, fully dismantled 1979)

## Argentina

### Power station reactors

- Atucha [5] (<http://www.oni.escuelas.edu.ar/olimpi98/Energia-Vs-Ambiente/atucha1.htm>) [6] (<http://www.ciencia-hoy.retina.ar/hoy02/atucha.htm>) (Spanish)
  - Atucha I [7] (<http://www.uic.com.au/nip96.htm>) PHWR, 335 MWe

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(<http://www.iaea.org/NewsCenter/News/2005/atucha.html>) ) PHWR, 692 MWe

- Atucha III : 2010 signed contract with AECL ACR-1000 1500 MWe <sup>[1]</sup>

- Embalse, a single unit 600 MWe PHWR (CANDU) [9] (<http://www.candu.org/nasa.html>)

## Research reactors

All reactors owned and operated by the National Atomic Energy Commission except as noted

- **RA-0**, built 1964, 0.01 kWt, tank type, owned and operated by Universidad Nacional de Córdoba
- **RA-1 Enrico Fermi**, built 1957, 40 kWt, tank type.
- **RA-2**, built 1965, 0.03 kWt, critical assembly type (shut down on 1983/09/01)
- **RA-3**, built 1963, 5,000 kWt, pool type.
- **RA-4** (former *SUR-100*), built 1971, HOMOG type, owned and operated by Universidad Nacional de Rosario
- **RA-6**, built 1978, 500 kWt, pool type.
- **RA-8**, built 1986, 0.01 kWt, critical assembly type (shut down)
- **CAREM**, being built near Atucha I <sup>[2]</sup>

## Armenia

- Metsamor Nuclear Power Plant – Two VVER-440 Model V230 reactors (Russian), one operational, one shut down in 1989

## Australia

- HIFAR (High Flux Australian Reactor; 10 MWt), Lucas Heights, New South Wales, produced patient nuclear medicine doses (approx half a million a year) for the diagnosis and treatment of major diseases such as cancer and heart disease. It first went critical on January 26, 1958 and was decommissioned January 2007<sup>[3]</sup> which will take up to 10 years to complete.
- MOATA, 100kWt Argonaut class reactor, now permanently shut down.
- HIFAR has been replaced by OPAL reactor facility supplied by Argentine INVAP. This facility first went critical at 11.25pm on August 12, 2006.<sup>[4]</sup>

## Austria

- Austrian Research Centers (<http://www.arcs.ac.at>) at Seibersdorf— 10 MW ASTRA research reactor (in use 1960–1999)
- Atomic Institute of the Austrian Universities (<http://www.ati.ac.at>) in Vienna — 250 kW TRIGA Mark II research reactor (in use since 1962)
- Zwentendorf Nuclear Power Plant (completed in 1978 but after a public vote it was never fuelled and never started-up)

## Bangladesh

- Savar – TRIGA Mark II, Atomic Energy Research Establishment (installed 1986)

## Belarus

- Sosny, Minsk

- IRT research reactor (shut down 1988)
- "Pamir" - mobile nuclear power reactor test (shut down 1986)

## Belgium

### Power station reactors

- Doel Nuclear Power Station – 4x PWR reactors, total power of 2839 MW<sub>e</sub>
- Tihange Nuclear Power Station – 3x PWR reactors, total power of 2985 MW<sub>e</sub>

### Research Reactors

- Mol (BR-1) – Research reactor
- Mol (BR-2) – Research reactor
- Mol (BR-3) – PWR reactor (shut down)

## Brazil

*Main article: Nuclear power in Brazil*

Name	Type	Capacity (MW <sub>e</sub> ), net/gross	Status
Angra-1	PWR	626MW <sub>e</sub> Net CNAACentral	Commercial operation 1985-01
Angra-2	PWR	1275MW <sub>e</sub> Net CNAACentral	Commercial operation 2001-02

### Research reactors

- São Paulo – IEA-R1 – Pool-type reactor, 5MW – IPEN-Instituto de Pesquisas Energéticas e Nucleares, São Paulo, SP (criticality 1957-09-16)
- Belo Horizonte – IPR-R1 – TRIGA Mark I, 250 kW - CDTN-Centro de Desenvolvimento de Tecnologia Nuclear, Belo Horizonte, MG (criticality 1960-11-06)
- Rio de Janeiro – ARGONAUTA – Argonaut class reactor, 100 kW – IEN-Instituto de Engenharia Nuclear, Rio de Janeiro, RJ (criticality 1965-02-20)
- São Paulo – IPEN/MB-01 – Critical assembly, 0.1 kW – IPEN-Instituto de Pesquisas Energéticas e Nucleares, São Paulo, SP (criticality 1988-11-09)]

## Bulgaria

*Main article: Nuclear power in Bulgaria*

Kozloduy Nuclear Power Plant – Six reactors:

- BLOK 1 – 440 MW (Currently out of service) VVER-440/230
- BLOK 2 – 440 MW (Currently out of service) VVER-440/230
- BLOK 3 – 440 MW (Currently out of service) VVER-440/230
- BLOK 4 – 440 MW (Currently out of service) VVER-440/230
- BLOK 5 – 1000 MW VVER-1000
- BLOK 6 – 1000 MW VVER-1000

Belene Nuclear Power Plant – Two 1000 MW reactors in construction:

- BELENE 1 – 1000 MW (To be finished in 2013) VVER-1000
- BELENE 2 – 1000 MW (To be finished in 2014) VVER-1000

Sofia – IRT research reactor (shut down 1987)

## Canada

*Main article: Nuclear power in Canada*

### Ontario

Ontario Power Generation Pickering A

- UNIT 1 – 515 MW CANDU
- UNIT 2 – 515 MW CANDU (Currently out of service)
- UNIT 3 – 515 MW CANDU (Currently out of service)
- UNIT 4 – 515 MW CANDU

**Ontario Power Generation Pickering B**

- UNIT 5 – 516 MW CANDU
- UNIT 6 – 516 MW CANDU
- UNIT 7 – 516 MW CANDU
- UNIT 8 – 516 MW CANDU

**Ontario Power Generation Darlington**

- UNIT 1 – 881 MW CANDU
- UNIT 2 – 881 MW CANDU
- UNIT 3 – 881 MW CANDU
- UNIT 4 – 881 MW CANDU

**Bruce Power Bruce A**

- UNIT 1 – 750 MW CANDU (Under refurbishment)
- UNIT 2 – 750 MW CANDU (Under refurbishment)
- UNIT 3 – 750 MW CANDU
- UNIT 4 – 750 MW CANDU

**Bruce Power Bruce B**

- UNIT 1 – 785 MW CANDU
- UNIT 2 – 820 MW CANDU
- UNIT 3 – 785 MW CANDU
- UNIT 4 – 785 MW CANDU
- 2 new 1500 MW CANDU ACR-1000 Reactors to be built (2013).
- Nuclear Power Demonstrator (Rolphton, Ontario) 1 decommissioned prototype
- Douglas Point (Tiverton, Ontario) 1 decommissioned large prototype

**Quebec****Hydro-Québec Gentilly Nuclear Generating Station**

- UNIT 1 – 275 MW CANDU-BWR (Shutdown in 1977)
- UNIT 2 – 675 MW CANDU-6

TOTAL – 950 MW

**New Brunswick****NB Power Point Lepreau Nuclear Generating Station**

- UNIT 1 – 635 MW CANDU-6 (Under refurbishment)

**Research reactors**

- Chalk River Laboratories
  - MMIR-1 – MAPLE class medical isotope production reactor - built,incomplete commissioning, no operating license
  - MMIR-2 – MAPLE class medical isotope production reactor - built,incomplete commissioning, no operating license
  - NRU – 135 MW reactor used for research and medical isotope production
  - NRX reactor – (1947–1992) One of the highest flux reactors in the world until shutdown
  - SLOWPOKE-1 prototype, moved to University of Toronto, later upgraded to SLOWPOKE-2 - decommissioned
  - PTR – pool test reactor (shut down in 1990)
  - ZED-2 – zero-energy reactor
  - ZEEP – The first nuclear reactor in Canada, and first outside the United States
- Whiteshell Laboratories
  - WR-1 – Organically cooled CANDU class reactor
  - SDR – Slowpoke demonstration reactor; SLOWPOKE-3 class reactor (shut down in 1989)
- Dalhousie University, Halifax, Nova Scotia – SLOWPOKE-2 class reactor - decommissioned (2009); dismantled (2011)
- Kanata – SLOWPOKE-2 class reactor (shut down in 1989)
- Tunney's Pasture – Ottawa, Ontario - SLOWPOKE-2 class reactor prototype?, (shutdown in 1984)
- École Polytechnique de Montréal, Montreal – SLOWPOKE-2 class reactor
- McMaster Nuclear Reactor – 5 MWth MTR class reactor
- Royal Military College, Kingston, Ontario – SLOWPOKE-2 class reactor
- Saskatchewan Research Council, Saskatoon – SLOWPOKE-2 class reactor
- University of Alberta, Edmonton – SLOWPOKE-2 class reactor
- University of Toronto – SLOWPOKE-2 class reactor (shut down in 2001)

## Chile

- RECH 1 – Pool-type reactor, 5 MWt MTR – Comisión Chilena de Energía Nuclear, Santiago (criticality 1974)
- RECH 2 – Pool-type reactor, 10 MWt MTR – Comisión Chilena de Energía Nuclear, Santiago (criticality 1977, refurbished 1989)

## China

*Main article: Nuclear power in China*

Operating units				
Name <span>▾</span>	Type <span>▾</span>	Capacity (MW <sub>e</sub> ), net / gross <span>▾</span>	Construction start <span>▾</span>	Grid connection <span>▾</span>
Daya Bay 1 (Guangdong 1)	PWR	944 / 984	August 7, 1987	August 31, 1993
Daya Bay 2 (Guangdong 2)	PWR	944 / 984	April 7, 1988	February 7, 1994
Ling'ao 1-1 (Lingao A)	PWR	938 / 990	May 15, 1997	February 26, 2002
Ling'ao 1-2 (Lingao B)	PWR	938 / 990	November 28, 1997	December 15, 2002
Ling'ao 2-1	CPR-1000	938 / 990	December 15, 2005	July 15, 2010
Qinshan 1 (formerly Qinshan)	CNP-300	279 / 300	March 20, 1985	December 15, 1991
Qinshan 2-1 (formerly Qinshan 2)	CNP-600	610 / 642	June 2, 1996	February 6, 2002
Qinshan 2-2 (formerly Qinshan 3)	CNP-600	610 / 642	April 1, 1997	March 11, 2004
Qinshan 2-3	CNP-600	610 / 642	March 28, 2006	August 1, 2010
Qinshan 3-1	CANDU 6	665 / 728	June 8, 1998	November 19, 2002
Qinshan 3-2	CANDU 6	665 / 728	September 25, 1998	June 12, 2003
Tianwan 1 (Lianyungang)	VVER-1000	1,000 / 1,060	October 20, 1999	May 12, 2006
Tianwan 2 (Lianyungang)	VVER-1000	1,000 / 1,060	October 20, 2000	May 14, 2007
<b>Total capacity</b>		<b>10,141 / 10,740</b>		

