

REFERENCE DATA SERIES No. 2
2020 Edition

Nuclear Power Reactors in the World



IAEA

International Atomic Energy Agency

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NUCLEAR POWER REACTORS IN THE WORLD

2020 Edition

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INTRODUCTION

Nuclear Power Reactors in the World is an annual publication that presents the most recent data pertaining to reactor units in IAEA Member States.

This fortieth edition of Reference Data Series No. 2 provides a detailed comparison of various statistics up to and including 31 December 2019. The tables and figures contain the following information:

- General statistics on nuclear reactors in IAEA Member States;
- Technical data on specific reactors that are either planned, under construction or operational, or that have been shut down or decommissioned;
- Performance data on reactors operating in IAEA Member States, as reported to the IAEA.

The data compiled in this publication are a product of the IAEA's Power Reactor Information System (PRIS). The PRIS database is a comprehensive source of data on all nuclear power reactors in the world. It includes specification and performance history data on operational reactors as well as on reactors under construction or in the decommissioning process. Data are collected by the IAEA via designated national correspondents in Member States.

PRIS outputs are available in the IAEA's annual publications and on the PRIS web page (<http://www.iaea.org/pris>). Detailed outputs are accessible to registered users through on-line applications. Enquiries should be addressed to:

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DEFINITIONS

Performance factors

$$\text{EAF (\%)} = \frac{(\text{REG} - \text{PEL} - \text{UEL} - \text{XEL})}{\text{REG}} \times 100$$

$$\text{UCF (\%)} = \frac{(\text{REG} - \text{PEL} - \text{UEL})}{\text{REG}} \times 100$$

$$\text{UCL (\%)} = \frac{\text{UEL}}{\text{REG}} \times 100$$

$$\text{PCL (\%)} = \frac{\text{PEL}}{\text{REG}} \times 100$$

$$\text{LF (\%)} = \frac{\text{EG}}{\text{REG}} \times 100$$

$$\text{OF (\%)} = \frac{\text{On-line hours}}{\text{Total hours}} \times 100$$

where

EAF is the energy availability factor, expressed in per cent.

UCF is the unit capability factor, expressed in per cent.

UCL is the unplanned capability loss factor, expressed in per cent.

PCL is the planned capability loss factor, expressed in per cent.

LF is the load factor, expressed in per cent.

OF is the operating factor, expressed in per cent.

REG Reference energy generation: The net electrical energy (MW·h), supplied by a unit continuously operated at the reference unit power for the duration of the entire reference period.

- PEL Planned energy loss: The energy (MW·h) that was not supplied during the period because of planned shutdowns or load reductions due to causes under plant management control. Energy losses are considered to be planned if they are scheduled at least four weeks in advance.
- UEL Unplanned energy loss: The energy (MW·h) that was not supplied during the period because of unplanned shutdowns, outage extensions, or load reductions due to causes under plant management control. Energy losses are considered to be unplanned if they are not scheduled at least four weeks in advance.
- XEL External energy loss: The energy (MW·h) that was not supplied owing to constraints beyond plant management control that reduced plant availability.
- EG The net electrical energy supplied during the reference period as measured at the unit outlet terminals after deducting the electrical energy taken by unit auxiliaries and the losses in transformers that are considered to be integral parts of the unit.

Planned reactors

The IAEA considers a reactor as planned from the date when a construction licence application has been submitted to the relevant national regulatory authorities to the construction start date.

Construction start

The date when the first major placing of concrete, usually for the base mat of the reactor building, is carried out.

First criticality

The date when the reactor is made critical for the first time.

Grid connection

The date when the plant is first connected to the electrical grid for the supply of power. After this date, the plant is considered as operational.

Commercial operation

The date when the plant is handed over by the contractors to the owner and declared officially in commercial operation.

Long term shutdown (suspended operation)

A unit is considered to be in long term shutdown if it has been shut down for an extended period (usually several years) initially without any firm recovery schedule, but with the intention to restart the unit eventually. Suspended operation is a new term for this status.

Permanent shutdown

The date when the plant is officially declared to be shut down by the owner and taken out of operation permanently.

NSSS supplier

The supplier of a power reactor unit's nuclear steam supply system.

Units and energy conversion

1 terawatt-hour (TW·h) = 10^6 megawatt-hours (MW·h)

For an average power plant,

1 TW·h = 0.39 megatonnes of coal equivalent (input),
= 0.23 megatonnes of oil equivalent (input)

TABLE 1. OVERVIEW OF POWER REACTORS AND NUCLEAR SHARE, 31 DEC. 2019

Country	Operational reactors		Reactors in long term shutdown		Reactors under construction		Nuclear electricity supplied in 2019	
	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	TW·h	% of total
ARGENTINA	3	1641			1	25	7.9	5.9
ARMENIA	1	375			2	2160	2.0	27.8
BANGLADESH					2	2220		
BELARUS								
BELGIUM	7	5930					41.4	47.6
BRAZIL	2	1884			1	1340	15.2	2.7
BULGARIA	2	2006					15.9	37.5
CANADA	19	13554					94.9	14.9
CHINA	48	45518			11	10564	330.1	4.9
CZECH REP.	6	3932					28.6	35.2
FINLAND	4	2794			1	1600	22.9	34.7
FRANCE	58	63130			1	1630	382.4	70.6
GERMANY	6	8113					NA	NA
HUNGARY	4	1902					15.4	49.2
INDIA	22	6255			7	4824	40.7	3.2
IRAN, ISL. REP.	1	915			1	974	5.9	1.8
JAPAN	33	31679			2	2653	65.7	7.5
KOREA, REP. OF	24	23172			4	5360	138.8	26.2
MEXICO	2	1552					10.9	4.5
NETHERLANDS	1	482					3.7	3.1
PAKISTAN	5	1318			2	2028	9.1	6.6
ROMANIA	2	1300					10.4	18.5
RUSSIA	38	28437			4	4525	195.5	19.7
SLOVAKIA	4	1814			2	880	14.3	53.9
SLOVENIA	1	688					5.5	37.0
SOUTH AFRICA	2	1860					13.6	6.7
SPAIN	7	7121					55.9	21.4
SWEDEN	7	7740					64.4	34.0

TABLE 1. OVERVIEW OF POWER REACTORS AND NUCLEAR SHARE, 31 DEC. 2019 — continued

Country	Operational reactors		Reactors in long term shutdown		Reactors under construction		Nuclear electricity supplied in 2019	
	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	TW·h	% of total
SWITZERLAND	4	2960					25.4	23.9
TURKEY					1	1114		
UAE					4	5380		
UK	15	8923			2	3260	51.0	15.6
UKRAINE	15	13107			2	2070	78.1	53.9
USA	96	98152			2	2234	809.4	19.7
TOTAL	443	392098			54	57441	2586.2	

Notes:

- The total includes the following data from Taiwan, China:
 - 4 units, 3844 MW(e) in operation; 2 units, 2600 MW(e) under construction;
 - 31.1 TW·h of nuclear electricity generation, representing 13.4% of the total electricity generated there.
- Nuclear electricity statistics do not include data from German reactor units, as information for these units was not submitted by the time of publication.

TABLE 2. TYPE AND NET ELECTRICAL POWER OF OPERATIONAL REACTORS, 31 DEC. 2019

Country	PWR		BWR		GCR		PHWR		LWGR		FBR		Total	
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)
ARGENTINA							3	1641					3	1641
ARMENIA	1	375											1	375
BELGIUM	7	5930											7	5930
BRAZIL	2	1884											2	1884
BULGARIA	2	2006											2	2006
CANADA							19	13554					19	13554
CHINA	45	44144					2	1354			1	20	48	45518
CZECH REP.	6	3932											6	3932
FINLAND	2	1014	2	1780									4	2794
FRANCE	58	63130											58	63130
GERMANY	5	6825	1	1288									6	8113
HUNGARY	4	1902											4	1902
HUNGARY	2	1864	2	300									4	1902
INDIA	2	1864	2	300			18	4091					22	6255
IRAN (ISL. REP.)	1	915											1	915
JAPAN	16	14120	17	17559			3	1845					33	31679
KOREA, REP. OF	21	21327	2	1552									24	23172
MEXICO													2	1552
NETHERLANDS	1	482											1	482
PAKISTAN	4	1228					1	90					5	1318
ROMANIA							2	1300					2	1300
RUSSIA	23	17774							13	9283	2	1380	38	28437
SLOVAKIA	4	1814											4	1814
SLOVENIA	1	688											1	688
SOUTH AFRICA	2	1860											2	1860
SPAIN	6	6057											7	7121
SPAIN	6	6057	1	1064									7	7121
SWEDEN	2	2179	5	5561									7	7740
SWITZERLAND	3	1740	1	1220									4	2960
UK	1	1198			14	7725							15	8923
UKRAINE	15	13107											15	13107
USA	64	64842	32	33310									96	98152
TOTAL	300	284211	65	65604	14	7725	48	23875	13	9283	3	1400	443	392098

Notes:

1. The totals include 4 units, 3844 MW(e) in Taiwan, China.
2. During 2019, 6 reactors, 5243 MW(e) were newly connected to the grid.

TABLE 3. TYPE AND NET ELECTRICAL POWER OF REACTORS UNDER CONSTRUCTION, 31 DEC. 2019

Country	PWR		BWR		PHWR		LWGR		FBR		HTGR		Total	
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)
ARGENTINA	1	25											1	25
BANGLADESH	2	2160											2	2160
BELARUS	2	2220											2	2220
BRAZIL	1	1340											1	1340
CHINA	10	10364									1	200	11	10564
FINLAND	1	1600											1	1600
FRANCE	1	1630											1	1630
INDIA	2	1834			4	2520							7	4824
IRAN, ISL. REP.	1	974							1	470			2	974
JAPAN			2	2653									2	2653
KOREA, REP. OF	4	5360											4	5360
PAKISTAN	2	2028											2	2028
RUSSIA	4	4525											4	4525
SLOVAKIA	2	880											2	880
TURKEY	1	1114											1	1114
UAE	4	5380											4	5380
UK	2	3260											2	3260
UKRAINE	2	2070											2	2070
USA	2	2234											2	2234
TOTAL	44	48998	4	5253	4	2520			1	470	1	200	54	57441

Notes:

1. The totals include 2 units (2 x BWR), 2600 MW(e) in Taiwan, China.
2. During 2019, construction started on 5 reactors, 5902 MW(e).

TABLE 4. REACTOR YEARS OF EXPERIENCE, UP TO 31 DEC. 2019

Country	Operational reactors		Reactors in long term shutdown		Permanently shut down reactors		Total Operational and shut down reactors			
	No.	Net capacity MW(e)	No.	Net capacity MW(e)	No.	Net capacity MW(e)	No.	Net capacity MW(e)	Operating experience	
									Years	Months
ARGENTINA	3	1641					3	1641	88	2
ARMENIA	1	375			1	376	2	751	45	8
BELGIUM	7	5930			1	10	8	5940	303	7
BRAZIL	2	1884					2	1884	57	3
BULGARIA	2	2006			4	1632	6	3638	167	3
CANADA	19	13554			6	2143	25	15697	769	6
CHINA	48	45518					48	45518	370	1
CZECH REP.	6	3932					6	3932	170	10
FINLAND	4	2794					4	2794	163	4
FRANCE	58	63130			12	3789	70	66919	2280	4
GERMANY	6	8113			30	18262	36	26375	846	7
HUNGARY	4	1902					4	1902	138	2
INDIA	22	6255					22	6255	526	11
IRAN, ISL. REP.	1	915					1	915	8	4
ITALY					4	1423	4	1423	80	8
JAPAN	33	31679			27	17119	60	48798	1899	6
KAZAKHSTAN					1	52	1	52	25	10
KOREA, REP. OF	24	23172			2	1237	26	24409	572	2
LITHUANIA					2	2370	2	2370	43	6
MEXICO	2	1552					2	1552	55	11
NETHERLANDS	1	482			1	55	2	537	75	5
PAKISTAN	5	1318					5	1318	82	5
ROMANIA	2	1300					2	1300	35	11
RUSSIA	38	28437			8	2107	46	30544	1334	5
SLOVAKIA	4	1814			3	909	7	2723	172	7
SLOVENIA	1	688					1	688	38	3
SOUTH AFRICA	2	1860					2	1860	70	3
SPAIN	7	7121			3	1067	10	8188	343	1

TABLE 4. REACTOR YEARS OF EXPERIENCE, UP TO 31 DEC. 2019 — continued

Country	Operational reactors		Reactors in long term shutdown		Permanently shut down reactors		Total Operational and shut down reactors			
	No.	Net capacity MW(e)	No.	Net capacity MW(e)	No.	Net capacity MW(e)	No.	Net capacity MW(e)	Operating experience Years Months	
SWEDEN	7	7740			6	3173	13	10913	467	11
SWITZERLAND	4	2960			2	379	6	3339	224	11
UK	15	8923			30	4715	45	13638	1619	7
UKRAINE	15	13107			4	3515	19	16622	518	6
USA	96	98152			37	16542	133	114694	4505	8
TOTAL	443	392098			186	82083	629	474181	18329	10

Notes:

1. The total includes the following data from Taiwan, China:
— reactors connected to the grid - 4 units, 3844 MW(e); 228 years, 8 months.
2. Operating experience is counted from the grid connection excluding any long term shutdown period.

TABLE 5. OPERATIONAL REACTORS AND NET ELECTRICAL POWER, 1990 TO 2019

Country	Number of units and net capacity as of 31 Dec. of given year															
	1990		1995		2000		2005		2010		2015		2018		2019	
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)
ARGENTINA	2	935	2	978	2	935	2	935	2	935	3	1633	3	1633	3	1641
ARMENIA	1	376	1	376	1	376	1	375	1	375	1	375	1	375	1	375
BELGIUM	7	5601	7	5712	7	5801	7	5926	7	5913	7	5913	7	5913	7	5930
BRAZIL	1	628	1	1976	2	1901	2	1884	2	1884	2	1884	2	1884	2	1884
BULGARIA	5	2585	6	3760	6	2722	4	1906	2	1966	2	1966	2	1966	2	2006
CANADA	20	13983	21	14902	14	9998	18	12584	18	12604	19	13554	19	13554	19	13554
CHINA	3	2188	3	2188	3	6587	9	10065	13	10065	31	26774	46	42858	48	45518
CZECH REP.	4	1632	4	1782	5	2611	6	3373	6	3675	6	3930	6	3932	6	3932
FINLAND	4	2310	4	2656	4	2676	4	2716	4	2752	4	2752	4	2784	4	2794
FRANCE	56	55808	56	63080	59	63260	59	63130	58	63130	58	63130	58	63130	58	63130
GERMANY	21	21250	19	20972	19	21283	17	20339	17	20490	8	10799	7	9515	6	8113
HUNGARY	4	1710	4	1729	4	1729	4	1755	4	1889	4	1889	4	1902	4	1902
INDIA	7	1324	10	1746	14	2508	15	2993	19	4189	21	5308	22	6255	22	6255
IRAN, ISL. REP.	41	30867	50	39625	52	43245	55	47593	54	46821	43	40290	38	36476	33	31679
JAPAN	1	135	1	50	16	12990	20	16810	21	18698	24	21733	24	22444	24	23172
KAZAKHSTAN	9	7220	11	9115	2	2370	1	1185	2	1360	2	1440	2	1552	2	1552
KOREA, REP. OF	2	2760	2	1256	2	1290	2	1360	2	1300	2	1440	2	1552	2	1552
MEXICO	1	640	2	510	1	449	1	450	1	482	1	482	1	482	1	482
NETHERLANDS	2	539	2	510	1	425	2	425	2	425	3	690	5	1318	5	1318
PAKISTAN	1	125	1	125	1	655	1	655	2	1300	2	1300	2	1300	2	1300
ROMANIA	29	18998	30	19848	30	19848	31	21743	32	22693	35	25413	36	27252	38	28437
RUSSIA	4	1632	4	1632	6	2442	6	2442	4	1814	4	1814	4	1814	4	1814
SLOVAKIA	1	620	1	620	1	676	1	666	1	666	1	666	1	688	1	688
SLOVENIA	2	1840	2	1840	2	1840	2	1800	2	1800	2	1860	2	1860	2	1860
SOUTH AFRICA	9	7099	9	7097	9	7468	9	7591	8	7514	7	7121	7	7121	7	7121
SPAIN	12	9826	12	10028	11	9397	10	8905	10	9303	10	9648	8	8613	7	7740
SWEDEN	5	2942	5	3056	5	3170	5	3220	5	3238	5	3333	5	3333	4	2960
SWITZERLAND	5	2942	5	3056	5	3170	5	3220	5	3238	5	3333	5	3333	4	2960

TABLE 5. OPERATIONAL REACTORS AND NET ELECTRICAL POWER, 1990 TO 2019 — continued

Country	Number of units and net capacity as of 31 Dec. of given year																	
	1990		1995		2000		2005		2010		2015		2018		2019			
	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)	No.	MW(e)		
UK	37	11360	35	12910	33	12490	23	11852	19	10137	15	8918	15	8923	15	8923		
UKRAINE	15	13020	15	13045	13	11195	15	13107	15	13107	15	13107	15	13107	15	13107		
USA	108	96228	108	98068	103	96297	103	98145	104	101211	99	99167	98	99266	96	98152		
WORLD	416	318253	434	341387	435	349984	441	368125	441	375277	441	382807	450	396618	443	392098		

Note: The world total includes the following data in Taiwan, China:

—1990: 6 units, 4828 MW(e); 1995: 6 units, 4884 MW(e); 2000: 6 units, 4884 MW(e); 2005: 6 units, 4884 MW(e); 2010: 6 units, 4982 MW(e); 2015: 6 units, 5052 MW(e); 2018: 5 units, 4448 MW(e); 2019: 4 units, 3844 MW(e).

TABLE 6. NUCLEAR ELECTRICITY PRODUCTION AND SHARE, FROM 1990 TO 2019

Country	Nuclear electricity supplied (TW-h) and percentage of nuclear share in given year															
	1990		1995		2000		2005		2010		2015		2018		2019	
	TW-h	% of total	TW-h	% of total	TW-h	% of total	TW-h	% of total	TW-h	% of total	TW-h	% of total	TW-h	% of total	TW-h	% of total
ARGENTINA	6.72	19.8	6.57	11.8	5.74	7.3	6.37	6.9	6.69	5.9	6.52	4.8	6.45	4.7	7.93	5.9
ARMENIA	40.59	60.1	39.30	55.5	45.81	56.8	2.50	42.7	2.29	39.4	2.57	34.5	1.90	25.6	2.03	27.8
BELGIUM	2.06	1.0	2.33	1.0	5.59	1.9	9.20	55.6	45.73	50.0	24.83	37.5	27.25	39.0	41.42	47.6
BRAZIL	13.51	35.7	16.22	46.4	16.79	45.0	17.38	2.5	13.77	3.1	13.89	2.8	14.79	2.7	15.22	2.7
BULGARIA	69.87	14.8	93.98	17.3	69.12	11.8	86.83	14.5	14.24	33.1	14.70	31.3	15.44	34.7	15.87	37.5
CANADA	11.77	NA	12.23	20.0	16.02	1.2	50.33	2.0	70.96	1.8	161.20	3.0	277.06	4.2	330.12	4.9
CZECH REP.	18.13	35.1	18.13	29.9	21.58	32.2	22.36	30.5	26.44	33.3	25.34	32.5	28.26	34.5	28.58	35.2
FINLAND	297.61	74.5	358.71	76.1	395.39	76.4	431.18	78.5	410.09	74.1	419.04	76.3	395.91	71.7	382.40	70.6
FRANCE	139.37	33.1	146.13	29.6	160.66	30.6	154.61	26.6	133.01	22.6	86.81	14.1	71.87	11.7	NA	NA
GERMANY	12.89	51.4	13.20	42.3	13.35	40.6	13.02	37.2	14.66	42.1	14.96	52.7	14.86	50.6	15.41	49.2
HUNGARY	5.29	2.2	6.99	1.9	14.23	3.1	15.73	2.8	20.48	2.9	34.64	3.5	35.39	3.1	40.74	3.2
INDIA	187.19	27.1	275.51	33.4	306.24	33.8	280.50	29.3	280.25	29.2	4.35	1.3	6.30	2.1	5.87	1.8
IRAN, ISL. REP.	50.26	49.1	60.21	36.1	103.54	40.7	137.59	44.7	141.89	32.2	157.20	31.7	127.08	23.7	138.81	26.2
JAPAN	15.70	NA	10.64	86.1	7.42	73.9	9.94	70.3	5.59	3.6	11.18	6.8	13.20	5.3	10.88	4.5
KAZAKHSTAN	2.78	2.6	7.53	6.0	7.92	3.9	10.32	5.0	3.75	3.4	3.86	3.7	3.34	3.1	3.70	3.2
KOREA, REP. OF	3.29	4.9	3.78	4.9	3.70	4.3	3.77	3.9	2.56	2.6	4.33	4.4	9.29	6.8	9.07	6.6
LITHUANIA	0.38	1.1	0.46	0.9	0.90	1.7	2.41	2.8	10.70	19.5	10.71	17.3	10.46	17.2	10.37	18.5
MEXICO	109.62	NA	11.8	11.8	120.10	15.0	137.54	15.8	159.41	17.1	182.81	18.6	191.34	17.9	195.54	19.7
NETHERLANDS	11.16	NA	11.35	44.1	15.17	53.4	16.34	56.1	13.54	51.8	14.08	55.9	13.79	55.0	14.28	53.9
PAKISTAN	4.39	NA	4.57	39.5	4.55	37.4	5.61	42.4	5.38	37.3	5.37	38.0	5.49	35.9	5.53	37.0
ROMANIA	8.47	5.6	11.29	6.5	13.00	6.6	12.24	5.5	12.90	5.2	10.97	4.7	10.59	4.7	13.60	6.7
RUSSIA	51.98	35.9	53.49	34.1	59.49	27.6	54.99	19.6	59.26	20.1	54.76	20.3	53.36	20.4	55.86	21.4
SLOVAKIA	65.27	45.9	67.17	46.6	54.81	39.0	69.58	44.9	55.73	38.1	54.46	34.3	65.87	40.3	64.43	34.0
SLOVENIA	22.40	42.6	23.58	39.9	25.05	38.2	22.11	38.0	25.34	38.0	22.16	33.5	24.50	37.7	25.37	23.9
SOUTH AFRICA																
SPAIN																
SWEDEN																
SWITZERLAND																

TABLE 6. NUCLEAR ELECTRICITY PRODUCTION AND SHARE, FROM 1990 TO 2019 — continued

Country	Nuclear electricity supplied (TW·h) and percentage of nuclear share in given year															
	1990		1995		2000		2005		2010		2015		2018		2019	
	TW·h	% of total	TW·h	% of total	TW·h	% of total	TW·h	% of total	TW·h	% of total	TW·h	% of total	TW·h	% of total	TW·h	% of total
UK	58.77	19.7	70.64	25.4	72.99	21.9	75.34	20.0	56.85	15.6	63.89	18.9	59.11	17.7	51.03	15.6
UKRAINE	71.26	NA	65.78	37.8	72.56	47.3	83.40	48.5	83.95	48.1	82.41	56.5	79.53	53.0	78.14	53.9
USA	578.08	20.6	673.52	22.5	755.55	19.8	783.35	19.3	807.08	19.6	798.01	19.5	808.03	19.3	809.36	19.7
WORLD	1890.35		2190.94		2443.85		2626.34		2629.82		2441.34		2562.76		2586.16	

Notes:

- The world total includes the following data from Taiwan, China:
 - 1990: 31.54 TW·h of nuclear electricity generation, representing 38.32% of the total electricity generated there;
 - 1995: 33.8 TW·h of nuclear electricity generation, representing 28.79% of the total electricity generated there;
 - 2000: 37 TW·h of nuclear electricity generation, representing 21.19% of the total electricity generated there;
 - 2005: 38.4 TW·h of nuclear electricity generation, representing 17.93% of the total electricity generated there;
 - 2010: 39.89 TW·h of nuclear electricity generation, representing 19.3% of the total electricity generated there;
 - 2015: 35.14 TW·h of nuclear electricity generation, representing 16.32% of the total electricity generated there;
 - 2018: 26.66 TW·h of nuclear electricity generation, representing 11.43% of the total electricity generated there;
 - 2019: 31.15 TW·h of nuclear electricity generation, representing 13.4% of the total electricity generated there.
- In 2019, nuclear electricity supply does not include data from German reactor units, as information for these units was not submitted by the time of publication.