## Units under construction

Name	Type	Capacity (MW <sub>e</sub> ) net / gross	Construction start	Expected completion
Qinshan 2-4	CNP-600	610 / 650	January 28, 2007	March 28, 2012
Changjiang 1	CNP-600	610 / 650	April 25, 2010	2014
Changjiang 2	CNP-600	610 / 650	November 21, 2010	2015
Fangchenggang 1	CPR-1000	1,000 / 1,087	July 30, 2010	2015
Fangjiashan 1	CPR-1000	1,000 / 1,087	December 26, 2008	December 2013
Fangjiashan 2	CPR-1000	1,000 / 1,087	July 17, 2009	October 2014
Fuqing 1	CPR-1000	1,000 / 1,087	November 21, 2008	October 2013
Fuqing 2	CPR-1000	1,000 / 1,087	June 17, 2009	August 2014
Fuqing 3	CPR-1000	1,000 / 1,087	December 31, 2010	July 2015
Haiyang 1	AP1000	1,000 / 1,250	September 24, 2009	May 2014
Haiyang 2	AP1000	1,000 / 1,250	June 21, 2010	March 2015
Hongyanhe 1	CPR-1000	1,000 / 1,080	August 18, 2007	October 2012
Hongyanhe 2	CPR-1000	1,000 / 1,080	March 28, 2008	2013
Hongyanhe 3	CPR-1000	1,000 / 1,080	March 7, 2009	2014
Hongyanhe 4	CPR-1000	1,000 / 1,080	August 15, 2009	
Ling'ao 2-2	CPR-1000	1,000 / 1,080	June 15, 2006	August 2011
Ningde 1	CPR-1000	1,000 / 1,087	February 18, 2008	December 2012
Ningde 2	CPR-1000	1,000 / 1,080	November 12, 2008	2013
Ningde 3	CPR-1000	1,000 / 1,080	January 8, 2010	2014
Ningde 4	CPR-1000	1,000 / 1,080	September 29, 2010	2015
Sanmen 1	AP1000	1,000 / 1,115	April 19, 2009	November 2013
Sanmen 2	AP1000	1,000 / 1,115	December 17, 2009	September 2014
Taishan 1	EPR	1,700 / 1,750	October 28, 2009	December 2013
Taishan 2	EPR	1,700 / 1,750	April 15, 2010	November 2014
Yangjiang 1	CPR-1000	1,000 / 1,087	December 16, 2008	August 2013
Yangjiang 2	CPR-1000	1,000 / 1,087	June 4, 2009	2014
Yangjiang 3	CPR-1000	1,000 / 1,087	November 15, 2010	2015
<b>Total capacity</b>		<b>27,230 / 29,690</b>		

Source: EIA Reactor Summaries ([http://www.eia.doe.gov/cneaf/nuclear/page/nuc\\_reactors/china/reactors.html](http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/china/reactors.html)) , PRIS database (<http://www.iaea.org/cgi-bin/db.page.pl/pris.reaucct.htm>) , and WNA Country Briefings (<http://www.world-nuclear.org/info/inf63.html>) , as of February 2011.

## Colombia

- Bogotá – TRIGA, Institute of Nuclear Science (installed in 1997)

## Democratic Republic of the Congo

*Article in French*

- TRICO I – TRIGA reactor, University of Kinshasa (shut down 1970)
- TRICO II – TRIGA reactor, University of Kinshasa

## Cuba

- Juragua Nuclear Power Plant, Cienfuegos – Construction of two 417 MW VVER-440 V213 reactors suspended in 1992 following the collapse of the Soviet Union

## Czech Republic

*Main article: Nuclear power in the Czech Republic*

- Dukovany – 4 reactors (VVER), 440 MWe each
- Temelín – 2 reactors (VVER), 1000 MWe each
- Řež – 2 research reactors (LVR-15, LR-0)
- Prague – research reactor (VR-1) at Czech Technical University

## Denmark

- Risø – DR-3 DIDO class experimental reactor (shut down permanently in 2000)
- Risø – DR-2 experimental reactor (shut down in 1975)
- Risø – DR-1 experimental reactor (shut down permanently in 2001)

## Egypt

- Inshas Nuclear Research Center
  - ETTR-1 – 2 MW LWR (supplied by USSR, 1958)
  - ETTR-2 – 22 MW reactor (supplied by Argentine INVAP, 1998)

## Estonia

- Paldiski – 2 PWR naval training reactors (dismantled)

## Finland

*Main article: Nuclear power in Finland*

- Loviisa Nuclear Power Plant – 2 × 488 MWe VVER reactors
- Olkiluoto Nuclear Power Plant – 2 × 860 MWe BWR reactors, 1 × 1650 MWe EPR under construction (expected in 2012)

Research reactor:

- Espoo – TRIGA Mark II, State Institute for Technical Research (installed 1962)

## France

*Main article: Nuclear power in France*

- Belleville Nuclear Power Plant – 2 1310 MWe PWR reactors
- Blayais Nuclear Power Plant – 4 910 MWe PWR reactors
- Bugey Nuclear Power Plant – 4 PWR reactors: 2 at 910 MWe, 2 at 880 MWe
- Cattenom Nuclear Power Plant – 4 1300 MWe PWR reactors
- Chinon Nuclear Power Plant – 4 905 MWe PWR reactors
- Chooz Nuclear Power Plant – 2 1500 MWe PWR reactors
- Civaux Nuclear Power Plant – 2 1495 MWe PWR reactors
- Cruas Nuclear Power Plant – 4 reactors: 2 at 880 MWe, 2 at 915 MWe
- Dampierre Nuclear Power Plant – 4 890 MWe PWR reactors
- Fessenheim Nuclear Power Plant – 2 880 MWe PWR reactors - oldest operating commercial PWR reactors in France
- Flamanville Nuclear Power Plant – 2 1330 MWe PWR reactors
- Golfech Nuclear Power Plant – 2 1310 MWe PWR reactors
- Gravelines Nuclear Power Plant – 6 910 MWe PWR reactors
- Nogent Nuclear Power Plant – 2 1310 MWe PWR reactors
- Paluel Nuclear Power Plant – 4 1330 MWe PWR reactors
- Penly Nuclear Power Plant – 2 1330 MWe PWR reactors
- Phénix Nuclear Power Plant – 1 233 MWe FBR reactor
- Saint-Alban Nuclear Power Plant – 2 1335 MWe PWR reactors
- Saint-Laurent Nuclear Power Plant – 2 PWR reactors: 1 at 880 MWe, 1 at 915 MWe
- Tricastin Nuclear Power Center – 4 915 MWe PWR reactors
- Under construction:
  - Flamanville – 1 1630 MWe PWR reactor; EDF is building the second EPR reactor there.
- Under planning:
  - Penly – 1 1630 MWe PWR reactor; EDF is planning a EPR reactor there.
- Decommissioned Power Reactors – 12 total
  - Bugey – 1 540 MWe GCR reactor
  - Chinon – 3 GCR reactors
  - Chooz-A – 1 310 MWe PWR reactor; reactor managed by SENA (*Société d'énergie nucléaire franco-belge des Ardennes*).
  - Marcoule – 3 38 MWe GCR reactors





- Brennilis – 1 70 MWe EL-49 heavy water reactor, the only one of its kind in France
- Saint Laurent des Eaux – 2 GCR reactors
- Superphénix, Creys-Malville – 1 1200 MWe FBR reactor
- Cancelled
  - Le Carnet
  - Plogoff
  - Thermos, a 50-100 MW reactor for the urban heating of Grenoble
- Research reactors
  - Institut Laue-Langevin, currently the world's most intense source of neutrons and the source of the most intense neutron flux
  - Rhapsodie
  - Zoé, the first French nuclear reactor (1948)
- ICJT list (<http://www.icjt.org/npp/lokacija.php?drzava=8>)

## Germany

*Main article: Nuclear power in Germany*

On 15 March 2011 the Government decided to close seven nuclear power plants for a duration of three months. These are marked with an asterisk (\*).<sup>[5]</sup>

- Biblis Nuclear Power Plant – Biblis-A (\*) and Biblis-B (\*)
- Brokdorf Nuclear Power Plant
- Brunsbüttel Nuclear Power Plant (\*)
- Emsland Nuclear Power Plant
- Grafenrheinfeld Nuclear Power Plant
- Grohnde Nuclear Power Plant
- Gundremmingen Nuclear Power Plant – Gundremmingen-B and Gundremmingen-C, A is defunct
- Nuclear Power Plant Landshut Isar I + Isar II; Isar I (\*)
- Krümmel Nuclear Power Plant
- Neckarwestheim Nuclear Power Plant (\*)
- Philippsburg Nuclear Power Plant Block A (\*) and Block B
- Unterweser Nuclear Power Plant (\*)

### Research reactors

- AKR II – Ausbildungskernreaktor II, Technische Universität Dresden; rating: 2 W, commissioned 2005
- BER II – Berliner-Experimentier-Reaktor II, Hahn-Meitner-Institut Berlin; rating: 10 MW, commissioned 1990
- FRG-1 (see GKSS Research Center (<http://www.gkss.de/index.html.en>) ) – Geesthacht; rating: 5 MW, commissioned 1958
- FRM II – Technische Universität München; Leistung: 20 MW, commissioned 2004
- FRMZ – TRIGA of the University of Mainz, institute of nuclear chemistry; continuous rating: 0.10 MW, pulse rating for 30ms: 250 MW; commissioned 1965

### Decommissioned

- Research nuclear plants in Jülich and Karlsruhe
- Greifswald Nuclear Power Plant located in the former GDR. Shut down in 1990 (Greifswald-1 to Greifswald-4, and the unfinished Greifswald-5 reactor), Type: VVER-440 (Russian)
- Gundremmingen-A (commissioned 1970, shut down 1977)
- Hamm-Uentrop, THTR-300, shut down in 1988
- Lingen, commissioned 1970, shut down in 1977
- Mülheim-Kärlich Nuclear Power Plant, completed, operated briefly and then shut down in 1988 because of potential hazards
- Niederaichbach, commissioned 1973, shut down in 1974
- Obrigheim, shut down in May 2005
- Rheinsberg, commissioned 1970, shut down in 1990, Type: VVER-70 (Russian)
- Stade, commissioned 1972, shut down in 2003
- Würgassen, commissioned 1971, shut down in 1994
- Kalkar, never finished
- Wyhl, famous planned nuclear plant that was never built because of long-time resistance by the local population and environmentalists.
- IJCT list (<http://www.icjt.org/npp/lokacija.php?drzava=9&kontinent=1>)
- Kahl Nuclear Power Plant commissioned 1971, shut down 1985

## Greece

- GRR-1 – 5 MW research reactor at Demokritos National Centre for Scientific Research, Athens.