TABLE 7. ANNUAL CONSTRUCTION STARTS AND CONNECTIONS TO THE GRID, 1954 TO 2019

Year	Construction starts		Connections to the grid		Operational reactors	
	Number of units	Design capacity (MW(e))	Number of units	Design capacity (MW(e))	Number of units	Updated capacity (MW(e))
1954	1	60	1	5	1	5
1955	8	260			1	5
1956	5	577	1	35	2	65
1957	13	1836	3	119	5	209
1958	6	476	1	35	6	269
1959	7	976	5	176	11	548
1960	11	1010	4	438	15	1087
1961	7	1529	1	15	16	1104
1962	8	1379	9	955	25	2223
1963	5	1722	9	500	33	2677
1964	9	2932	8	1022	40	3686
1965	9	3291	8	1879	48	5910
1966	15	7052	8	1528	55	7539
1967	25	16287	11	2165	64	9595
1968	37	26859	7	1086	69	10648
1969	13	9277	10	3670	78	14121
1970	37	25489	6	3410	84	17656
1971	18	12623	16	7711	99	24320
1972	28	21163	16	8880	113	32797
1973	30	24627	20	12727	132	43761
1974	38	35230	26	17149	154	61021
1975	38	36434	15	10236	169	70414
1976	43	41729	19	14232	186	83992
1977	23	21849	18	13199	199	96202
1978	23	21735	20	15782	218	111740
1979	27	23007	8	6909	225	117814
1980	20	19084	21	15088	245	133037
1981	17	16029	23	20352	267	153832
1982	19	19815	19	15313	284	168317
1983	14	11286	23	19244	306	187756
1984	13	11332	33	30980	336	218452
1985	19	15337	33	31061	363	245779
1986	8	7286	27	27134	389	272074
1987	13	11202	22	22191	407	295812
1988	7	7722	14	13574	416	305212
1989	6	4018	12	10536	420	311942
1990	5	3267	10	10543	416	318253
1991	2	2246	4	3719	415	321924
1992	3	3094	6	4809	418	325261
1993	4	3515	9	9012	427	333914
1994	2	1334	5	4302	429	336904
1995			5	3536	434	341387
1996	1	610	6	7080	438	347281
1997	5	4410	3	3557	434	347880
1998	3	2150	4	2973	430	344900
1999	4	4540	4	2729	432	347353
2000	7	5356	6	3063	435	349984
2001	1	1304	3	2696	438	352715
2002	6	3440	6	5049	439	357481
2003	1	202	2	1627	437	359827
2004	2	1336	5	4785	438	364673
2005	3	2907	4	3823	441	368125
2006	4	3444	2	1492	435	369581
2007	8	6640	3	1842	439	371707
2008	10	10588			438	371557
2009	12	13626	2	1068	437	370697
2010	16	15968	5	3776	441	375277
2011	4	1888	7	4013	435	368921
2012	7	7054	3	2963	437	373245
2013	10	11344	4	4060	434	371775
2014	3	2480	5	4660	438	376262
2015	8	8481	10	9450	441	382807
2016	3	3014	10	9531	447	390491
2017	4	4254	4	3373	448	391721
2018	5	6339	9	10323	450	396618
2019	5	6021	6	5174	443	392098

TABLE 8. NUMBER OF NEW REACTORS CONNECTED TO THE GRID AND MEDIAN CONSTRUCTION TIME IN MONTHS

Country	1986 to 1990	1991 to 1995	1996 to 2000	2001 to 2005	2006 to 2010	2011 to 2015	2016 to 2018	2019
	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months
ARGENTINA						1		
BRAZIL	1 89	1 113	1 176					
BULGARIA	5 101	2 97						
CANADA		3 73		6 59	4 68	18 67	15 68	2 89
CHINA	3 93		1 167	1 191				
CZECH REP.	15 86	3 93	4 124					
FRANCE	6 103							
GERMANY	2 90							
HUNGARY	1 152	3 120	4 122	1 64	4 81	2 123	1 170	
IRAN, ISL. REP.						1 222		
JAPAN	8 49	10 46	3 42	4 47	1 53			
KOREA, REP. OF	4 62	2 61	5 56	4 54	1 51	3 56	1 88	1 117
LITHUANIA	1 116							
MEXICO	1 151	1 210						
PAKISTAN			1 83			1 64	2 67	
ROMANIA			1 169		1 161			
RUSSIA	4 72	1 109		2 233	1 323	3 108	3 99	3 153
SLOVAKIA			2 150					
SPAIN	2 96							
UK	4 98	1 80						
UKRAINE	6 58	1 113		2 227				
USA	22 146	1 221	1 272				1 250	
TOTAL	85 93	29 82	23 121	20 59	12 77	29 68	23 81	6 118

Note: Construction time is measured from the first pouring of concrete to the connection of the unit to the grid.

TABLE 9. CONSTRUCTION STARTS DURING 2019

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation
	Code	Name			Thermal	Gross					
CHINA	CN -61	TAIPINGLING-1	PWR	HPR1000	3190	1200	HZNP	DEC	2019-12	—	—
	CN -57	ZHANGZHOU-1	PWR	HPR1000	3180	1212	ZGZEC	CFHI	2019-10	—	—
IRAN, ISL. REP.	IR -2	BUSHEHR-2	PWR	V-528 VVER-100	3012	1057	NPPDCO	JSC ASE	2019-9	—	—
RUSSIA	RU -189	KURSK 2-2	PWR	VVER V-510K	3300	1255	REA	AEM	2019-4	2023-12	2024-8
UK	GB -25B	HINKLEY POINT C-2	PWR	EPR-1750	4524	1720	EDF-CGN	AREVA	2019-12	—	—

Note: During 2019, construction started on 5 reactors (6021 MW(e)).

TABLE 10. CONNECTIONS TO THE GRID DURING 2019

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	First criticality	Grid connection
	Code	Name			Thermal	Gross					
CHINA	CN -33	TAISHAN-2	PWR	EPR-1750	4590	1750	TNPJVC	AREVA	2010-4	2019-5	2019-6
	CN -48	YANGJIANG-6	PWR	ACPR-1000	2905	1086	YJNPC	CFHI	2013-12	2019-6	2019-6
KOREA, REP. OF	KR -26	SHIN-KORI-4	PWR	APR-1400	3983	1455	KHNP	DHICKOPC	2009-8	2019-4	2019-4
RUSSIA	RU -151	AKADEMIK LOMONOSOV-1	PWR	KL-T-40S Float	150	35	REA	AEM	2007-4	2018-11	2019-12
	RU -152	AKADEMIK LOMONOSOV-2	PWR	KL-T-40S Float	150	35	REA	AEM	2007-4	2018-11	2019-12
	RU -162	NOVOVORONEZH 2-2	PWR	VVER V-392M	3200	1181	REA	AEM	2009-7	2019-3	2019-5

Note: During 2019, 6 reactors (5174 MW(e)) were newly connected to the grid.

TABLE 11. SCHEDULED CONNECTIONS TO THE GRID DURING 2020

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	First criticality	Grid date
	Code	Name		Thermal	Gross	Net					
SLOVAKIA	SK-10	MOCHOVCE-3	PWR	1375	471	440	SE	SKODA	1987-1	2020-11	2020-12

Note: During 2020, 1 reactor (440 MW(e)) is expected to achieve connection to grid.

TABLE 12. REACTORS PLANNED FOR CONSTRUCTION AS KNOWN ON 31 DEC. 2019

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Expected construction start
	Code	Name			Thermal	Gross			
CHINA	CN-73	BAMAOSHAN	PWR	CPR-1000	2905	1080			—
	CN-97	CHANGJIANG-3	PWR		1930	650			—
	CN-58	CHANGJIANG-4	PWR		1930	650			—
	CN-59	FANGCHENGANG-5	PWR						—
	CN-60	FANGCHENGANG-6	PWR						—
	CN-85	GUOHE-1	PWR	CAP-1400	4040	1534	SNPDP		—
	CN-86	GUOHE-2	PWR	CAP-1400	4040	1534	SNPDP		—
	CN-76	HAIYANG-3	PWR	AP-1000	3415	1253	SDNPC	WH	—
	CN-77	HAIYANG-4	PWR	AP-1000	3415	1253	SDNPC	WH	—
	CN-80	HONGSHIDING-1	PWR						—
	CN-81	HONGSHIDING-2	PWR	ACPR1000		0		DEC	—
	CN-85	JIYANG-1	PWR						—
	CN-66	JIYANG-2	PWR						—
	CN-67	JIYANG-3	PWR						—
	CN-68	JIYANG-4	PWR						—
	CN-87	LUFENG-1	PWR						—
	CN-88	LUFENG-2	PWR	CPR-1000			LFNPC		—
	CN-901	PENGZE-1	PWR	CPR-1000			LFNPC		—
	CN-62	PENGZE-2	PWR						—
	CN-63	PENGZE-3	PWR						—
CN-64	PENGZE-4	PWR						—	
CN-78	SANMEN-3	PWR						—	
CN-79	SANMEN-4	PWR	AP-1000	3400	1251	SMNPC	WH/MHI	—	
CN-71	SANMING-1	FBR	BN-800	2100	860	FSNPC	WH/MHI	—	
CN-72	SANMING-2	FBR	BN-800	2100	860	FSNPC		—	
CN-74	TAOHUAIJIANG-1	PWR						—	
CN-75	TAOHUAIJIANG-2	PWR						—	
CN-69	XIANNING-1	PWR						—	
CN-70	XIANNING-2	PWR						—	

TABLE 12. REACTORS PLANNED FOR CONSTRUCTION AS KNOWN ON 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Expected construction start
	Code	Name			Thermal	Gross			
CHINA	CN-82	XUDABU-1	PWR	CPR-1000	2905	1080	LNPC	DEC	—
	CN-83	XUDABU-2	PWR	CPR-1000	2905	1080	LNPC	DEC	—
FINLAND	FI -6	HANHIKIVI-1	PWR	VVER V-522	3200	1200	FV	AEM	—
HUNGARY	HU -5	PAKS-5	PWR	VVER V-527	3200	1285	PAKS II	AEM	—
	HU -6	PAKS-6	PWR	VVER V-527	3200	1265	PAKS II	AEM	—
INDIA	IN -33	GORAKHPUR-1	PHWR	PHWR-700	700	700	NPCIL	—	—
	IN -34	GORAKHPUR-2	PHWR	PHWR-700	700	700	NPCIL	—	—
IRAN, ISL. REP.	IR -5	BUSHEHR-3	PWR	VVER V-528	3000	1000	NPPDCO	JSC ASE	—
	IR -9	DARKHOVAIN	PWR	IR-360	1113	360	NPPDCO	—	—
JAPAN	JP -76	HAMAOKA-6	BWR	ABWR	3926	1400	CHUBU	—	—
	JP -69	HIGASHI DORI-1 (TEPCO)	BWR	ABWR	3926	1385	TEPCO	H/G	—
	JP -74	HIGASHI DORI-2 (TEPCO)	BWR	ABWR	3926	1385	TEPCO	—	—
	JP -72	HIGASHI DORI-2 (TOHOKU)	BWR	ABWR	3926	1067	TOHOKU	—	—
	JP -62	KAMINOSEKI-1	BWR	ABWR	3926	1373	CHUGOKU	—	—
	JP -63	KAMINOSEKI-2	BWR	ABWR	3926	1373	CHUGOKU	—	—
	JP -75	SENDAI-3	PWR	APWR	4466	1590	KYUSHU	—	—
	JP -67	TSURUGA-3	PWR	APWR	4466	1538	JAPCO	MHI	—
RUSSIA	JP -68	TSURUGA-4	PWR	APWR	4466	1538	JAPCO	MHI	—
	RU -171	BALTIC-2	PWR	VVER V-491	3200	1194	REA	AEM	—
RU -202	BASHKIR-1	PWR	VVER V-510	3300	1255	REA	AEM	—	
RU -203	BASHKIR-2	PWR	VVER V-510	3300	1255	REA	AEM	—	
RU -207	BELOYARSK-5	FBR	BN-1200	3000	1220	0	REA	AEM	—
RU -177	CENTRAL-1	PWR	VVER V-510	3300	1255	0	REA	AEM	—
RU -178	CENTRAL-2	PWR	VVER V-510	3300	1255	0	REA	AEM	—

TABLE 12. REACTORS PLANNED FOR CONSTRUCTION AS KNOWN ON 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Expected construction start	
	Code	Name			Thermal	Gross				Net
RUSSIA	RU-175	KOLA 2-1	PWR	-	3200	1200	REA	AEM	-	
	RU-176	KOLA 2-2	PWR	-	3200	1200	REA	AEM	-	
	RU-190	KURSK 2-3	PWR	VVER V-510K	3300	1255	REA	AEM	-	
	RU-191	KURSK 2-4	PWR	VVER V-510K	3300	1255	REA	AEM	-	
	RU-165	LENINGRAD 2-3	PWR	VVER V-491	3200	1199	REA	AEM	-	
	RU-167	LENINGRAD 2-4	PWR	VVER V-491	3200	1199	REA	AEM	-	
	RU-181	NIZHEGORODSK-1	PWR	VVER V-510	3300	1255	REA	AEM	-	
	RU-182	NIZHEGORODSK-2	PWR	VVER V-510	3300	1255	REA	AEM	-	
	RU-187	SEVERSK-1	PWR	VVER V-510	3300	1255	REA	AEM	-	
	RU-188	SEVERSK-2	PWR	VVER V-510	3300	1255	REA	AEM	-	
	RU-198	SMOLENSK 2-1	PWR	VVER V-510	3300	1255	REA	AEM	-	
	RU-199	SMOLENSK 2-2	PWR	VVER V-510	3300	1255	REA	AEM	-	
	RU-204	SOUTH URALS-1	FBR	BN-1200	3000	1220	REA	AEM	-	
	RU-205	SOUTH URALS-2	FBR	BN-1200	3000	1220	REA	AEM	-	
	TURKEY	TR-2	AKKUYU-2	PWR	VVER V-509	3200	1200	ANC	AEM	-
		TR-3	AKKUYU-3	PWR	VVER V-509	3200	1200	ANC	AEM	-
		TR-4	AKKUYU-4	PWR	VVER V-509	3200	1200	ANC	AEM	-
		US-5033	FERMI-3	BWR	ESBWR	4500	1600	1520	AEM	-
	USA	US-5017	NORTH ANNA-3	PWR	US-APWR	3926	1400	1350	AEM	-
		US-5012	SOUTH TEXAS-3	BWR	ABWR	3926	1400	1350	AEM	-
US-5013		SOUTH TEXAS-4	BWR	ABWR	3926	1400	1350	AEM	-	
US-5040		TURKEY POINT-6	PWR	AP-1000	3750	1250	1117	AEM	-	
US-5041		TURKEY POINT-7	PWR	AP-1000	3750	1250	1117	AEM	-	
US-5018		WILLIAM STATES LEE III-1	PWR	AP-1000	3750	1250	1117	AEM	-	
US-5019		WILLIAM STATES LEE III-2	PWR	AP-1000	3750	1250	1117	AEM	-	
US-5018		WILLIAM STATES LEE III-2	PWR	AP-1000	3750	1250	1117	AEM	-	

Note: Status as of 31 December 2019, 78 reactors (69471 MW(e)) were known as planned.

TABLE 13. REACTORS UNDER CONSTRUCTION, 31 DEC. 2019

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	First criticality	Grid connection	Commercial operation	
	Code	Name			Thermal	Gross							Net
ARGENTINA	AR -4	CAREM25	PWR	CAREM Prototype	100	29	25	CNEA	2014-2	—	—	—	
BANGLADESH	BD -1	ROOPPUR-1	PWR	VVER V-523	3200	1200	1080	NPCBL	2017-11	—	—	—	
	BD -2	ROOPPUR-2	PWR	VVER V-523	3200	1200	1080	NPCBL	2018-7	—	—	—	
BELARUS	BY -1	BELARUSIAN-1	PWR	VVER V-491	3200	1194	1110	BelNPP	2013-11	—	—	—	
	BY -2	BELARUSIAN-2	PWR	VVER V-491	3200	1194	1110	BelNPP	2014-4	—	—	—	
BRAZIL	BR -3	ANGRA-3	PWR	PRE KONVOI	3900	1405	1340	ELETRONU KWU	2010-6	2025-9	2025-9	2026-1	
CHINA	CN -55	FANGCHENGANG-3	PWR	HPR1000	3150	1180	1000	GFNPC	2015-12	—	—	—	
	CN -56	FANGCHENGANG-4	PWR	HPR1000	3150	1180	1000	GFNPC	2016-12	—	—	—	
	CN -51	FUQING-5	PWR	HPR1000	3060	1150	1000	FQNP	2015-5	—	—	—	
	CN -52	FUQING-6	PWR	HPR1000	3060	1150	1000	FQNP	2015-5	—	—	—	
	CN -49	HONGYANHE-5	PWR	ACPR-1000	2905	1119	1061	LHNPC	2015-3	—	—	—	
	CN -50	HONGYANHE-6	PWR	ACPR-1000	2905	1119	1061	LHNPC	2015-7	—	—	—	
	CN -44	SHIDAO BAY-1	HTGR	HTR-PM	500	211	200	HSNPC	2012-12	—	—	—	
	CN -61	TAIPINGLING-1	PWR	HPR1000	3190	1200	1116	HZNP	2019-12	—	—	—	
	CN -53	TIANWAN-5	PWR	CNP-1000	2905	1118	1000	JNPC	2015-12	—	—	—	
	CN -54	TIANWAN-6	PWR	CNP-1000	2905	1118	1000	JNPC	2016-9	—	—	—	
	CN -57	ZHANGZHOU-1	PWR	HPR1000	3180	1212	1126	ZGZEC	2019-10	—	—	—	
	FINLAND	FI -5	OLKILUOTO-3	PWR	EPR	4300	1720	1600	TVO	2005-8	—	—	2020-1
	FRANCE	FR -74	FLAMANVILLE-3	PWR	EPR	4300	1650	1630	EDF	2007-12	—	—	—
INDIA	IN -30	KAKRAPAR-3	PHWR	PHWR-700	2166	700	630	NPCIL	2010-11	—	—	—	
	IN -31	KAKRAPAR-4	PHWR	PHWR-700	2166	700	630	NPCIL	2010-11	—	—	—	
	IN -35	KUDANKULAM-3	PWR	VVER V-412	3000	1000	917	NPCIL	2017-6	2022-9	—	2023-3	

TABLE 13. REACTORS UNDER CONSTRUCTION, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	First criticality	Grid connection	Commercial operation
	Code	Name			Thermal	Gross						
INDIA	IN-36	KUDANKULAM-4	PWR	VVERV-412	3000	1000	917	JSC ASE	2017-10	2023-5	—	2023-11
	IN-29	PFBR	FBR	Prototype	1253	500	470	BHAVINI	2004-10	—	—	—
	IN-21	RAJASTHAN-7	PHWR	Horizontal Pre	2177	700	630	NPCIL	2011-7	—	—	—
	IN-22	RAJASTHAN-8	PHWR	Horizontal Pre	2177	700	630	NPCIL	2011-9	—	—	—
IRAN, ISL. REP.	IR-2	BUSHEHR-2	PWR	V-528 VVER-100	3012	1057	974	JSC ASE	2019-9	—	—	—
JAPAN	JP-66	OHMA	BWR	ABWR	3926	1383	1328	EPDC	2010-5	—	—	—
	JP-65	SHIMANE-3	BWR	ABWR	3926	1373	1325	CHUGOKU HITACHI	2007-10	—	—	—
KOREA, REP. OF	KR-27	SHIN-HANUL-1	PWR	APR-1400	3983	1400	1340	KHNP	2012-7	—	—	—
	KR-28	SHIN-HANUL-2	PWR	APR-1400	3983	1400	1340	KHNP	2013-6	—	—	—
	KR-29	SHIN-KORI-5	PWR	APR-1400	3983	1400	1340	KHNP	2017-4	—	—	—
	KR-30	SHIN-KORI-6	PWR	APR-1400	3983	1400	1340	KHNP	2018-9	—	—	—
	PK-6	KANUPP-2	PWR	ACP-1000	3060	1100	1014	PAEC	2015-8	2020-6	2020-7	2020-7
RUSSIA	PK-7	KANUPP-3	PWR	ACP-1000	3060	1100	1014	PAEC	2016-5	—	—	—
	RU-170	BALTIC-1	PWR	VVER V-491	3200	1194	1109	REA	2012-2	—	—	—
	RU-166	KURSK 2-1	PWR	VVER V-510K	3300	1255	1175	REA	2018-4	—	2022-6	2023-9
	RU-189	KURSK 2-2	PWR	VVER V-510K	3300	1255	1175	REA	2019-4	—	2023-12	2024-8
	RU-164	LENINGRAD 2-2	PWR	VVER V-491	3200	1150	1066	REA	2010-4	2021-11	2021-12	2022-1
	SK-10	MOCHOVCE-3	PWR	VVER V-213	1375	471	440	SE	1987-1	2020-8	2020-8	2020-11
SLOVAKIA	SK-11	MOCHOVCE-4	PWR	VVER V-213	1375	471	440	SE	1987-1	2022-2	2022-2	2022-4
	TR-1	AKKUYU-1	PWR	VVER V-509	3200	1200	1114	ANC	2018-4	—	—	—
UAE	AE-01	BARAKAH-1	PWR	APR-1400	3983	1400	1345	NAWAH KEPCO	2012-7	—	—	—
	AE-02	BARAKAH-2	PWR	APR-1400	3983	1400	1345	NAWAH KEPCO	2013-4	—	—	—

TABLE 13. REACTORS UNDER CONSTRUCTION, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Construction start	First criticality	Grid connection	Commercial operation
	Code	Name			Thermal	Gross	Net						
UAE	AE -03	BARAKAH-3	PWR	APR-1400	3983	1400	1345	NAWAH	KEPCO	2014-9	—	—	—
	AE -04	BARAKAH-4	PWR	APR-1400	3983	1400	1345	NAWAH	KEPCO	2015-7	—	—	—
UK	GB -25A	HINKLEY POINT C-1	PWR	EPR-1750	4524	1720	1630	EDF-CGN	AREVA	2018-12	—	—	—
	GB -25B	HINKLEY POINT C-2	PWR	EPR-1750	4524	1720	1630	EDF-CGN	AREVA	2019-12	—	—	—
UKRAINE	UA -51	KHMELNITSKI-3	PWR	VVER	3132	1089	1035	NNEGC	JSC ASE	1986-3	—	—	—
	UA -52	KHMELNITSKI-4	PWR	VVER	3132	1089	1035	NNEGC	JSC ASE	1987-2	—	—	—
USA	US -5025	VOGTLE-3	PWR	AP-1000	3400	1250	1117	SOUTHERN WH	WH	2013-3	—	—	—
	US -5026	VOGTLE-4	PWR	AP-1000	3400	1250	1117	SOUTHERN WH	WH	2013-11	—	—	—

Note: Status as of 31 December 2019. 54 reactors (57441 MW(e)) were under construction, including 2 units (2600 MW(e)) in Taiwan, China.