## Hungary

- Paks – 4 VVER (Russian pressurized light water reactor VVER 440/v213) 500 MWe reactors. The modernization of the four reactors was finally ended at 2009, so the plant's total power generation reached 2000 MWe.
- Budapest
  - Technical University of Budapest (BME) Institute of Nuclear Techniques – University Research Reactor
  - KFKI Atomic Energy Research Institute (see KFKI (<http://www.kfki.hu/brr/reactdpt.html>) ) – (10 MW Budapest Research Reactor)
- Debrecen
  - Institute of Nuclear Research of the Hungarian Academy of Sciences – 20 MV cyclotron and a 5 MV Van de Graaff accelerator

## India

*Main article: Nuclear power in India*

### Power station reactors

For more information: Electricity in India [10] (<http://www.dae.gov.in/power/np cil.htm>)

Name	Location	Type	Rating, MWe	Status
Tarapur Atomic Power Station	Tarapur, Maharashtra	BWR	160	Operational October 1969-
		BWR	160	Operational October 1969-
		PHWR	540	Operational August 2006-
		PHWR	540	Operational September 2005-
Rajasthan Atomic Power Station	Rawatbhata, Rajasthan	PHWR	90	Operational December 1973-
		PHWR	187	Operational April 1981-
		PHWR	202	Operational June 2000-
		PHWR	202	Operational December 2000-
		PHWR	202	Operational December 22, 2009
		PHWR	202	Operational March 28, 2010
Madras Atomic Power Station	Kalpakkam, Tamilnadu	PHWR	170	Operational January 1984-
		PHWR	220	Operational March 1986-
Narora Atomic Power Station	Narora, Uttar Pradesh	PHWR	220	Operational January 1991-
		PHWR	220	Operational July 1992-
Kakrapar Atomic Power Station	Kakrapar, Gujarat	PHWR	220	Operational May 1993-
		PHWR	220	Operational September 1995-
		PHWR	700	under constrution
		PHWR	700	under constrution
Kaiga Atomic Power Station	Kaiga, Karnataka	PHWR	220	Operational November 2000-
		PHWR	220	Operational March 2000-
		PHWR	220	Operational May 2007-
		PHWR	220	Operational January 2011-
Koodankulam Nuclear Power Plant	Kudankulam, Tamilnadu	VVER	1000	Under construction, online February 2011
		VVER	1000	Under construction, online August 2011
Prototype Fast Breeder Reactor	Kalpakkam, Tamilnadu	FBR	500	Under construction
<b>Total Capacity</b>			<b>6,730 MWe</b>	

### Research and production reactors

- Bhabha Atomic Research Center (BARC) – Trombay
  - Apsara reactor – 1 MWT, pool type, light water moderated, enriched uranium fuel supplied by France
  - CIRUS reactor – 40 MWT, supplied by Canada, heavy water moderated, uses natural uranium fuel
  - Dhruva reactor – 100 MWT, heavy water moderated, uses natural uranium fuel
- Indira Gandhi Center for Atomic Research (IGCAR) – Kalpakkam
  - PFBR – 500MWe Sodium cooled fast breeder nuclear reactor, under construction. Expected completion 2011.

- FBTR – 40 MWT Fast Breeder Test Reactor, uses mixed (plutonium and uranium) carbide fuel
- KAMINI –30 kWT, uses U-233 fuel

None of these reactors is under IAEA safeguards.

## Indonesia

*Main article: Nuclear power in Indonesia*

- Bandung – TRIGA Mark II (250 kW installed 1965, 2MW installed 1997)
- Yogyakarta – TRIGA Mark II (100 kW installed 1979)
- Serpong – SIWABESSY 30MWth Multi-Purpose Reactor (installed 1987)

## Iran

*Main article: Nuclear program of Iran*

### Power station reactors

- Bushehr
  - Bushehr I – 915MWe, Reactor System: VVER-1000 PWR (Russian), officially opened 21 August 2010.<sup>[6]</sup>
  - Bushehr II – construction suspended by German KWU
- Dakhovin Nuclear Power Plant(Khouzestan Province)
  - Dakhovin I - Reactor System: IR-360 (PWR), a domestically developed 360 MWe NPP, as of 2010, the basic design has been finished and the works on the detailed design of the system has been started by the Iranian experts. Complementary Checks is to be done by the European incorporations. Primary construction works is to be started soon.

### Research reactors

- Tehran – AMF reactor at Tehran Nuclear Research Center (supplied by USA, 1967)
- Isfahan, Nuclear Technology Center (mainly supplied by China,<sup>[7]</sup>)
  - MNSR – 27 kWt Miniature Neutron Source Reactor
  - Light Water Subcritical Reactor (LWSCR)
  - Heavy Water Zero Power Reactor (HWZPR)
  - Graphite Subcritical Reactor (GSCR)
- Arak – IR-40 Heavy water-moderated Reactor (under construction, planned commissioning 2014)

## Iraq

### Research reactors

- IRT-5000 – 5 MWT, shut down 1991
- Osirak / "Tammuz 1" (destroyed by Israeli airstrike, June 7, 1981)
- Tammuz 2 – 500 kWT, shut down 1991

## Israel

### Research and production reactors

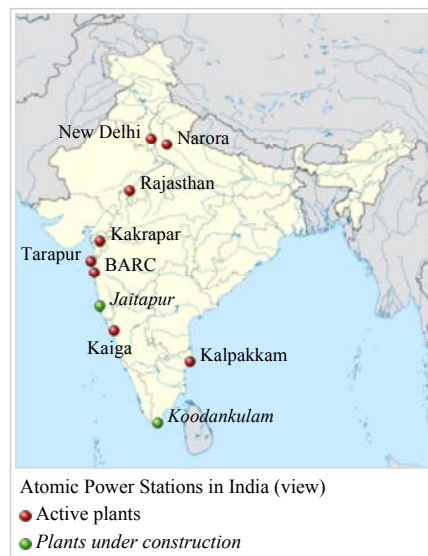
- Negev Nuclear Research Center – EL-102 uranium/heavy water research reactor, originally 24 MWT (supplied by France, operational 1962, not under IAEA safeguards)
- Soreq Nuclear Research Center – 5 MWT light water research reactor (supplied by USA, operational 1960)

## Italy

*Main article: Nuclear power in Italy*

### Power station reactors

- Garigliano – BWR, 1 unit of 150 MWe, 1964–1982
- Latina – Magnox, 1 unit of 160 MWe, 1964–1987
- Trino Vercellese – PWR, 1 unit of 260 MWe, 1965–1990
- Caorso – BWR, 1 unit of 860 MWe, 1981–1990



- Montalto di Castro – BWR, 2 units of 982 MWe each, mothballed in 1988

### Research reactors

- Brasimone (Bologna) – **PEC** (Prove Esperimenti Combustibile - Fuel Test Experiments) : ENEA Brasimone Research Center (1972 - 1987)
- Ispra (Varese) – **ISPRA-1** (5 MW) : European Joint Research Center (1959 - 1973)
- Ispra (Varese) – **ESSOR** (Essai Organique Eau Lourde, 35MW) : European Joint Research Center (1967 - 1983)
- Legnaro (Padova) - **RTS-1** : INFN istituto Nazionale Fisica Nucleare - National Institute for Nuclear Physic (1963 - 1980)
- Milano - **CeSNEF L-54** (50kW) : Milano Technical University (1957- 1979)
- Montecuccolino (Bologna) - **RB-1** (zero-power reactor) : Bologna University (1962 - 1985)
- Montecuccolino (Bologna) - **RB-2** (1 kW): Bologna University (1964 - 1985)
- Montecuccolino (Bologna) - **RB-3 - Aquilone 11** (1 kW): Bologna University (1971- 1989)
- Pavia – **TRIGA LENA** (TRIGA Mk.II model, 250 kW) : University of Pavia (1965 - operational)
- Saluggia (Vercelli) - **AVOGADRO RS-1** ("Swimming Pool" model) : FIAT/Montecatini (1959 - 1971)
- San Pietro a Grado (Pisa) – **RTS-1** ("Swimming Pool" model, 5MW): CAMEN Centro Applicazioni Militari Energia Nucleare - Center for Military Applications of Nuclear Energy (1963 - 1980).
- Santa Maria di Galeria (Roma) – **TRIGA RC-1** (modified TRIGA Mk.II model, 1MW): ENEA Casaccia Research Center (1960 - 1987, reactivated 2010)
- Santa Maria di Galeria (Roma) – **TAPIRO** (modified Argonne Fast Source Reactor model, 1kW): ENEA Casaccia Research Center (1971 - 1987, reactivated 2010)

### Jamaica

- SLOWPOKE-2 reactor – Kingston, Jamaica

### Japan

*See also: Nuclear power in Japan*

**Power station reactors**





Reactor	Location	Type	Rating, MWe	Status	Operator
Fukushima I-1	Futaba, Fukushima	BWR	439	Shutdown March 2011	TEPCO
Fukushima I-2		BWR	760	Shutdown March 2011	TEPCO
Fukushima I-3		BWR	760	Shutdown March 2011	TEPCO
Fukushima I-4		BWR	760	Shutdown 2011	TEPCO
Fukushima I-5		BWR	760	Operational April 1978	TEPCO
Fukushima I-6		BWR	1067	Operational October 1979	TEPCO
Fukushima II-1	Naraha, Fukushima	BWR	1067	Operational April 1982	TEPCO
Fukushima II-2		BWR	1067	Operational February 1984	TEPCO
Fukushima II-3		BWR	1067	Operational June 1985	TEPCO
Fukushima II-4		BWR	1067	Operational August 1987	TEPCO
Genkai-1	Genkai, Saga	PWR	529	Operational October 1975	Kyūshū Electric
Genkai-2		PWR	529	Operational March 1981	Kyūshū Electric
Genkai-3		PWR	1127	Operational March 1994	Kyūshū Electric
Genkai-4		PWR	1127	Operational July 1997	Kyūshū Electric
Hamaoka-1	Omaezaki, Shizuoka	BWR	515	Operational March 1976	Chūbu Electric
Hamaoka-2		BWR	806	Operational November 1978	Chūbu Electric
Hamaoka-3		BWR	1056	Operational August 1987	Chūbu Electric
Hamaoka-4		BWR	1092	Operational September 1993	Chūbu Electric
Hamaoka-5		ABWR	1380	Operational January 2005	Chūbu Electric
Higashidōri-1	Higashidōri, Aomori	BWR	1067	Operational December 2005	Tōhoku Electric
Higashidōri-1	Higashidōri, Aomori	ABWR		Construction began 2008 <i>[citation needed]</i>	TEPCO
Higashidōri-2	Higashidōri, Aomori	ABWR		Construction began 2010 <i>[citation needed]</i>	Tōhoku Electric
Higashidōri-2	Higashidōri, Aomori	ABWR		Construction began 2011 <i>[citation needed]</i>	TEPCO
Ikata-1	Ikata, Ehime	PWR	538	Operational September 1977	YONDEN
Ikata-2		PWR	838	Operational March 1982	YONDEN
Ikata-3		PWR	846	Operational December 1994	YONDEN
Kashiwazaki-Kariwa-1	Kashiwazaki, Niigata	BWR	1067	Operational September 1985	TEPCO
Kashiwazaki-Kariwa-2		BWR	1067	Operational September 1990	TEPCO
Kashiwazaki-Kariwa-3		BWR	1067	Operational August 1993	TEPCO
Kashiwazaki-Kariwa-4		BWR	1067	Operational August 1994	TEPCO
Kashiwazaki-Kariwa-5		BWR	1067	Operational April 1990	TEPCO
Kashiwazaki-Kariwa-6		ABWR	1315	Operational November 1996	TEPCO
Kashiwazaki-Kariwa-7		ABWR	1315	Operational July 1997	TEPCO
Mihama-1	Mihama, Fukui	PWR	320	Operational November 1970	KEPCO
Mihama-2		PWR	470	Operational July 1972	KEPCO
Mihama-3		PWR	780	Operational December 1976	KEPCO
Monju	Tsuruga, Fukui	FBR	320	Operational 1994-1995; 2010-	JAEA
Ōi-1	Ōi, Fukui	PWR	1120	Operational March 1979	KEPCO
Ōi-2		PWR	1120	Operational December 1979	KEPCO
Ōi-3		PWR	1127	Operational December 1991	KEPCO
Ōi-4		PWR	1127	Operational February 1993	KEPCO