TAIWAN, CHINA	TW -7	LUNGMEN 1	BWR	ABWR	3926	1350	1300	TPC	GE	1989-3	—	—	—
TAIWAN, CHINA	TW -8	LUNGMEN 2	BWR	ABWR	3926	1350	1300	TPC	GE	1999-8	—	—	—

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical appliances	
	Code	Name			Thermal	Gross									Net
ARGENTINA	AR-1	ATUCHA-1	PHWR	PHWR KWU	1179	362	340	NASA	1968-6	1974-3	1974-6	81.6	81.8	-	
	AR-3	ATUCHA-2	PHWR	PHWR KWU	2160	745	693	NASA	1981-7	2014-6	2016-5	56.8	56.8	-	
	AR-2	EMBALSE	PHWR	CANDU 6	2064	656	608	NASA	1974-4	1983-4	1984-1	54.8	54.9	-	
ARMENIA	AM -19	ARMENIAN-2	PWR	WER V-270	1375	408	375	ANPPCJSC	1975-7	1980-1	1980-5	66.9	68.8	-	
BELGIUM	BE-2	DOEL-1	PWR	WH 2LP	1311	454	445	EBL+EDF	1969-7	1974-8	1975-2	80.9	81.3	-	
	BE-4	DOEL-2	PWR	WH 2LP	1311	454	433	EBL+EDF	1971-9	1975-8	1975-12	80.9	81.4	-	
	BE-5	DOEL-3	PWR	WH 3LP	3054	1056	1006	FRAMACEG	1975-1	1982-6	1982-10	58.2	58.4	-	
	BE-7	DOEL-4	PWR	WH 3LP	2988	1090	1038	FRAMACEG	1978-12	1985-4	1985-7	82.7	83.0	-	
	BE-3	TIHANGE-1	PWR	Framatome 3 lo	2873	1009	962	EBL	1970-6	1975-3	1975-10	74.4	75.4	-	
	BE-6	TIHANGE-2	PWR	WH 3LP	3064	1055	1008	EBL	FRAMACEG	1976-4	1982-10	1983-6	60.2	60.4	-
	BE-8	TIHANGE-3	PWR	WH 3LP	3000	1089	1038	EBL	ACECOWEI	1978-11	1985-6	1985-9	84.1	85.0	-
	BR-1	ANGRA-1	PWR	WH 2LP	1882	640	609	ELETRONU WH	1971-5	1982-4	1985-1	84.7	84.9	-	
BR-2	ANGRA-2	PWR	PRE KONVOI	3764	1350	1275	ELETRONU KWU	1976-1	2000-7	2001-2	90.7	91.3	-		
BULGARIA	BG-5	KOZLODUY-5	PWR	WER V-320	3000	1000	1003	KOZNPP	1980-7	1987-11	1988-12	88.0	88.4	DH	
	BG-6	KOZLODUY-6	PWR	WER V-320	3120	1040	1003	KOZNPP	1982-4	1991-8	1993-12	87.6	88.3	DH	
CANADA	CA-8	BRUCE-1	PHWR	CANDU 791	2620	830	760	BRUCEPOW OHIAECL	1971-6	1977-1	1977-9	87.5	87.5	-	
	CA-9	BRUCE-2	PHWR	CANDU 791	2620	830	760	BRUCEPOW OHIAECL	1970-12	1976-9	1977-9	87.4	87.5	-	
	CA-10	BRUCE-3	PHWR	CANDU 750A	2550	830	750	BRUCEPOW OHIAECL	1972-7	1977-12	1978-2	76.1	76.3	-	
	CA-11	BRUCE-4	PHWR	CANDU 750A	2550	830	750	BRUCEPOW OHIAECL	1972-9	1978-12	1979-1	82.3	82.4	-	
	CA-18	BRUCE-5	PHWR	CANDU 750B	2832	872	817	BRUCEPOW OHIAECL	1978-6	1984-12	1985-3	88.5	88.7	-	
	CA-19	BRUCE-6	PHWR	CANDU 750B	2690	891	817	BRUCEPOW OHIAECL	1978-1	1984-6	1984-9	89.4	89.6	-	
	CA-20	BRUCE-7	PHWR	CANDU 750B	2832	872	817	BRUCEPOW OHIAECL	1979-5	1986-2	1986-4	88.1	88.2	-	
	CA-21	BRUCE-8	PHWR	CANDU 750B	2690	872	817	BRUCEPOW OHIAECL	1979-8	1987-3	1987-5	88.4	88.5	-	
	CA-22	DARLINGTON-1	PHWR	CANDU 850	2776	934	878	OPG	1982-4	1990-12	1992-11	87.0	87.9	-	

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applics		
	Code	Name			Thermal	Gross									Net	
CANADA	CA-23	DARLINGTON-2	PHWR	CANDU 850	2776	934	878	OPG	OHI/AECL	1981-9	1990-1	1990-10	59.3	60.0	-	
	CA-24	DARLINGTON-3	PHWR	CANDU 850	2776	934	878	OPG	OHI/AECL	1984-9	1992-12	1993-2	88.5	89.3	-	
	CA-25	DARLINGTON-4	PHWR	CANDU 850	2776	934	878	OPG	OHI/AECL	1985-7	1993-4	1993-6	85.2	85.9	-	
	CA-4	PICKERING-1	PHWR	CANDU 500A	1744	542	515	OPG	OHI/AECL	1986-6	1971-4	1971-7	72.9	73.4	-	
	CA-7	PICKERING-4	PHWR	CANDU 500A	1744	542	515	OPG	OHI/AECL	1988-5	1973-5	1973-6	74.4	74.8	-	
	CA-13	PICKERING-5	PHWR	CANDU 500B	1744	540	516	OPG	OHI/AECL	1974-11	1982-12	1983-5	76.4	77.4	-	
	CA-14	PICKERING-6	PHWR	CANDU 500B	1744	540	516	OPG	OHI/AECL	1983-11	1983-11	1984-2	81.8	82.7	-	
	CA-15	PICKERING-7	PHWR	CANDU 500B	1744	540	516	OPG	OHI/AECL	1975-10	1984-11	1985-1	78.5	79.1	-	
	CA-16	PICKERING-8	PHWR	CANDU 500B	1744	540	516	OPG	OHI/AECL	1976-3	1986-1	1986-2	74.5	75.0	-	
	CA-17	POINT LEPREAU	PHWR	CANDU 6	2180	705	660	NBEPCC	AECL	1975-5	1982-9	1983-2	57.9	57.9	-	
	CHINA	CN-84	CEFR	FBR	BN-20	65	25	20	CIAE	IZ	2000-5	2011-7	—	—	—	-
		CN-36	CHANGJIANG-1	PWR	CNP-600	1930	650	601	HNPC	DEC	2010-4	2015-11	2015-12	87.2	87.2	-
		CN-37	CHANGJIANG-2	PWR	CNP-600	1930	650	601	HNPC	DEC	2010-11	2016-6	2016-8	87.5	87.5	-
		CN-2	DAYA BAY-1	PWR	M310	2905	984	944	DNMC	FRAM	1987-8	1993-8	1994-2	90.6	90.7	-
		CN-3	DAYA BAY-2	PWR	M310	2905	984	944	DNMC	FRAM	1988-4	1994-2	1994-5	90.6	90.7	-
		CN-38	FANGCHENGANG-1	PWR	CPR-1000	2905	1086	1000	GFNPC	DEC	2010-7	2015-10	2016-1	91.6	91.7	-
		CN-39	FANGCHENGANG-2	PWR	CPR-1000	2905	1086	1000	GFNPC	DEC	2010-12	2016-7	2016-10	91.5	91.5	-
CN-24		FANGJASHAN-1	PWR	CPR-1000	2905	1089	1012	GNPC	NPIC	2008-12	2014-11	2014-12	90.9	91.4	-	
CN-25		FANGJASHAN-2	PWR	CPR-1000	2905	1089	1012	GNPC	NPIC	2009-7	2015-1	2015-2	90.8	91.1	-	
CN-20		FUJING-1	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2008-11	2014-8	2014-11	87.9	88.0	-	
CN-21		FUJING-2	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2009-6	2015-8	2015-10	88.4	88.6	-	
CN-42		FUJING-3	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2010-12	2016-9	2016-10	89.3	89.5	-	
CN-43		FUJING-4	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2012-11	2017-7	2017-9	86.3	86.5	-	
CN-30		HAYANG-1	PWR	AP-1000	3415	1250	1170	SDNPC	WH	2009-9	2018-10	2018-10	96.1	96.9	-	
CN-31		HAYANG-2	PWR	AP-1000	3415	1250	1170	SDNPC	WH	2010-6	2018-10	2019-1	97.4	98.4	-	
CN-16		HONGYANHE-1	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2007-8	2013-2	2013-6	87.4	88.2	-	
CN-17		HONGYANHE-2	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2008-3	2013-11	2014-5	84.9	85.9	-	
CN-26		HONGYANHE-3	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2009-3	2015-3	2015-8	88.0	89.3	-	
CN-27		HONGYANHE-4	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2009-8	2016-4	2016-6	88.6	89.7	-	

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies	
	Code	Name			Thermal	Gross									Net
CHINA	CN-6	LING AO-1	PWR	M310	2905	990	950	DNMC	1997-5	2002-2	2002-5	90.6	91.0	-	
	CN-7	LING AO-2	PWR	M310	2905	990	950	DNMC	1997-11	2002-9	2003-1	91.5	91.9	-	
	CN-12	LING AO-3	PWR	CPR-1000	2905	1086	1007	DNMC	2005-12	2010-7	2010-9	87.9	88.2	-	
	CN-13	LING AO-4	PWR	CPR-1000	2905	1086	1007	DNMC	2006-6	2011-5	2011-8	89.8	90.1	-	
	CN-18	NINGDE-1	PWR	CPR-1000	2905	1089	1018	NDNP	2008-2	2012-12	2013-4	86.8	86.9	-	
	CN-19	NINGDE-2	PWR	CPR-1000	2905	1089	1018	SHE	2008-11	2014-1	2014-5	90.3	90.3	-	
	CN-34	NINGDE-3	PWR	CPR-1000	2905	1089	1018	NDNP	2010-1	2015-3	2015-6	90.4	90.4	-	
	CN-35	NINGDE-4	PWR	CPR-1000	2905	1089	1018	NDNP	2010-9	2016-3	2016-7	92.6	92.6	-	
	CN-4	QINSHAN 2-1	PWR	CNP-600	1930	650	610	NPQJVC	1996-6	2002-2	2002-4	87.5	87.6	-	
	CN-5	QINSHAN 2-2	PWR	CNP-600	1930	650	610	NPQJVC	1997-4	2004-3	2004-5	88.3	88.3	-	
	CN-14	QINSHAN 2-3	PWR	CNP-600	1930	660	619	NPQJVC	2006-4	2010-8	2010-10	91.0	91.0	-	
	CN-15	QINSHAN 2-4	PWR	CNP-600	1930	660	619	NPQJVC	2007-1	2011-11	2011-12	90.3	90.4	-	
	CN-8	QINSHAN 3-1	PHWR	CANDU 6	2064	728	677	TQNPC	1988-6	2002-11	2002-12	90.6	91.0	-	
	CN-9	QINSHAN 3-2	PHWR	CANDU 6	2064	728	677	TQNPC	1988-9	2003-6	2003-7	91.7	92.2	-	
	CN-1	QINSHAN-1	PWR	CNP-300	966	330	298	CNNO	1985-3	1991-12	1994-4	87.1	87.2	-	
	CN-28	SANMEN-1	PWR	AP-1000	3400	1251	1157	SMNPC	2009-4	2018-6	2018-9	92.9	93.8	-	
	CN-29	SANMEN-2	PWR	AP-1000	3400	1251	1157	SMNPC	2009-12	2018-8	2018-11	19.9	19.9	-	
	CN-32	TAISHAN-1	PWR	EPR-1750	4590	1750	1660	TNPJVC	2009-11	2018-6	2018-12	90.3	90.3	-	
	CN-33	TAISHAN-2	PWR	EPR-1750	4590	1750	1660	TNPJVC	2010-4	2018-6	—	—	—	—	—
	CN-10	TIANWAN-1	PWR	WER V-428	3000	1060	990	JNPC	1999-10	2006-5	2007-5	89.3	89.4	-	
	CN-11	TIANWAN-2	PWR	WER V-428	3000	1060	990	JNPC	2000-9	2007-5	2007-8	89.5	89.7	-	
	CN-45	TIANWAN-3	PWR	WER V-428M	3000	1126	1045	JNPC	2012-12	2017-12	2018-2	85.8	86.2	-	
	CN-46	TIANWAN-4	PWR	WER V-428M	3000	1126	1045	JNPC	2013-9	2018-10	2018-12	84.6	84.7	-	
	CN-22	YANGJIANG-1	PWR	CPR-1000	2905	1086	1000	YJNPC	2008-12	2013-12	2014-3	89.3	89.3	-	
	CN-23	YANGJIANG-2	PWR	CPR-1000	2905	1086	1000	YJNPC	2009-6	2015-3	2015-6	90.3	90.4	-	
	CN-40	YANGJIANG-3	PWR	CPR-1000	2905	1086	1000	YJNPC	2010-11	2015-10	2016-1	92.1	92.4	-	
	CN-41	YANGJIANG-4	PWR	CPR-1000	2905	1086	1000	YJNPC	2012-11	2017-1	2017-3	88.5	88.6	-	
	CN-47	YANGJIANG-5	PWR	ACPR-1000	2905	1086	1000	YJNPC	2013-9	2018-5	2018-7	88.0	88.3	-	
	CN-48	YANGJIANG-6	PWR	ACPR-1000	2905	1086	1000	YJNPC	2013-12	2019-6	2019-7	100.0	100.0	-	