Onagawa-1	Onagawa, Miyagi	BWR	498	Operational June 1984	Tōhoku Electric
Onagawa-2		BWR	796	Operational July 1995	Tōhoku Electric
Onagawa-3		BWR	798	Operational January 2002	Tōhoku Electric
Sendai-1	Satsumasendai, Kagoshima	PWR	846	Operational July 1984	Kyūshū Electric
Sendai-2		PWR	846	Operational November 1985	Kyūshū Electric
Shika-1	Shika, Ishikawa	BWR	505	Operational July 1993	RIKUDEN
Shika-2		ABWR	1358	Operational March 2006	RIKUDEN
Shimane-1	Matsue, Shimane	BWR	439	Operational March 1974	Chūgoku Electric
Shimane-2		BWR	789	Operational February 1989	Chūgoku Electric
Shimane-3		ABWR	1373	Under construction, online Dec 2011	Chūgoku Electric
Takahama-1	Takahama, Fukui	PWR	780	Operational November 1974	KEPCO
Takahama-2		PWR	780	Operational November 1975	KEPCO
Takahama-3		PWR	830	Operational January 1985	KEPCO
Takahama-4		PWR	830	Operational June 1985	KEPCO
Tōkai-1	Tōkai, Ibaraki	Magnox	169	Operational 1966-1998	JAPC
Tōkai-2		BWR	1056	Operational November 1978	JAPC
Tomari-1	Tomari, Hokkaidō	PWR	550	Operational June 1989	HEPCO
Tomari-2		PWR	550	Operational April 1991	HEPCO
Tomari-3		PWR	912	Under construction, online Dec 2009	HEPCO
Tsuruga-1	Tsuruga, Fukui	BWR	341	Operational March 1970	JAPC
Tsuruga-2		PWR	1115	Operational February 1987	JAPC
JPDR-II		BWR	13	1963–1982	

### Research reactors

- Japan Atomic Energy Agency (JAEA) Reactors
  - Tōkai JRR-1 (Japan Research Reactor No. 1, shut down)
  - Tōkai JRR-2 (shut down)
  - Tōkai JRR-3
  - Tōkai JRR-4
  - Tōkai JPDR (Japan Power Demonstration Reactor, shut down)
  - Ōarai HTTR (High-Temp engineering Test Reactor)
  - Ōarai JMTR (Japan Materials Testing Reactor)
  - Naka JT-60 fusion reactor
  - Nuclear Safety Research Reactor
  - Fugen (ATR (Advanced Thermal Reactor), shut down)
  - Jōyō (FBR)
  - Monju (FBR)
- Kinki University
  - UTR-KINKI
- Kyoto University
  - KUR
- Musashi Institute of Technology (Tokyo City University)
  - MITRR (TRIGA-II) (shut down 1990)
- Rikkyo University
  - RUR (TRIGA-II) (shut down)
- University of Tokyo
  - Yayoi

### Kazakhstan

#### Power station reactors

- Aktau (Kazakhstan State Corporation for Atomic Power and Industry)
  - BN-350 135 MWe reactor (shut down 1999)

### Research reactors

- Alatau, Institute of Nuclear Physics of the National Nuclear Center
  - VVR-K – 10 MWe reactor
- Kurchatov, National Nuclear Center, Semipalatinsk Test Site
  - IVG-1M – 60 MW reactor
  - RA – zirconium hydride moderated reactor (dismantled)
  - IGR (Impulse Graphite Reactor) – 50 MW reactor

## Latvia

- Salaspils, Nuclear Research Center
  - 5 MWe research reactor (shut down)

## Libya

- Tajura Nuclear Research Center, REWDRC (see [11] (<http://www.tnrc.org/>) ) – 10 MW research reactor (supplied by the USSR)

## Lithuania

- Ignalina Nuclear Power Plant
  - Ignalina-1, RBMK, shut down on December 31, 2004 per EU demand
  - Ignalina-2, RBMK, shut down on December 31, 2009. 1360 MWe.
- Visaginas Nuclear Power Plant (under construction)

## Malaysia

- Kuala Lumpur - TRIGA Mark II, Malaysian Institute of Nuclear Technology Research (installed 1982)

## Mexico

- Laguna Verde - 2 BWRs
- Mexico City - TRIGA Mark III, National Institute for Nuclear Research
- Mexico City - National Polytechnic Institute - Subcritical research reactor <sup>[8]</sup>
- Zacatecas - Autonomous University of Zacatecas - Subcritical research reactor <sup>[8]</sup>

## Morocco

- Rabat - TRIGA (under construction)

## Netherlands

### Power station reactors

- Borssele nuclear power plant - 481 MWe PWR
- Dodewaard nuclear power plant - 58 MWe BWR (shut down 1997)

### Research reactors

- Delft, Reactor Institute Delft, part of the Delft University of Technology
- Petten nuclear reactor in Petten
- Biologische Agrarische Reactor Nederland, part of the Wageningen University, shutdown in 1980
- ATHENE nuclear reactor, at the Eindhoven University of Technology, shut down
- Kema Suspensie Test Reactor, test reactor at KEMA, Arnhem, disassembled

## North Korea

*For more details on this topic, see Nuclear power in North Korea.*

## Power station reactors

- Yongbyon
  - Yongbyon 2 - 50 MWe Magnox reactor (construction suspended 1994)
- Taechon (20 km from Yongbyon)
  - Taechon 1 - 200 MWe reactor (construction suspended 1994)
- Kumho (30 km north of Sinpo), see KEDO
  - Kumho 1 - PWR 1000 MWe (construction suspended 2003)
  - Kumho 2 - PWR 1000 MWe (construction suspended 2003)

## Research and production reactors

- Yongbyon
  - IRT-2000 - 8 MWt (2MWt 1965-1974, 4MWt 1974-1986) heavy-water moderated research reactor (supplied by USSR, 1965)
  - Yongbyon 1 - 5 MWe Magnox reactor, provides power and district heating (active 1987-1994, reactivated 2003, and shut-down in July 2007)

## Norway

### Research reactors

- Kjeller reactors
  - NORA (activated 1961, shut down 1967)
  - JEEP I (activated 1951, shut down 1967)
  - JEEP II (activated 1966)
- Halden reactor
  - HBWR - Halden boiling water reactor (activated 1959)

## Pakistan

*See also: Nuclear power in Pakistan*

### Power station reactors

Reactor	Type	MWe net	Location	Status
CHASNUPP-1	PWR	300	Chashma	Operational since 2000
CHASNUPP-2	PWR	300	Chashma	Under construction. Expected 2011.
CHASNUPP-3	PWR	650 <sup>[<i>citation needed</i>]</sup>	Chashma	Approved. To be constructed by China.
CHASNUPP-4	PWR	650 <sup>[<i>citation needed</i>]</sup>	Chashma	Approved. To be constructed by China
KANUPP-1	PHWR	125	Karachi	Operational since 1966
KANUPP-2	PWR	1000	Karachi	Approved. Preliminary work started but then the project was put on hold in 2009. <sup>[9]</sup>
KANUPP-3	PWR	1000	Karachi	Proposed

### Research and production reactors

#### Under IAEA safeguards

Reactor	Type	MWT	Location	Status
PARR I	Pool-type reactor	10	Islamabad	Operational since 1965
PARR II	Pool-type reactor	30 kWt	Islamabad	Operational since 1974

#### Not under IAEA safeguards

Reactor	Type	MWT	Location	Status
Khushab-I	HWR	Classified. Estimated: 50-70	Khushab	Operational since 1998
Khushab-II	HWR	Classified	Khushab	Operational since 2010
Khushab-III	HWR	Classified	Khushab	Under construction
Khushab-IV	HWR	Classified	Khushab	Under construction <sup>[10]</sup>

## Panama

- USS Sturgis - floating nuclear power plant for Panama Canal (operating 1966 to 1976)

## Peru

- RP-0 - Located in Lima, built by Argentine INVAP
- RP-10 - Located in Huarangal built by Argentine INVAP

## Philippines

- PRR-1 - 3 MW TRIGA-converted reactor, Quezon City. Managed by the Philippine Nuclear Research Institute (formerly Philippine Atomic Energy Commission). 1st criticality on August 1963, reactor conversion on March 1984, criticality after conversion on April 1988, shutdown since 1988 for pool repairs, on extended shutdown at present.
- Bataan Nuclear Power Plant - 620 MWe, mothballed

## Poland

- Ewa reactor - 10 MW research reactor (dismantled in 1995)
- Maria reactor - 30 MW research reactor
- Żarnowiec Nuclear Power Plant - 1600 MW construction cancelled

## Portugal

- Sacavem - RPI, Portuguese Research Reactor - 1 MWt pool type, Instituto Tecnológico e Nuclear

## Puerto Rico

- Mayagüez - TRIGA reactor (dismantled)
- Boiling Nuclear Superheater (BONUS) Reactor Facility, BONUS - superheated BWR (decommissioned). Listed on the U.S. National Register of Historic Places.