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies	
	Code	Name			Thermal	Gross									Net
CZECH REP.	CZ-4	DUKOVANY-1	PWR	WVER V-213	1444	500	468	CEZ	SKODA	1979-1	1985-2	1985-5	82.5	83.3	-
	CZ-5	DUKOVANY-2	PWR	WVER V-213	1444	500	471	CEZ	SKODA	1979-1	1986-1	1986-3	77.3	78.4	-
	CZ-8	DUKOVANY-3	PWR	WVER V-213	1444	500	468	CEZ	SKODA	1979-3	1986-11	1986-12	79.5	80.6	-
	CZ-9	DUKOVANY-4	PWR	WVER V-213	1444	500	471	CEZ	SKODA	1979-3	1987-6	1987-7	82.9	83.8	-
	CZ-23	TEMLIN-1	PWR	WVER V-320	3120	1082	1027	CEZ	SKODA	2000-12	2002-6	2002-6	80.8	81.3	DH
	CZ-24	TEMLIN-2	PWR	WVER V-320	3120	1082	1027	CEZ	SKODA	1987-2	2002-12	2003-4	78.2	78.3	DH
FINLAND	FI-1	LOVISA-1	PWR	WVER V-213	1500	531	507	FORTUMPH AEE	AEE	1971-5	1977-2	1977-5	91.2	92.2	-
	FI-2	LOVISA-2	PWR	WVER V-213	1500	531	507	FORTUMPH AEE	AEE	1972-8	1980-11	1981-1	90.9	91.9	-
	FI-3	OLKILUOTO-1	BWR	AA-III, BWR-25	2500	920	890	TVO	ASEASTAL	1974-2	1978-9	1979-10	93.0	93.8	-
	FI-4	OLKILUOTO-2	BWR	AA-III, BWR-25	2500	920	890	TVO	ASEASTAL	1975-11	1980-2	1982-7	91.9	92.7	-
FRANCE	FR-54	BELLEVILLE-1	PWR	P4 REP 1300	3817	1363	1310	EDF	FRAM	1980-5	1987-10	1988-6	78.0	79.4	-
	FR-55	BELLEVILLE-2	PWR	P4 REP 1300	3817	1363	1310	EDF	FRAM	1980-8	1988-7	1989-1	75.0	76.7	-
	FR-32	BLAYAIS-1	PWR	CP1	2785	951	910	EDF	FRAM	1977-1	1981-6	1981-12	81.4	81.4	-
	FR-33	BLAYAIS-2	PWR	CP1	2785	951	910	EDF	FRAM	1977-1	1982-7	1983-2	80.6	82.1	-
	FR-34	BLAYAIS-3	PWR	CP1	2785	951	910	EDF	FRAM	1978-4	1983-8	1983-11	75.4	76.5	-
	FR-35	BLAYAIS-4	PWR	CP1	2785	951	910	EDF	FRAM	1978-4	1983-5	1983-10	77.0	79.2	-
	FR-13	BUGEY-2	PWR	CP0	2785	945	910	EDF	FRAM	1972-11	1979-3	1979-3	75.2	78.0	-
	FR-14	BUGEY-3	PWR	CP0	2785	945	910	EDF	FRAM	1973-9	1978-9	1979-3	70.9	75.0	-
	FR-15	BUGEY-4	PWR	CP0	2785	917	880	EDF	FRAM	1974-6	1979-3	1979-7	80.5	81.6	-
	FR-16	BUGEY-5	PWR	CP0	2785	917	880	EDF	FRAM	1974-7	1979-7	1980-1	63.1	64.9	-
	FR-50	CATTENOM-1	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1979-10	1986-11	1987-4	73.4	75.1	-
	FR-53	CATTENOM-2	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1980-7	1987-9	1988-2	77.0	79.5	-
	FR-60	CATTENOM-3	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1982-6	1990-7	1991-2	77.9	80.2	-
	FR-65	CATTENOM-4	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1983-9	1991-5	1992-1	76.4	80.1	-
	FR-40	CHINON B-1	PWR	CP2	2785	954	905	EDF	FRAM	1977-3	1982-11	1984-2	73.9	74.7	-
	FR-41	CHINON B-2	PWR	CP2	2785	954	905	EDF	FRAM	1977-3	1983-11	1984-8	72.3	75.4	-
FR-56	CHINON B-3	PWR	CP2	2785	954	905	EDF	FRAM	1980-10	1986-10	1987-3	79.4	80.2	-	
FR-57	CHINON B-4	PWR	CP2	2785	954	905	EDF	FRAM	1981-2	1987-11	1988-4	79.0	79.9	-	
FR-62	CHOOZ B-1	PWR	N4 REP 1450	4270	1560	1500	EDF	FRAM	1984-1	1996-8	2000-5	80.2	83.0	-	

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applics
	Code	Name			Thermal	Gross								
FRANCE	FR-70	CHOOZ B-2	PWR	N4 REP 1450	4270	1560	1500	EDF	1985-12	1997-4	2000-9	76.6	82.2	-
	FR-72	CIVAUX-1	PWR	N4 REP 1450	4270	1561	1495	EDF	1988-10	1997-12	2002-1	77.5	80.3	-
	FR-73	CIVAUX-2	PWR	N4 REP 1450	4270	1561	1495	EDF	1991-4	1999-12	2002-4	75.7	81.1	-
	FR-42	CRUAS-1	PWR	CP2	2785	956	915	EDF	1978-8	1983-4	1984-4	71.7	73.8	-
	FR-43	CRUAS-2	PWR	CP2	2785	956	915	EDF	1978-11	1984-9	1985-4	75.0	79.0	-
	FR-44	CRUAS-3	PWR	CP2	2785	956	915	EDF	1979-4	1984-5	1984-9	73.1	78.5	-
	FR-45	CRUAS-4	PWR	CP2	2785	956	915	EDF	1979-10	1984-10	1985-2	70.7	73.4	-
	FR-22	DAMPIERRE-1	PWR	CP1	2785	937	890	EDF	1975-2	1980-3	1980-9	79.0	80.3	-
	FR-29	DAMPIERRE-2	PWR	CP1	2785	937	890	EDF	1975-4	1980-12	1981-2	77.5	79.0	-
	FR-30	DAMPIERRE-3	PWR	CP1	2785	937	890	EDF	1975-9	1981-1	1981-5	78.4	80.9	-
	FR-31	DAMPIERRE-4	PWR	CP1	2785	937	890	EDF	1975-12	1981-8	1981-11	74.7	77.6	-
	FR-11	FESSENHEIM-1	PWR	CP0	2785	920	880	EDF	1971-9	1977-4	1978-1	76.6	78.6	-
	FR-12	FESSENHEIM-2	PWR	CP0	2785	920	880	EDF	1972-2	1977-10	1978-4	60.6	63.2	-
	FR-46	FLAMANVILLE-1	PWR	P4 REP 1300	3817	1362	1330	EDF	1979-12	1985-12	1986-12	69.4	70.8	-
	FR-47	FLAMANVILLE-2	PWR	P4 REP 1300	3817	1362	1330	EDF	1980-5	1986-7	1987-3	71.7	74.3	-
	FR-61	GOLFECH-1	PWR	P4 REP 1300	3817	1363	1310	EDF	1982-11	1990-6	1991-2	83.9	87.0	-
	FR-68	GOLFECH-2	PWR	P4 REP 1300	3817	1363	1310	EDF	1984-10	1993-6	1994-3	82.5	83.7	-
	FR-20	GRAVELINES-1	PWR	CP1	2785	951	910	EDF	1975-2	1980-3	1980-11	69.8	72.3	-
	FR-21	GRAVELINES-2	PWR	CP1	2785	951	910	EDF	1975-3	1980-8	1980-12	71.1	75.7	-
	FR-27	GRAVELINES-3	PWR	CP1	2785	951	910	EDF	1975-12	1980-12	1981-6	74.0	75.2	-
	FR-28	GRAVELINES-4	PWR	CP1	2785	951	910	EDF	1976-4	1981-6	1981-10	77.6	79.3	-
	FR-51	GRAVELINES-5	PWR	CP1	2785	951	910	EDF	1979-10	1984-8	1985-1	67.0	68.4	-
	FR-52	GRAVELINES-6	PWR	CP1	2785	951	910	EDF	1979-10	1985-8	1985-10	77.4	79.4	-
	FR-58	NOGENT-1	PWR	P4 REP 1300	3817	1363	1310	EDF	1981-5	1987-10	1988-2	78.4	80.8	-
	FR-59	NOGENT-2	PWR	P4 REP 1300	3817	1363	1310	EDF	1982-1	1988-12	1989-5	82.8	85.0	-
	FR-36	PALUEL-1	PWR	P4 REP 1300	3817	1362	1330	EDF	1977-8	1984-6	1985-12	76.1	78.3	-
	FR-37	PALUEL-2	PWR	P4 REP 1300	3817	1362	1330	EDF	1978-1	1984-9	1985-12	57.1	58.1	-
	FR-38	PALUEL-3	PWR	P4 REP 1300	3817	1362	1330	EDF	1979-2	1985-9	1986-2	70.2	74.4	-
	FR-39	PALUEL-4	PWR	P4 REP 1300	3817	1362	1330	EDF	1980-2	1986-4	1986-6	74.6	77.3	-
	FR-63	PENLY-1	PWR	P4 REP 1300	3817	1362	1330	EDF	1982-9	1990-5	1990-12	81.1	82.2	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applics
	Code	Name			Thermal	Gross								
FRANCE	FR-64	PENLY-2	PWR	P4 REP 1300	3817	1382	EDF	FRAM	1984-8	1992-2	1992-11	80.0	81.6	-
	FR-48	ST. ALBAN-1	PWR	P4 REP 1300	3817	1381	EDF	FRAM	1979-1	1985-8	1986-5	77.8	81.4	-
	FR-49	ST. ALBAN-2	PWR	P4 REP 1300	3817	1381	EDF	FRAM	1979-7	1986-7	1987-3	76.8	79.9	-
	FR-17	ST. LAURENT B-1	PWR	CP2	2785	956	EDF	FRAM	1976-5	1981-1	1983-8	74.8	78.4	-
	FR-23	ST. LAURENT B-2	PWR	CP2	2785	956	EDF	FRAM	1976-7	1981-6	1983-8	71.2	74.0	-
	FR-18	TRICASTIN-1	PWR	CP1	2785	955	EDF	FRAM	1974-11	1980-5	1980-12	69.6	72.5	-
	FR-19	TRICASTIN-2	PWR	CP1	2785	955	EDF	FRAM	1974-12	1980-8	1980-12	71.9	78.0	-
	FR-25	TRICASTIN-3	PWR	CP1	2785	955	EDF	FRAM	1975-4	1981-2	1981-5	72.0	78.3	-
	FR-26	TRICASTIN-4	PWR	CP1	2785	955	EDF	FRAM	1975-5	1981-6	1981-11	77.3	79.4	-
	GERMANY	DE-32	BROKDORF	PWR	PWR	3900	1480	PElectra	KWU	1976-1	1986-10	1986-12	84.2	84.5
DE-33		EMSLAND	PWR	Konvoi	3850	1406	KLE	KWU	1982-8	1988-4	1988-6	93.6	94.1	-
DE-27		GROHDE	PWR	PWR	3900	1430	PElectra	KWU	1976-6	1984-9	1985-2	85.5	86.7	-
DE-28		GUNDREMMINGEN-C	BWR	BWR-72	3840	1344	KGG	KWU	1976-7	1984-11	1985-1	87.7	88.5	-
DE-31		ISAR-2	PWR	Konvoi	3950	1485	PElectra	KWU	1982-9	1988-1	1988-4	92.8	93.2	-
DE-44		NECKARWESTHEIM-2	PWR	Konvoi	3850	1400	EnKK	KWU	1982-11	1989-1	1989-4	90.2	90.7	-
HU-1		PAKS-1	PWR	WER V-213	1485	500	PAKS Zrt	AEE	1974-8	1982-12	1983-8	89.1	89.4	-
HU-2		PAKS-2	PWR	WER V-213	1485	500	PAKS Zrt	AEE	1974-8	1984-9	1984-11	89.8	90.1	DH
HU-3		PAKS-3	PWR	WER V-213	1485	500	PAKS Zrt	AEE	1979-10	1986-9	1986-12	88.4	88.7	DH
HU-4		PAKS-4	PWR	WER V-213	1485	500	PAKS Zrt	AEE	1979-10	1987-8	1987-11	89.3	90.0	DH
INDIA	IN-13	KAIGA-1	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1989-9	2000-10	2000-11	82.1	94.0	-
	IN-14	KAIGA-2	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1989-12	1989-12	2000-3	80.6	92.3	-
	IN-15	KAIGA-3	PHWR	Horizontal Pre	800	220	NPCIL	NPCIL	2002-3	2007-4	2007-5	79.4	88.4	-
	IN-16	KAIGA-4	PHWR	Horizontal Pre	800	220	NPCIL	NPCIL	2002-5	2011-1	2011-1	84.6	91.4	-
	IN-9	KAKRAPAR-1	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1984-12	1992-11	1993-5	54.8	54.8	-
	IN-10	KAKRAPAR-2	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1985-4	1995-3	1995-9	58.6	63.1	-
	IN-25	KUDANKULAM-1	PWR	WER V-412	3000	1000	932	MAEP	2002-3	2013-10	2014-12	52.2	52.2	-
	IN-26	KUDANKULAM-2	PWR	WER V-412	3000	1000	932	MAEP	2002-7	2016-8	2017-3	46.0	46.0	-