## Romania

### Power stations

- Cernavodă Nuclear Power Plant
  - Cernavodă-1 PHWR CANDU reactor 700 MW
  - Cernavodă-2 PHWR CANDU reactor 700 MW

### Fuel Factory

- - Mioveni Fuel Factory, CANDU fuel
  - Turmu Severin-Halínga Heavy Water Factory

### Research

- Institute for Nuclear Research, Mioveni, 110 km north-west of Bucharest
- National Institute for Research and Isotopic Separation, Govora, 170 km west of Bucharest
- National Institute for Physics and Nuclear Engineering, IFIN-HH, Măgurele, 5 km south-west of Bucharest

## Russia

*Main article: Nuclear power in Russia*

*See also: List of nuclear power plants of Europe and CIS#Russia*

**Power station reactors**





Name	Unit	Reactortype	Status	Net capacity (MW)	Gross capacity (MW)	Electricity Grid (planned)	Shutdown (planned)
Balakovo	1	VVER-1000/320	Operating	950	1,000	28.12.1985	(2015)
Balakovo	2	VVER-1000/320	Operating	950	1,000	08.10.1987	(2017)
Balakovo	3	VVER-1000/320	Operating	950	1,000	25.12.1988	(2018)
Balakovo	4	VVER-1000/320	Operating	950	1,000	11.04.1993	(2023)
Beloyarsk	1	AMB-100	Shutdown	102	108	26.04.1964	01.01.1983
Beloyarsk	2	AMB-200	Shutdown	146	160	29.12.1967	01.01.1990
Beloyarsk (BN-600)	3	BN-600 (Fast breeder)	Operating	560	600	08.04.1980	(2025)
Beloyarsk (BN-800)	4	BN-800 (Fast breeder)	Under Construction since 2006	750	800	(2012)	–
Bilibino	1	GBWR-12/EGP-6	Operating	11	12	12.01.1974	(2019)
Bilibino	2	GBWR-12/EGP-6	Operating	11	12	30.12.1974	(2019)
Bilibino	3	GBWR-12/EGP-6	Operating	11	12	22.12.1975	(2021)
Bilibino	4	GBWR-12/EGP-6	Operating	11	12	27.12.1976	(2022)
Kalinin	1	VVER-1000/338	Operating	950	1,000	09.05.1984	(2014)
Kalinin	2	VVER-1000/338	Operating	950	1,000	03.12.1986	(2016)
Kalinin	3	VVER-1000/320	Operating	950	1,000	16.12.2004	(2034)
Kalinin	4	VVER-1000/320	Under Construction since 1986	950	1,000	(31.12.2010)	–
Kola	1	VVER-440/230	Operating	411	440	29.06.1973	(2018)
Kola	2	VVER-440/230	Operating	411	440	09.12.1974	(2019)
Kola	3	VVER-440/213	Operating	411	440	24.03.1981	(2036)
Kola	4	VVER-440/213	Operating	411	440	11.10.1984	(2014)
Kursk	1	RBMK-1000 (1. Gen.)	Operating	925	1,000	19.12.1976	(2021)
Kursk	2	RBMK-1000 (1. Gen.)	Operating	925	1,000	28.01.1979	(2024)
Kursk	3	RBMK-1000 (2. Gen.)	Operating	925	1,000	17.10.1983	(2033)
Kursk	4	RBMK-1000 (2. Gen.)	Operating	925	1,000	02.12.1985	(2035)
Kursk	5	RBMK-1000 (3. Gen.)	Under Construction since 1985	925	1,000	(31.12.2010)	–
Novovoronezh	1	VVER-210 <sup>[11]</sup>	Shutdown	197	210	30.09.1964	16.02.1988
Novovoronezh	2	VVER-365 <sup>[12]</sup>	Shutdown	336	365	27.12.1969	29.08.1990
Novovoronezh	3	VVER-440/179	Operating	385	417	27.12.1971	(2016)
Novovoronezh	4	VVER-440/179	Operating	385	417	28.12.1972	(2017)
Novovoronezh	5	VVER-1000/187	Operating	950	1,000	31.05.1980	(2030)
Novovoronezh II	1	VVER-1200/491 (AES-2006)	Under Construction since 2008	1,085	1,170	(31.12.2012)	–
Obninsk (APS-1)	1	AM-1	Shutdown	5	6	26.06.1954	29.04.2002
Severodvinsk	1	KLT-40S	Under Construction since 2007	30	38	(2010)	–
Severodvinsk	2	KLT-40S	Under Construction since 2007	30	38	(2010)	–
Smolensk	1	RBMK-1000 (2. Gen.)	Operating	925	1,000	09.12.1982	(2033)
Smolensk	2	RBMK-1000 (2. Gen.)	Operating	925	1,000	31.05.1985	(2035)
Smolensk	3	RBMK-1000 (3. Gen.)	Operating	925	1,000	17.01.1990	(2040)
Leningrad (Sosnovy Bor)	1	RBMK-1000 (1. Gen.)	Operating	925	1,000	21.12.1973	(2018)
Leningrad (Sosnovy Bor)	2	RBMK-1000 (1. Gen.)	Operating	925	1,000	11.07.1975	(2020)
Leningrad (Sosnovy Bor)	3	RBMK-1000 (1. Gen.)	Operating	925	1,000	07.12.1979	(2029)
Leningrad (Sosnovy Bor)	4	RBMK-1000 (1. Gen.)	Operating	925	1,000	09.02.1981	(2031)
Leningrad II	1	VVER-1200/491	Construction started in 2008 <sup>[13]</sup>	1,085	1,170	(2012)	–
Leningrad II	2	VVER-1200/491		1,085	1,170	(2014)	–



			Construction started in 2010 <sup>[14]</sup>				
Leningrad II	3	VVER-1200/491	-	1,085	1,170	-	-
Leningrad II	4	VVER-1200/491	-	1,085	1,170	-	-
VK-50 <sup>[15]</sup>	1	VK-50	Shutdown	50	62	01.01.1966	01.01.1989
Volgodonsk (Rostov)	1	VVER-1000/320	Operating	950	1,000	30.03.2001	(2030)
Volgodonsk (Rostov)	2	VVER-1000/320	Operating	950	1,000	(31.12.2008)	-

## Research reactors

*(There are approximately 109 research reactors in Russia. [12] ([http://www.atomsafe.ru/GAN\\_1\\_00.htm](http://www.atomsafe.ru/GAN_1_00.htm)))*

- T-15 fusion reactor at Kurchatov Institute

## Serbia

### Research reactors

- Vinca Nuclear Institute, Vinča
  - RA - Reaktor A (1956–2002) - 6.5 MW heavy water moderated and cooled research reactor
  - RB - Reaktor B (1958–...) - At the very beginning the RB reactor was designed and constructed as an unreflected zero power heavy water - natural uranium critical assembly. First criticality was reached in April 1958. Later, the 2% enriched metal uranium fuel and 80% enriched UO2 fuel were obtained and used in the reactor core. Modifications of the reactor control, safety and dosimetry systems (1960, 1976, 1988) converted the RB critical assembly to a flexible heavy water reflected experimental reactor with 1 W nominal power, operable up to 50 W. Several coupled fast-thermal systems were designed and constructed at RB reactor in the early 1990s, for the research in fast reactors physics.

*(For more information on the subject, please visit [13] ([http://www.vin.bg.ac.rs/150/index\\_e.htm](http://www.vin.bg.ac.rs/150/index_e.htm)))*

## Slovakia

- Bohunice - 4 408 MWe WWER (aka VVER),
  - Bohunice V-1 - 2x WWER-440/V230 (unit #1 shut down on December 31, 2006, unit #2 shut down on December 31, 2008<sup>[16]</sup>)
  - Bohunice V-2 - 2x WWER-440/V213
  - Bohunice A-1 - 1x 144 MWe KS-150 (shut down after a 1977 refuelling incident; decommission in progress since 1979)
- Mochovce - 2 388 MWe WWER
  - 2x WWER-440/V213
  - 2x WWER-440/V213 (under construction; likely to be finished by Enel)

## Slovenia

- Krško NPP - 670 MWe PWR (with Croatia 50% ownership)
- Ljubljana - TRIGA Mark II research reactor, Jožef Stefan Institute (supplied in 1966 by the U.S.)

## South Africa

### Power station reactors

- Koeberg nuclear power station (near Cape Town) 33°40'35.2"S 18°25'55.37"E
  - Koeberg-1 920MWe
  - Koeberg-2 920MWe

### Research reactors

- Pelindaba - Pelindaba Nuclear Research Center near Pretoria 25°48'03"S 27°56'54"E
  - SAFARI-1 20MW swimming pool reactor
  - SAFARI-2 (dismantled 1970)

## South Korea

*For a list of nuclear reactors in South Korea please see: Nuclear power in South Korea*

Breakdown by site

Plant <span>↕</span>	Town <span>↕</span>	Province <span>↕</span>	Primary Technology <span>↕</span>	Current Capacity <span>↕</span>	Planned Capacity <span>↕</span>
Kori	Gijang	Busan	PWR	4137	10737
Ulchin	Uljin	Gyeongbuk	PWR	5900	11500
Wolsong	Gyeongju	Gyeongbuk	PHWR	2779	4779
Yeonggwang	Yeonggwang	Jeonnam	PWR	5900	5900

Breakdown by Reactor

Reactor <span>↕</span>	Type <span>↕</span>	Rating, MWe <span>↕</span>	Start of Operations <span>↕</span>
Kori-1	PWR	587	1978
Kori-2	PWR	650	1983
Kori-3	PWR	950	1985
Kori-4	PWR	950	1986
Ulchin-1	PWR	950	1988
Ulchin-2	PWR	950	1989
Ulchin-3	KSNP	1000	1998
Ulchin-4	KSNP	1000	1999
Ulchin-5	KSNP	1000	2004
Ulchin-6	KSNP	1000	2005
Wolsong-1	CANDU	679	1983
Wolsong-2	CANDU	700	1997
Wolsong-3	CANDU	700	1998
Wolsong-4	CANDU	700	1999
Yeonggwang-1	PWR	950	1986
Yeonggwang-2	PWR	950	1987
Yeonggwang-3	System 80	1000	1995
Yeonggwang-4	System 80	1000	1996
Yeonggwang-5	KSNP	1000	2002
Yeonggwang-6	KSNP	1000	2002
Shin Kori 1	OPR-1000	1000	2011
Shin Kori 2	OPR-1000	1000	2011 (Under construction)
Shin Wolsong 1	OPR-1000	1000	2012 (Under construction)
Shin Wolsong 2	OPR-1000	1000	2013 (Under construction)
Shin Kori 3	APR-1400	1400	2013 (Under construction)
Shin Kori 4	APR-1400	1400	2014 (Under construction)
Shin Ulchin 1	APR-1400	1400	2015 (Under construction)
Shin Ulchin 2	APR-1400	1400	2016 (Under construction)
Shin Kori 5	APR-1400	1400	2018 (Planned)
Shin Kori 6	APR-1400	1400	2019 (Planned)
Shin Ulchin 3	APR-1400	1400	2020 (Planned)
Shin Ulchin 4	APR-1400	1400	2021 (Planned)

Research Reactors:

- Aerojet General Nucleonics Model 201 Research Reactor
- HANARO, MAPLE class reactor
- TRIGA General Atomics Mark II (TRIGA-Mark II) Research Reactor (Decommissioned)
- TRIGA General Atomics Mark III (TRIGA-Mark III) Research Reactor (Decommissioned)

## Spain

*Main article: Nuclear power in Spain*

## Power station reactors

- Almaraz Nuclear Power Plant
  - Almaraz-1 - 1032 MWe-PWR
  - Almaraz-2 - 1027 MWe-PWR
- Ascó Nuclear Power Plant
  - Ascó-1 - 930 MWe-PWR
  - Ascó-2 - 930 MWe-PWR
- Central nuclear José Cabrera (Zorita) (shut down 04-30-2006) 160MWe-PWR
- Cofrentes Nuclear Power Plant - 994 MWe-BWR
- Santa María de Garoña Nuclear Power Plant - 460 MWe-BWR
- Trillo Nuclear Power Plant - 1.066 MWe-PWR
- Vandellòs Nuclear Power Plant Tarragona
  - Vandellòs-1 UNGG (shut down after fire, 1989)
  - Vandellòs-2 - 1080 MWe-PWR

## Research reactors

- Argos 10 kW Argonaut reactor - Polytechnic University of Catalonia, Barcelona (shut down 1992)
- CORAL-I reactor

## Sweden

*Main article: Nuclear power in Sweden*

### Power Station Reactors

Name	Type	Power	Operational	Current status	Manufacturer
<b>Barsebäck 1</b>	BWR	630 MW	1975–1999	shut down	ASEA-Atom
Barsebäck 2	BWR	630 MW	1977–2005	shut down	ASEA-Atom
<b>Forsmark 1</b>	BWR	1,018 MW	1980–	operational	ASEA-Atom
Forsmark 2	BWR	960 MW	1981–	operational	ASEA-Atom
Forsmark 3	BWR	1,230 MW	1985–	operational	ASEA-Atom
<b>Oskarshamn 1</b>	BWR	500 MW	1972–	operational	ASEA-Atom
Oskarshamn 2	BWR	630 MW	1975–	operational	ASEA-Atom
Oskarshamn 3	BWR	1,200 MW	1985–	operational	ASEA-Atom
<b>Ringhals 1</b>	BWR	860 MW	1976–	operational	ASEA-Atom
Ringhals 2	PWR	870 MW	1975–	operational	Westinghouse Electric Company
Ringhals 3	PWR	920 MW	1981–	operational	Westinghouse Electric Company
Ringhals 4	PWR	910 MW	1983–	operational	Westinghouse Electric Company

### Research reactors

Name	Location	Description	Power	Operational	Current status
R1	KTH, Stockholm	Research	1 MW	1954–1970	dismantled
R2	Studsvik	Research, production of isotopes for industry	50 MW	1960–2005	shut down
R2-0	Studsvik	Research, production of isotopes for industry	1 MW	1960–2005	shut down
Ågestaverket (R3)	Farsta, Stockholm	District heating	80 MW	1963–1973	shut down
Marviken (R4)	Marviken, Norrköping	Research, plutonium production	—	never completed	abandoned in 1970
FR-0	Studsvik	Research, zero-power fast reactor	low	1964–1971	dismantled

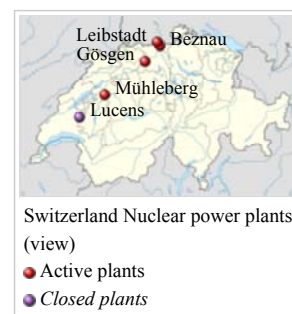
## Switzerland



*See also: Nuclear power in Switzerland*

## Power station reactors

- Beznau Nuclear Power Plant - 2 identical PWR power reactors. Commissioned in 1969 and 1970. (Aerial view (<http://maps.google.com/maps?f=q&hl=en&sll=37.0625,-95.677068&sspn=46.409192,78.75&layer=&ie=UTF8&om=1&z=16&ll=47.552998,8.230927&spn=0.009717,0.019226&t=k&iwloc=addr>) )



- Goesgen Nuclear Power Plant - PWR power reactor, commissioned 1979. (Aerial view (<http://maps.google.com/maps?f=q&hl=en&sll=37.0625,-95.677068&sspn=46.409192,78.75&layer=&ie=UTF8&om=1&z=16&ll=47.365048,7.968199&spn=0.009752,0.019226&t=k&iwloc=addr>) )
- Leibstadt Nuclear Power Plant - BWR power reactor, commissioned 1984. (Aerial view (<http://maps.google.com/maps?f=q&hl=en&sll=37.0625,-95.677068&sspn=46.409192,78.75&layer=&ie=UTF8&z=16&ll=47.600781,8.183484&spn=0.009709,0.019226&t=k&om=1>) )
- Mühleberg Nuclear Power Plant - BWR power reactor, commissioned 1970. (Aerial view (<http://maps.google.com/maps?f=q&hl=en&sll=37.0625,-95.677068&sspn=46.409192,78.75&layer=&ie=UTF8&om=1&z=17&ll=46.969469,7.269441&spn=0.004913,0.009613&t=k&iwloc=addr>) )

## Research reactors

- SAPHIR - Pool reactor. First criticality: April 30, 1957. Shut down: End of 1993. Paul Scherrer Institut
- DIORIT - HW cooled and moderated. First criticality: April 15, 1960. Shut down: 1977. Paul Scherrer Institut
- Proteus - Null-power reconfigurable reactor (graphite moderator/reflector). In operation. Paul Scherrer Institut
- Lucens - Prototype power reactor (GCHWR) 30 MWth/6 MWe. Shut down in 1969 after accident. Site decommissioned.
- CROCUS - Null-power light water reactor. In operation. École polytechnique fédérale de Lausanne

## Syria

- Miniature neutron source reactor

## Taiwan

*Main article: Nuclear power in Taiwan*

## Power station reactors

Name	Location	Type	Rating, MWe net	Status
Chin Shan Nuclear Power Plant	Chin Shan	BWR-4	604	1978-
		BWR-4	604	1979-
Kuosheng Nuclear Power Plant	Kuosheng	BWR-6	948	1981-
		BWR-6	948	1983-
Nanwan Nuclear Power Plant	Nanwan	PWR	890	1984-
		PWR	890	1985-
Lungmen Nuclear Power Plant	Lungmen	ABWR	1350	Under construction
		ABWR	1350	Under construction

## Research reactors

- Hsinchu - TRIGA, Tsing Hua University (installed 1977)

## Thailand

- Bangkok - TRIGA, Office of Atoms for Peace (installed 1977)
- Bangkok - TRIGA MPR 10, Ongkharak Nuclear Research Center (under construction)

## Turkey

Location	Status	Reactor	Type	MWe net	Construction Start	Commercial Operation
Mersin	Proposed	-	VVER pressurized water reactors	4800	-	-
Sinop	Proposed	-	-	1800	-	-

### Research reactors

- TR-1 Research Reactor (Turkish Atomic Energy Authority) Reactor's Web Site: [www.tr-2.org](http://www.tr-2.org) (<http://www.tr-2.org>)
- TR-2 Research Reactor (Turkish Atomic Energy Authority) Reactor's Web Site: [www.tr-2.org](http://www.tr-2.org) (<http://www.tr-2.org>)
- TRIGA MARK II Research Reactor (Istanbul Technical University) Institute of Energy (<http://www.energy.itu.edu.tr/triga.htm>)

### Fuel pilot plants

- TRD Fuel Pilot Plant (Turkish Atomic Energy Authority)

## Ukraine

### Power station reactors

- V.I. Lenin Memorial Chernobyl Nuclear Power Station
  - Chernobyl-1 RBMK-1000 LWGR (shut down 1996)
  - Chernobyl-2 RBMK-1000 LWGR (shut down 1991)
  - Chernobyl-3 RBMK-1000 LWGR (shut down 2000)
  - Chernobyl-4 RBMK-1000 LWGR (exploded in Chernobyl disaster 1986)
- Khmel'nitskiy Nuclear Power Plant - 2 WWER-1000 reactors
- Rivne Nuclear Power Plant - 2 WWER-440 and 2 WWER-1000 reactors
- South Ukraine Nuclear Power Plant, Kostiantynivka, Mykolaiv Oblast - 3 WWER-1000 reactors
- Zaporizhzhia Nuclear Power Plant - 6 WWER-1000 reactors (Europe's largest nuclear power plant)



### Research reactors

- Kiev Institute for Nuclear Research
- Sevastopol Institute of Nuclear Energy and Industry

## United Kingdom

*Main article: Nuclear power in the United Kingdom*

### Power station reactors

- Berkeley, Gloucestershire 2 x 276MW, de-commissioned
- Bradwell, Essex (Generation ceased in 2002, defuelled by September 2005)
- Calder Hall, Sellafield, Cumbria - 4 x 50MWe (Generation started in 1956 and ceased in 2003)
- Chapelcross, Dumfries and Galloway - 4 x 180MW(th) (Generation ceased in June 2004)
- Dungeness A, Kent 2 x 223MW. BNG owned Magnox station (Entered decommissioning January 2007)
- Dungeness B, Kent 2 x 550 MW(e). British Energy owned AGR
- Hartlepool, Hartlepool 2 x 600MW(e). British Energy owned AGR
- Heysham nuclear power stations, Lancashire - 4 x 600 MW(e)
- Hinkley Point A, Somerset (Ceased operations in 2000, defuelled by September 2005)
- Hinkley Point B, Somerset 2 x 570MW(e). British Energy owned AGR
- Hunterston A, North Ayrshire (Generation ceased 1990)
- Hunterston B, North Ayrshire 2 x 570 MW(e) British Energy owned AGR
- Oldbury, Gloucestershire - 2 x 435MW. (Generation due to cease July 2011 or when Cumulative Mean Core Irradiation reaches 31.5 MWd/te (R1) and 32.7 MWd/te (R2))
- Sizewell A, Suffolk BNFL owned Magnox station (Entered decommissioning January 2007)
- Sizewell B, Suffolk 1 x 1195MWe. British Energy PWR
- Torness, East Lothian 2 x 625 MW(e). British Energy owned AGR
- Trawsfynydd, Gwynedd BNG owned Magnox station (Generation ceased 1991)
- Wylfa, Anglesey - 2 x 490MW magnox reactors. (Generation due to cease at end of 2012)

## Research reactors

- Aldermaston - VIPER - Atomic Weapons Establishment
- Ascot - CONSORT reactor, Imperial College London, Silwood Park campus
- Billingham - TRIGA Mark I reactor, ICI refinery (installed 1971, shut down 1988)
- Culham - JET fusion reactor
- Derby - Neptune - Rolls-Royce Marine Power Operations Ltd, Raynesway
- Dounreay
  - The Shore Test Facility (STF) at VULCAN (Rolls-Royce Naval Marine)
  - DSMP1 at VULCAN (Rolls-Royce Naval Marine)(shut down 1984)
  - DMTR
  - Dounreay Fast Reactor - Fast breeder reactor (shut down 1994)
  - Prototype fast reactor
- East Kilbride - Scottish Universities Research and Reactor Centre (deactivated 1995, fully dismantled 2003)
- Harwell AERE
  - GLEEP (shut down 1990)
  - BEPO (shut down 1968)
  - LIDO (shut down 1974)
  - DIDO (shut down 1990)
  - PLUTO (shut down 1990)
- London
  - Greenwich - JASON PWR reactor (dismantled 1999)
  - Stratford Marsh - Queen Mary, University of London (commissioned 1966, deactivated 1982, (fully dismantled))
- Risley - Universities Research Reactor (shut down 1991 decommissioned-land released 1996)
- Sellafield (named Windscale until 1971)
  - PILE 1 (shut down 1957 after Windscale fire)
  - PILE 2 (shut down 1957)
  - WAGR (shut down 1982)
- Winfrith - Dorchester, Dorset, 9 reactors, shut down 1990
  - Dragon reactor