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW(e))			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies
	Code	Name			Thermal	Gross	Net								
INDIA	IN-5	MADRAS-1	PWR	Horizontal Pre	801	220	205	NPCL	1971-1	1983-7	1984-1	57.5	73.6	DS	
	IN-6	MADRAS-2	PWR	Horizontal Pre	801	220	205	NPCL	1972-10	1985-9	1986-3	68.5	86.4	DS	
	IN-7	NARORA-1	PWR	Horizontal Pre	801	220	202	NPCL	1976-12	1989-7	1991-1	75.7	92.2	-	
	IN-8	NARORA-2	PWR	Horizontal Pre	801	220	202	NPCL	1977-11	1992-1	1992-7	71.2	86.2	-	
	IN-3	RAJASTHAN-1	PWR	Horizontal Pre	346	100	90	NPCL	1965-8	1972-11	1973-12	0.0	0.0	PH	
	IN-4	RAJASTHAN-2	PWR	Horizontal Pre	693	200	187	NPCL	1968-4	1980-11	1981-4	78.2	81.2	PH	
	IN-11	RAJASTHAN-3	PWR	Horizontal Pre	801	220	202	NPCL	1990-2	2000-3	2000-6	88.4	91.7	PH	
	IN-12	RAJASTHAN-4	PWR	Horizontal Pre	801	220	202	NPCL	1990-10	2000-11	2000-12	91.0	93.0	PH	
	IN-19	RAJASTHAN-5	PWR	Horizontal Pre	801	220	202	NPCL	2002-9	2009-12	2010-2	91.6	91.8	-	
	IN-20	RAJASTHAN-6	PWR	Horizontal Pre	801	220	202	NPCL	2003-1	2010-3	2010-3	79.1	79.3	-	
	IN-1	TARAPUR-1	BWR	BWR-1 (Mark 2)	530	160	150	NPCL	1964-10	1969-4	1969-10	69.9	70.4	-	
	IN-2	TARAPUR-2	BWR	BWR-1 (Mark 2)	530	160	150	NPCL	1964-10	1969-5	1969-10	74.3	75.0	-	
	IN-23	TARAPUR-3	PWR	Horizontal Pre	1730	540	490	NPCL	2000-5	2006-6	2006-8	85.2	89.0	-	
	IN-24	TARAPUR-4	PWR	Horizontal Pre	1730	540	490	NPCL	2000-3	2005-6	2005-9	77.7	85.2	-	
	IRAN, ISL. REP.	IR-1	BUSHEHR-1	PWR	WER V-446	3000	1000	915	NPPDCO	1975-5	2011-9	2013-9	71.8	72.2	-
	JAPAN	JP-45	GENKAI-3	PWR	M (4-loop)	3423	1180	1127	KYUSHU	1988-6	1993-6	1994-3	24.5	24.5	DS
		JP-46	GENKAI-4	PWR	M (4-loop)	3423	1180	1127	KYUSHU	1992-7	1996-11	1997-7	30.6	30.6	DS
		JP-36	HAMAOKA-3	BWR	BWR-5	3293	1100	1056	CHUBU	1983-4	1987-1	1987-8	9.1	9.1	-
		JP-49	HAMAOKA-4	BWR	BWR-5	3293	1137	1092	CHUBU	1989-10	1993-1	1993-9	10.4	10.4	-
		JP-60	HAMAOKA-5	BWR	ABWR	3926	1380	1325	CHUBU	2000-7	2004-4	2005-1	2.9	4.8	-
		JP-58	HIGASHI DORI-1 (TOHOKU)	BWR	BWR-5	3293	1100	1067	TOHOKU	2000-11	2005-3	2005-12	11.0	11.0	-
		JP-47	KAITA-3	PWR	M (3-loop)	2660	890	846	SHIKOKU	1990-10	1994-3	1994-12	42.7	42.7	DS
		JP-33	KASHIWAZAKI KARIWA-1	BWR	BWR-5	3293	1100	1067	TEPCO	1980-6	1985-2	1985-9	11.6	11.6	-
		JP-39	KASHIWAZAKI KARIWA-2	BWR	BWR-5	3293	1100	1067	TEPCO	1985-11	1990-2	1990-9	0.0	0.0	-
JP-52		KASHIWAZAKI KARIWA-3	BWR	BWR-5	3293	1100	1067	TEPCO	1989-3	1993-12	1993-8	0.0	0.0	-	
JP-53		KASHIWAZAKI KARIWA-4	BWR	BWR-5	3293	1100	1067	TEPCO	1990-3	1993-12	1994-8	0.0	0.0	-	
JP-40		KASHIWAZAKI KARIWA-5	BWR	BWR-5	3293	1100	1067	TEPCO	1985-6	1989-9	1990-4	11.5	11.5	-	
JP-55		KASHIWAZAKI KARIWA-6	BWR	ABWR	3926	1356	1315	TEPCO	1992-11	1996-1	1996-11	19.6	19.6	-	

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DS desalination, PH process heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-	Non-electrical applics	
	Code	Name			Thermal	Gross									Net
JAPAN	JP-56	KASHIWAZAKI KARIWA-7	BWR	ABWR	3926	1356	1315	TEPCO	1993-7	1996-12	1997-7	14.0	14.0	-	
	JP-14	MIHAMA-3	PWR	M (3-loop)	2440	826	780	KEPCO	1972-8	1976-2	1976-12	11.4	11.4	-	
	JP-50	OHI-3	PWR	M (4-loop)	3423	1180	1127	KEPCO	1987-10	1991-6	1991-12	37.6	37.7	DS	
	JP-51	OHI-4	PWR	M (4-loop)	3423	1180	1127	KEPCO	1988-6	1992-6	1993-2	38.3	38.3	DS	
	JP-54	ONAGAWA-2	BWR	BWR-5	2436	825	796	TOHOKU	1991-4	1994-12	1995-7	8.4	13.1	-	
	JP-57	ONAGAWA-3	BWR	BWR-5	2436	825	796	TOHOKU	1998-1	2001-5	2002-1	9.3	14.2	-	
	JP-28	SENDAI-1	PWR	M (3-loop)	2660	890	846	KYUSHU	1979-12	1983-9	1984-7	46.1	46.1	-	
	JP-37	SENDAI-2	PWR	M (3-loop)	2660	890	846	KYUSHU	1981-10	1985-4	1985-11	48.3	48.3	-	
	JP-48	SHIKA-1	BWR	BWR-5	1593	540	505	HOKURIKU	1989-7	1993-1	1993-7	8.7	8.7	-	
	JP-59	SHIKA-2	BWR	ABWR	3926	1206	1108	HOKURIKU	2001-8	2005-7	2006-3	10.5	10.5	-	
	JP-41	SHIMANE-2	BWR	BWR-5	2436	820	789	CHUGOKU	1985-2	1988-7	1989-2	13.5	13.5	-	
	JP-8	TAKAHAMA-1	PWR	M (3-loop)	2440	826	780	KEPCO	1970-4	1974-3	1974-11	10.2	10.2	-	
	JP-13	TAKAHAMA-2	PWR	M (3-loop)	2440	826	780	KEPCO	1971-3	1975-1	1975-11	15.8	15.8	-	
	JP-29	TAKAHAMA-3	PWR	M (3-loop)	2660	870	830	KEPCO	1980-12	1984-5	1985-1	50.7	50.7	DS	
	JP-30	TAKAHAMA-4	PWR	M (3-loop)	2660	870	830	KEPCO	1981-3	1984-11	1985-6	43.2	43.2	DS	
	JP-21	TOKAI-2	BWR	BWR-5	3293	1100	1060	JAPCO	1973-10	1978-3	1978-11	7.3	9.2	-	
	JP-43	TOMARI-1	PWR	M (2-loop)	1650	579	550	HEPCO	1985-4	1988-12	1989-6	11.2	11.2	-	
	JP-44	TOMARI-2	PWR	M (2-loop)	1650	579	550	HEPCO	1985-6	1990-8	1991-4	14.7	14.7	-	
	JP-64	TOMARI-3	PWR	M (3-loop)	2660	912	866	HEPCO	2004-11	2009-3	2009-12	21.7	21.7	-	
	JP-34	TSURUGA-2	PWR	M (4-loop)	3411	1160	1108	JAPCO	1982-11	1986-6	1987-2	9.6	9.6	-	
	KOREA, REP. OF	KR-7	HANBIT-1	PWR	WHF	2787	1028	995	KHNP	1981-6	1986-3	1986-8	76.9	77.4	-
		KR-8	HANBIT-2	PWR	WHF	2787	1025	988	KHNP	1981-12	1986-11	1987-6	77.1	77.4	-
		KR-11	HANBIT-3	PWR	OPR-1000	2825	1037	986	KHNP	1989-12	1994-10	1995-3	66.6	66.9	-
		KR-12	HANBIT-4	PWR	OPR-1000	2825	1022	970	KHNP	1989-5	1995-7	1996-1	64.5	64.9	-
		KR-17	HANBIT-5	PWR	OPR-1000	2825	1049	992	KHNP	1997-6	2001-12	2002-5	87.4	87.7	-
		KR-18	HANBIT-6	PWR	OPR-1000	2825	1051	993	KHNP	1997-11	2002-9	2002-12	84.1	84.4	-
		KR-9	HANUL-1	PWR	France CPI	2775	1008	966	KHNP	1983-1	1988-4	1988-9	83.7	83.9	-
		KR-10	HANUL-2	PWR	France CPI	2775	1010	967	KHNP	1983-7	1989-4	1989-9	85.3	85.5	-
		KR-13	HANUL-3	PWR	OPR-1000	2825	1049	997	KHNP	1993-7	1998-1	1998-8	78.7	78.9	-