## United States of America

*Main article: Nuclear power in the United States*

*See also: List of canceled nuclear plants in the United States*

### Power station reactors

#### NRC Region One (Northeast)

- Beaver Valley, Pennsylvania 40°37'24"N 80°25'50"W
- Calvert Cliffs, Maryland 38°25'55"N 76°26'32"W
- Connecticut Yankee, Connecticut (Decommissioned) 41°28'55"N 72°29'57"W
- FitzPatrick, New York 43°31'24"N 76°23'54"W
- Ginna, New York 43°16'40"N 77°18'36"W
- Hope Creek, New Jersey 39°28'4"N 75°32'17"W
- Indian Point, New York 41°16'11"N 73°57'8"W
- Limerick, Pennsylvania 40°13'36"N 75°35'14"W
- Maine Yankee, Maine (Decommissioned) 43°57'3"N 69°41'45"W
- Millstone, Connecticut 41°18'43"N 72°10'7"W
- Nine Mile Point, New York 43°31'15"N 76°24'25"W
- Oyster Creek, New Jersey 39°48'53"N 74°12'18"W
- Peach Bottom, Pennsylvania 39°45'30"N 76°16'5"W
- Pilgrim, Massachusetts 41°56'42"N 70°34'42"W
- Salem, New Jersey 39°27'46"N 75°32'8"W
- Saxton, Pennsylvania (Decommissioned) 40°13'37"N 78°14'31"W
- Seabrook, New Hampshire 42°53'56"N 70°51'3"W
- Shippingport, Pennsylvania (Decommissioned) 40°37'16"N 80°26'7"W
- Shoreham, New York (Decommissioned) 40°57'40"N 72°51'54"W
- Susquehanna, Pennsylvania 41°5'20"N 76°8'56"W
- Three Mile Island, Pennsylvania 40°9'14"N 76°43'29"W
- Penn State University Park, Pennsylvania
- Vermont Yankee, Vermont 42°46'44"N 72°30'47"W
- Yankee Rowe, Massachusetts (Decommissioned) 42°43'40"N 72°55'45"W

**NRC Region Two (South)**

- Bellefonte, Alabama (Unfinished)
- Browns Ferry, Alabama
- Brunswick, North Carolina
- Carolinas-Virginia Tube Reactor, South Carolina (decommissioned)
- Catawba, South Carolina
- Crystal River 3, Florida
- Farley (Joseph M. Farley), Alabama
- Hatch (Edwin I. Hatch), Georgia
- McGuire Nuclear Station, North Carolina
- North Anna, Virginia
- Oconee, South Carolina
- H.B. Robinson, South Carolina
- Sequoyah, Tennessee
- Shearon Harris, North Carolina
- St. Lucie, Florida
- Virgil C. Summer, South Carolina
- Surry, Virginia
- Turkey Point, Florida
- Alvin W. Vogtle, Georgia
- Watts Bar, Tennessee

**NRC Region Three (Midwest)**

- Big Rock Point, Michigan (Decommissioned)
- Byron, Illinois
- Braidwood, Illinois
- Clinton, Illinois
- Davis-Besse, Ohio
- Donald C. Cook, Michigan
- Dresden, Illinois
- Duane Arnold, Iowa
- Elk River, Minnesota (Decommissioned)
- Enrico Fermi, Michigan
- Kewaunee, Wisconsin
- La Crosse, Wisconsin (Decommissioned)
- LaSalle County, Illinois
- Marble Hill, Indiana (Unfinished)
- Monticello, Minnesota
- Palisades, Michigan
- Perry, Ohio
- Piqua, Ohio (Decommissioned)
- Point Beach, Wisconsin
- Prairie Island, Minnesota
- Quad Cities, Illinois
- Zion, Illinois (Decommissioned)

**NRC Region Four (West)**

- Arkansas Nuclear One, Arkansas
- Callaway, Missouri
- Columbia, Washington - formerly WNP-2
- Comanche Peak, Texas
- Cooper, Nebraska
- Diablo Canyon, California
- Fort Calhoun, Nebraska
- Fort Saint Vrain, Colorado (Decommissioned)
- Grand Gulf, Mississippi
- Hallam, Nebraska (Decommissioned)
- Hanford N Reactor, Washington (Retired - see Plutonium Production Reactors below)
- Humboldt Bay, California (Decommissioned)
- Palo Verde, Arizona
- Pathfinder, South Dakota (Decommissioned)
- Rancho Seco, California (Decommissioned)
- River Bend, Louisiana
- San Onofre, California
- Sodium Reactor Experiment, Santa Susana Field Laboratory, California (Accident 1959, Closed 1964)

- South Texas Project Electric Generating Station, Texas
- Trojan, Rainier, Oregon (Decommissioned)
- MSTR, Missouri
- Vallecitos, California (idle research center)
- Waterford, Louisiana
- Wolf Creek, Kansas

### Plutonium production reactors

- Hanford Site, Washington
  - B-Reactor (Pile) - Preserved as a Museum
  - F-Reactor (Pile) - Cocooned
  - D-Reactor (Pile) - Cocooned
  - H-Reactor (Pile) - Being Cocooned
  - DR-Reactor (Pile) - Cocooned
  - C-Reactor (Pile) - Cocooned
  - KE-Reactor (Pile) - Being Cocooned
  - KW-Reactor (Pile) - Being Cocooned
  - N-Reactor - Being Cocooned
- Savannah River Site, South Carolina
  - R-Reactor (Heavy Water) - S&M (Surveillance and Maintenance) Mode
  - P-Reactor (Heavy Water) - S&M Mode
  - L-Reactor (Heavy Water) - S&M Mode
  - K-Reactor (Heavy Water) - S&M Mode
  - C-Reactor (Heavy Water) - S&M Mode

### Army Nuclear Power Program

*Main article: Army Nuclear Power Program*

- SM-1
- SM-1A
- PM-2A
- PM-1
- PM-3A
- MH-1A
- SL-1
- ML-1

### United States Naval reactors

Knolls Atomic Power Laboratory Prototype S6W Reactor, Ballston Spa, New York

*Main article: List of United States Naval reactors*

### Research reactors

- Arkansas-Southwest Experimental Fast Oxide Reactor, Arkansas
  - SEFOR - Shut Down
- Argonne National Laboratory, Illinois (and Idaho)
  - CP-1 - Chicago Pile 1 (Relocated and renamed as Chicago Pile 2 in 1943) - Shut Down
  - CP-3 - Chicago Pile 3 - Shut Down
  - CP-5 - Chicago Pile 5 - Shut Down (1979)
  - EBWR - Experimental Boiling Water Reactor - Shut Down
  - LMFBR - Liquid Metal Fast Breeder Reactor - Shut Down
  - Janus reactor - Shut Down (1992)
  - JUGGERNAUT - Shut Down
  - IFR - Integral Fast Reactor - Never Operated<sup>[*citation needed*]</sup>
- Brookhaven National Laboratory, Upton, New York
  - High Flux Beam Reactor - Shut Down (1999)
  - Medical Research Reactor - Shut Down (2000)
  - Brookhaven Graphite Research Reactor - Shut Down (1968)
- Hanford Site, Washington
  - Fast Flux Test Facility - ~~currently in cold standby~~ Core drilled
- Idaho National Laboratory, Idaho
  - ARMF-I - Shut Down
  - AMRF-II - Shut Down



- **ATR - Operating**
- ATRC - Operating
- AFSR - Shut Down
- BORAX-I - Shut Down
- BORAX-II - Shut Down
- BORAX-III - Shut Down
- BORAX-IV - Shut Down
- BORAX-V - Shut Down (1964)
- CRCE - Shut Down
- CFRMF - Shut Down
- CET - Shut Down
- Experimental Test Reactor - Shut Down
- ETRC - Shut Down
- EBOR - Never Operated
- EBR-I - Experimental Breeder Reactor I (originally CP-4) - Shut Down
- EBR-II - Experimental Breeder Reactor II - Shut Down
- ECOR - Never Operated
- 710 - Shut Down
- GCRE - Gas Cooled Reactor Experiment - Shut Down
- HTRE-1 - Heat Transfer Reactor Experiment 1 - Shut Down
- HTRE-2 - Heat Transfer Reactor Experiment 2 - Shut Down
- HTRE-3 - Heat Transfer Reactor Experiment 3 - Shut Down
- 603-A - Shut Down
- HOTCE - Shut Down
- A1W-A - Shut Down
- A1W-B - Shut Down
- LOFT - Shut Down
- MTR - Shut Down
- ML-1 - Mobil Low Power Plant - Shut Down
- S5G - Shut Down
- **NRAD - Operating**
- FRAN - Shut Down
- OMRE - Shut Down
- PBF - Shut Down
- RMF - Shut Down
- **SUSIE - Operational**
- SPERT-I - Shut Down
- SPERT-II - Shut Down
- SPERT-III - Shut Down
- SPERT-IV - Shut Down
- SCRCE - Shut Down
- SL-1/ALPR - Stationary Low Power Plant - Shut Down
- S1W/STR - Shut Down
- SNAPTRAN-1 - Shut Down
- SNAPTRAN-2 - Shut Down
- SNAPTRAN-3 - Shut Down
- THRITS - Shut Down
- TREAT - Shut Down
- ZPPR - Zero Power Physics Reactor (formerly Zero Power Plutonium Reactor) - *Standby*
- ZPR-III - Shut Down
- Los Alamos National Laboratory, New Mexico
  - UHTREX - Shut Down
  - Omega West - Shut Down
  - Clementine - Shut Down
- Nevada Test Site, Nevada
  - BREN Tower
- Oak Ridge National Laboratory, Tennessee
  - X-10 Graphite Reactor - Shut Down, Operated 1943-1963
  - Homogeneous Reactor Experiment (HRE) - Shut down, Operated 1952-1954
  - Homogeneous Reactor Test (HRT) - Shut down, Operated 1957-1961
  - Aircraft Reactor Experiment (ARE) - Shutdown, Operated 1954-1955
  - Molten Salt Reactor Experiment (MSRE) - Shut Down, Operated 1965-1969
  - Health Physics Research Reactor (HPRR) - Shut down, Operated 1963-1987
  - Low-Intensity Test Reactor (LITR)- Shut down, Operated 1950-1968
  - Bulk Shielding Reactor (BSR) - Shut Down, Operated 1950-1987
  - Geneva Conference Reactor - Shutdown, Operated 1955
  - Tower Shielding Reactor-I (TSR-I) - Shut Down, Operated 1954-1958
  - Tower Shielding Reactor-II (TSR-II) - Shutdown, Operated 1958-1982
  - Oak Ridge Research Reactor (ORR) - Shut Down, Operated 1958-1987

- High Flux Isotope Reactor - **Operational**, Started 1965
- Pool Critical Assembly - Shutdown, Operated 1958 - 1987
- Experimental Gas Cooled Reactor (EGCR) - Constructed, but never operated (project canceled in 1966)
  
- Savannah River Site, South Carolina
  - HWCTR - Heavy Water Components Test Reactor - Partial Decommissioning
  
- Santa Susana Field Laboratory, Simi Hills California
  - Sodium Reactor Experiment (Accident 1959, Closed 1964)
  - SNAP-10A (Shut Down 1965, presently orbiting)

**Civilian Research and Test Reactors Licensed To Operate**

<b>Operator</b> <span>✕</span>	<b>Location</b> <span>✕</span>	<b>Reactor</b> <span>✕</span>	<b>Power</b> <span>✕</span>	<b>Operational</b> <span>✕</span>
Aerotest Operations Inc.	San Ramon, California	TRIGA Mark I	250 kW	
Armed Forces Radiobiology Research Institute	Bethesda, Maryland	TRIGA Mark F	1 MW	
Dow Chemical Company	Midland, Michigan	TRIGA Mark I	300 kW	
General Electric Company	Sunol, California	"Nuclear Test"	100 kW	
Idaho State University	Pocatello, Idaho	AGN-201 #103	50 W	1967
Kansas State University	Manhattan, Kansas	TRIGA Mark II	1250 kW	1962
Massachusetts Institute of Technology	Cambridge, Massachusetts	Tank Type HWR Reflected (MITR-II)	6 MW	1958 -
Missouri University of Science and Technology	Rolla, Missouri	Pool	200 kW	1961 -
National Institute of Standards and Technology	Gaithersburg, Maryland	Tank Type, Heavy Water Moderated	20 MW	1967 -
North Carolina State University	Raleigh, North Carolina	Pulstar	1 MW	1973 -
Ohio State University	Columbus, Ohio	Pool (modified Lockheed) [14] ( <a href="http://www-nrl.eng.ohio-state.edu/facilities/reactor.html">http://www-nrl.eng.ohio-state.edu/facilities/reactor.html</a> )	500 kW	1961
Oregon State University	Corvallis, Oregon	TRIGA Mark II (OSTR)	1.1 MW	1967 -
Penn State University	University Park, Pennsylvania	TRIGA BNR Reactor	1.1 MW	1955 -
Purdue University	West Lafayette, Indiana	Lockheed	1 kW	1962
Reed College	Portland, Oregon	TRIGA Mark I (RRR)	250 kW	1968 -
Rensselaer Polytechnic Institute	Troy, New York	Reactor Critical Facility <sup>[17][18]</sup>	1 W	1965-
Rhode Island Atomic Energy Commission/University of Rhode Island	Narragansett, Rhode Island	GE Pool	2 MW	
Texas A&M University	College Station, TX	AGN-201M #106 - TRIGA Mark I (two reactors)	5 W, 1 MW	
University of Arizona	Tucson, AZ	TRIGA Mark I	110 kW	1958-2010
University of California-Davis	Sacramento, California	TRIGA Mark II, McClellan Nuclear Radiation Center	2.3 MW	August 13, 1998 -
University of California, Irvine	Irvine, California	TRIGA Mark I	250 kW	1969
University of Florida	Gainesville, Florida	Argonaut (UFTR)	100 kW	1959 -
University of Maryland, College Park	College Park, Maryland	TRIGA Mark I	250 kW	1960 -
University of Massachusetts Lowell	Lowell, Massachusetts	Pool	1 MW	
University of Missouri	Columbia, Missouri	General Electric tank type UMRR	10 MW	1966 -
University of New Mexico	Albuquerque, New Mexico	AGN-201M \$112		
University of Texas at Austin	Austin, Texas	TRIGA Mark II	1.1 MW	
University of Utah	Salt Lake City, Utah	TRIGA Mark I	100 kW	
University of Wisconsin–Madison	Madison, Wisconsin	TRIGA Mark I	1 MW	1961
U.S. Geological Survey	Denver, Colorado	TRIGA Mark I	1 MW	
U.S. Veterans Administration	Omaha, Nebraska	TRIGA Mark I	20 kW	
Washington State University	Pullman, Washington	TRIGA Conversion (WSUR)	1 MW	March 7, 1961 -

**Under Decommission Orders or License Amendments**

(These research and test reactors are authorized to decontaminate and dismantle their facility to prepare for final survey and license termination.)

- General Atomics, San Diego, California (two reactors)
- National Aeronautics and Space Administration, Sandusky, Ohio (two reactors)
- University of Illinois at Urbana-Champaign, Urbana, Illinois
- University of Michigan, Ann Arbor, Michigan

#### With Possession-Only Licenses

(These research and test reactors are not authorized to operate the reactor, only to possess the nuclear material on-hand. They are permanently shut down.)

- General Electric Company, Sunol, California (two research and test reactors, one power reactor)
- Nuclear Ship Savannah, James River Reserve Fleet, Virginia (one power reactor)
- University at Buffalo
- U.S. Veterans Administration, Omaha, NE
- Worcester Polytechnic Institute, Worcester, MA

#### External links

- DoE list ([http://www.eia.doe.gov/cneaf/nuclear/page/at\\_a\\_glance/reactors/nuke1.html](http://www.eia.doe.gov/cneaf/nuclear/page/at_a_glance/reactors/nuke1.html))
- ICJT list (<http://www.icjt.org/npp/lokacija.php?drzava=32>) —includes the defunct

## Uruguay

- URR reactor

## Uzbekistan

- Ulugbek, Tashkent
  - VVER-SM tank reactor

## Venezuela

- RV-1 pool-type reactor (shut down 1994)

## Vietnam

- Da Lat - TRIGA Mark II (supplied by USA 1963, shut down 1975, reactivated by USSR 1984)

Name <span>ⓘ</span>	Unit <span>ⓘ</span>	Reactortype <span>ⓘ</span>	Status <span>ⓘ</span>	Net capacity (MW) <span>ⓘ</span>	Gross capacity (MW) <span>ⓘ</span>	Electricity Grid (planned) <span>ⓘ</span>	Shutdown (planned) <span>ⓘ</span>
Phuoc Dinh (Ninh Thuan) <sup>[19]</sup>	1	VVER-1000/392	Planned	1.000	-	-	-
Phuoc Dinh (Ninh Thuan) <sup>[20]</sup>	2	VVER-1000/392	Planned	1.000	-	-	-

## See also

- Economics of new nuclear power plants
- List of nuclear power stations - another list by station
- List of power stations in Europe
- Lists of nuclear disasters and radioactive incidents
- List of small nuclear reactor designs
- Nuclear power by country
- Integrated Nuclear Fuel Cycle Information System

## References

- ↑ [1] ([http://www.perfil.com/contenidos/2010/03/13/noticia\\_0020.html](http://www.perfil.com/contenidos/2010/03/13/noticia_0020.html))
- ↑ *Estamos desarrollando el prototipo del Carem en Atucha* ([http://www.lanacion.com.ar/nota.asp?nota\\_id=1207239](http://www.lanacion.com.ar/nota.asp?nota_id=1207239))
- ↑ HIFAR ([http://www.ansto.gov.au/resources/images\\_of\\_ansto/hifar.html](http://www.ansto.gov.au/resources/images_of_ansto/hifar.html))
- ↑ OPAL ([http://www.ansto.gov.au/resources/images\\_of\\_ansto/opal\\_images2.html](http://www.ansto.gov.au/resources/images_of_ansto/opal_images2.html))
- ↑ [2] ([http://www.bundesregierung.de/nn\\_6538/Content/EN/Artikel/\\_2011/03/2011-03-16-bund-laender-kkw-pruefungen\\_\\_en.html](http://www.bundesregierung.de/nn_6538/Content/EN/Artikel/_2011/03/2011-03-16-bund-laender-kkw-pruefungen__en.html))

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7. ^ [3] (<http://www.baztab.com/news/34161.php>)
8. ^ <sup>a</sup> <sup>b</sup> [4] (<http://www.elfinanciero.com.mx/ElFinanciero/Portal/cfpages/contentmgr.cfm?docId=9561&docTipo=1&orderby=docid&sortby=ASC>) - El financiero en línea - "Factible construir centrales nucleares de electricidad en México" (6/2/2006) "A la fecha, México cuenta con cuatro instalaciones nucleares en operación. La central de electricidad nuclear Laguna Verde (CNLV) que opera la CFE y el reactor TRIGA MARK-III en instalaciones del Instituto Nacional de Investigaciones Nucleares. Asimismo, tiene dos ensamblajes subcríticos en la Universidad Autónoma de Zacatecas y en el Instituto Politécnico Nacional (IPN), que funcionan con fines de investigación."
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11. ^ (<http://novnpp.rosenergoatom.ru/eng/about/history/>) VVER-210 by Rosenergoatom (russ)
12. ^ (<http://novnpp.rosenergoatom.ru/eng/about/history/>) VVER-365 by Rosenergoatom (russ)
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14. ^ Leningrad II 2 on the PRIS of the IAEA (<http://www.iaea.org/cgi-bin/db.page.pl/pris.prdet.htm?country=RU&refno=164>)
15. ^ VK-50 on the PRIS of the IAEA (<http://www.iaea.org/cgi-bin/db.page.pl/pris.prdet.htm?country=RU&site=&refno=5&link=HOT&sort=&sortlong=Alphabetic>)
16. ^ <http://www.tasr.sk/30.axd?k=20090110TBB00423>
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18. ^ <http://www.rpi.edu/~liue/facilities/facilities.html>
19. ^ Power Reactor Information System (<http://www.iaea.org/programmes/a2/>) of the IAEA: „Nuclear Power Reactor Details - PHUOC DINH 1“ (<http://www.iaea.org/cgi-bin/db.page.pl/pris.prdet.htm?country=VN&refno=1>)
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## External links

Reactor lists:

- IAEA list as of 2006 ([http://www-pub.iaea.org/MTCDB/publications/PDF/RDS2-26\\_web.pdf](http://www-pub.iaea.org/MTCDB/publications/PDF/RDS2-26_web.pdf)) (1.5 MB)
- ICJT lists of Nuclear Power Plants worldwide (<http://www.icjt.org/npp/>)
- NED Database of Commercial Nuclear Power Reactors (<http://www.nukleer.web.tr/indexe.htm>)
- Clickable map of US nuclear power reactors ([http://www.insc.anl.gov/pwrmaps/map/united\\_states.html](http://www.insc.anl.gov/pwrmaps/map/united_states.html))
- Interactive map with all nuclear power plants (<http://exploreourpla.net/explorer/?geoLink=999&lat=38.6596875&lon=-95.4140625&alt=4194304&mid=8&nbl=8,10,111>) US and worldwide (Note: missing many plants)
- US DoE commercial nuclear reactors page ([http://www.eia.doe.gov/cneaf/nuclear/page/nuc\\_reactors/reactsum.html](http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/reactsum.html))
- List of Canadian nuclear power stations (<http://www.icjt.org/npp/lokacija.php?drzava=4>) on the ICJT site
- Link collection to Nuclear Power Plants ([http://www.world-nuclear.org/portal/nuclear\\_power\\_plants.htm](http://www.world-nuclear.org/portal/nuclear_power_plants.htm))
- British Nuclear Group portfolio of Nuclear Sites (<http://www.britishnucleargroup.com/content.php?pageID=186>)
- US University Research Reactors - A Brief Overview (<http://www.trtr.org/Links/OSTP%20Briefing%202000.pdf>)
- How many people live near a nuclear power plant in the United States? (<http://opendata.zeit.de/nuclear-reactors-usa/#/en/>) Data Visualization)

Reactor news items:

- CFE Mexico reactor (<http://www.cfe.gob.mx/NR/exeres/2955F304-1D53-4A90-B40F-BE1BE30C1110>)
- Netherlands reactors ([http://www.expatica.com/source/site\\_article.asp?subchannel\\_id=1&story\\_id=12294&name=Netherlands+revisits+the+nuclear+taboo](http://www.expatica.com/source/site_article.asp?subchannel_id=1&story_id=12294&name=Netherlands+revisits+the+nuclear+taboo))

Other:

- Status of Closed US Plants (<http://www.tlgservices.com/nucleus/nukegone.htm>) (This Web link is not working as of 10/14/08))
- IAEA Intergrated Nuclear Fuel Cycle Information System (<http://www-nfcis.iaea.org/>) - ( registration required)

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