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DS desalination.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applics	
	Code	Name			Thermal	Gross									Net
KOREA, REP. OF	KR-14	HANUL-4	PWR	OPR-1000	2825	1053	999	DHICKOPC	1993-11	1998-12	1999-12	70.6	70.7	-	
	KR-19	HANUL-5	PWR	OPR-1000	2825	1048	998	DHICKOPC	1999-10	2003-12	2004-7	86.8	87.1	-	
	KR-20	HANUL-6	PWR	OPR-1000	2825	1048	997	DHICKOPC	2000-9	2005-1	2005-4	87.3	87.5	-	
	KR-2	KORI-2	PWR	WHF	1882	681	640	WH	1977-12	1983-7	1983-7	83.6	84.6	-	
	KR-5	KORI-3	PWR	WHF	2912	1045	1011	KHNP	1979-10	1985-1	1985-9	76.8	76.9	-	
	KR-6	KORI-4	PWR	WHF	2912	1045	1012	KHNP	1980-4	1985-12	1986-4	77.7	77.8	-	
	KR-21	SHIN-KORI-1	PWR	OPR-1000	2825	1046	996	DHICKOPC	2006-6	2010-8	2011-2	71.9	72.2	-	
	KR-22	SHIN-KORI-2	PWR	OPR-1000	2825	1047	996	KHNP	DHICKOPC	2007-6	2012-1	2012-7	80.3	80.6	-
	KR-25	SHIN-KORI-3	PWR	APR-1400	3983	1486	1416	DHICKOPC	2008-10	2016-1	2016-12	78.8	79.0	-	
	KR-26	SHIN-KORI-4	PWR	APR-1400	3983	1455	1418	DHICKOPC	2009-8	2019-4	2019-8	100.0	100.0	-	
	KR-23	SHIN-WOLSONG-1	PWR	OPR-1000	2825	1049	997	KHNP	DHICKOPC	2007-11	2012-1	2012-7	80.1	80.4	-
	KR-24	SHIN-WOLSONG-2	PWR	OPR-1000	2825	1051	993	KHNP	DHICKOPC	2008-9	2015-2	2015-7	78.7	78.8	-
	KR-4	WOLSONG-2	PHWR	CANDU 6	2061	620	606	AECU/DHI	1992-9	1997-4	1998-7	88.4	90.9	-	
	KR-15	WOLSONG-3	PHWR	CANDU 6	2061	650	630	AECU/DHI	1994-3	1998-3	1998-7	79.1	81.5	-	
	KR-16	WOLSONG-4	PHWR	CANDU 6	2061	621	609	AECU/DHI	1994-7	1999-5	1999-10	88.7	90.3	-	
	MEXICO	MX-1	LAGUNA VERDE-1	BWR	BWR-5	2317	805	777	GE	1976-10	1989-4	1990-7	76.8	78.7	-
MX-2		LAGUNA VERDE-2	BWR	BWR-5	2317	803	775	GE	1977-6	1994-11	1995-4	81.6	83.0	-	
NETHERLANDS	NL-2	BORSSELE	PWR	KWU 2LP	1366	515	482	SKWU	1969-7	1973-7	1973-10	84.2	85.2	-	
	PK-2	CHASNUPP-1	PWR	CNP-300	999	325	300	CNNC	1993-8	2000-6	2000-9	83.0	83.2	-	
PAKISTAN	PK-3	CHASNUPP-2	PWR	CNP-300	999	325	300	CNNC	2005-12	2011-3	2011-5	85.4	85.5	-	
	PK-4	CHASNUPP-3	PWR	CNP-300	999	340	315	CNNC	2011-5	2016-10	2016-12	86.8	87.6	-	
	PK-5	CHASNUPP-4	PWR	CNP-300	999	340	313	CNNC	2011-12	2017-7	2017-9	89.4	90.2	-	
	PK-1	KANUPP-1	PHWR	CANDU-137 MW	337	100	90	CGE	1966-8	1971-10	1972-12	41.1	41.1	DS	
ROMANIA	RO-1	CERNAVODA-1	PHWR	CANDU 6	2180	706	650	SNN	1982-7	1996-7	1996-12	91.9	93.0	DH	
	RO-2	CERNAVODA-2	PHWR	CANDU 6	2180	705	650	SNN	1983-7	2007-8	2007-11	93.8	94.6	DH	

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DS desalination, DH district heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies
	Code	Name			Thermal	Gross								
RUSSIA	RU-151	AKADEMIK LOMONOSOV-1	PWR	KL-T-40S	150	35	32	REA	2007-4	2019-12	2020-5			-
	RU-152	AKADEMIK LOMONOSOV-2	PWR	KL-T-40S	150	35	32	REA	2007-4	2019-12	2020-5			-
	RU-96	BALAKOVO-1	PWR	WER V-320	3000	1000	950	REA	1980-12	1985-12	1986-5	86.9	87.0	DH, PH
	RU-97	BALAKOVO-2	PWR	WER V-320	3000	1000	950	REA	1981-8	1987-10	1988-1	88.1	88.4	DH, PH
	RU-98	BALAKOVO-3	PWR	WER V-320	3000	1000	950	REA	1982-11	1988-12	1989-4	86.4	86.6	DH, PH
	RU-99	BALAKOVO-4	PWR	WER V-320	3200	1000	950	REA	1984-4	1983-4	1983-12	87.9	88.0	DH, PH
	RU-21	BELOYARSK-3	FBR	BN-600	1470	600	560	REA	1969-1	1980-4	1981-11	80.4	80.4	DH, PH
	RU-116	BELOYARSK-4	FBR	BN-800	2100	885	820	REA	2006-7	2015-12	2016-10	67.9	69.1	-
	RU-142	BILIBINO-2	LWGR	EGP-6	62	12	11	REA	1970-1	1974-12	1975-2	82.1	82.1	DH
	RU-143	BILIBINO-3	LWGR	EGP-6	62	12	11	REA	1970-1	1975-12	1976-2	83.6	83.6	DH
	RU-144	BILIBINO-4	LWGR	EGP-6	62	12	11	REA	1970-1	1976-12	1977-1	83.0	83.0	DH
	RU-30	KALININ-1	PWR	WER V-338	3000	1000	950	REA	1977-2	1984-5	1985-6	82.6	82.6	DH, PH
	RU-31	KALININ-2	PWR	WER V-338	3000	1000	950	REA	1982-2	1986-12	1987-3	86.7	86.7	DH, PH
	RU-36	KALININ-3	PWR	WER V-320	3200	1000	950	REA	1985-10	2004-12	2005-11	82.9	82.9	DH, PH
	RU-37	KALININ-4	PWR	WER V-320	3200	1000	950	REA	1986-8	2011-11	2012-12	87.4	87.4	DH, PH
	RU-12	KOLA-1	PWR	WER V-230	1375	440	411	REA	1970-5	1973-6	1973-12	76.9	77.4	DH, PH
	RU-13	KOLA-2	PWR	WER V-230	1375	440	411	REA	1970-5	1974-12	1975-2	78.0	78.3	DH, PH
	RU-32	KOLA-3	PWR	WER V-213	1375	440	411	REA	1977-4	1981-3	1982-12	80.9	81.0	DH, PH
	RU-33	KOLA-4	PWR	WER V-213	1375	440	411	REA	1976-8	1984-10	1984-12	83.1	83.1	DH, PH
	RU-17	KURSK-1	LWGR	RBMK-1000	3200	1000	925	REA	1972-6	1976-12	1977-10	74.0	74.9	DH, PH
RU-22	KURSK-2	LWGR	RBMK-1000	3200	1000	925	REA	1973-1	1979-8	1979-8	68.0	68.4	DH, PH	
RU-38	KURSK-3	LWGR	RBMK-1000	3200	1000	925	REA	1978-4	1983-10	1984-3	80.9	81.4	DH, PH	
RU-39	KURSK-4	LWGR	RBMK-1000	3200	1000	925	REA	1985-5	1985-12	1986-2	82.8	83.4	DH, PH	
RU-163	LENINGRAD 2-1	PWR	WER V-491	3200	1188	1101	REA	2008-10	2018-3	2018-10	67.2	67.7	-	
RU-16	LENINGRAD-2	LWGR	RBMK-1000	3200	1000	925	REA	1970-6	1975-7	1976-2	69.3	69.7	DH, PH	
RU-34	LENINGRAD-3	LWGR	RBMK-1000	3200	1000	925	REA	1973-12	1979-12	1980-6	85.9	85.9	DH, PH	
RU-35	LENINGRAD-4	LWGR	RBMK-1000	3200	1000	925	REA	1975-2	1981-2	1981-8	82.6	82.7	DH, PH	
RU-161	NOVOVORONEZH 2-1	PWR	WER V-392M	3200	1180	1100	REA	2008-6	2016-8	2017-2	74.1	76.1	-	
RU-162	NOVOVORONEZH 2-2	PWR	WER V-392M	3200	1181	1101	REA	2009-7	2019-5	2019-10	85.5	85.5	-	
RU-11	NOVOVORONEZH-4	PWR	WER V-179	1375	417	385	REA	1967-7	1972-12	1973-3	77.8	78.8	DH, PH	
RU-20	NOVOVORONEZH-5	PWR	WER V-187	3000	1000	950	REA	1974-3	1980-5	1981-2	73.6	74.1	DH, PH	

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating, PH process heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies	
	Code	Name			Thermal	Gross									Net
RUSSIA	RU-59	ROSTOV-1	PWR	WER V-320	3200	1000	950	REA	1981-9	2001-3	2001-12	89.1	90.0	-	
	RU-62	ROSTOV-2	PWR	WER V-320	3200	1000	950	REA	1983-5	2010-3	2010-12	89.4	89.4	-	
	RU-63	ROSTOV-3	PWR	WER V-320	3000	1000	950	REA	2009-9	2014-12	2015-9	82.6	84.0	-	
	RU-64	ROSTOV-4	PWR	WER V-320	3000	1030	979	REA	2010-6	2018-2	2018-9	89.6	90.6	-	
	RU-23	SMOLENSK-1	LWGR	RBMK-1000	3200	1000	925	REA	1975-10	1982-12	1983-9	78.3	78.5	DH, PH	
	RU-24	SMOLENSK-2	LWGR	RBMK-1000	3200	1000	925	REA	1976-6	1985-5	1985-7	78.6	78.8	DH, PH	
	RU-67	SMOLENSK-3	LWGR	RBMK-1000	3200	1000	925	REA	1984-5	1990-1	1990-10	80.2	80.2	DH, PH	
SLOVAKIA	SK-13	BOHUNICE-3	PWR	WER V-213	1471	505	471	SE	1976-12	1984-8	1985-2	88.0	91.5	DH, PH	
	SK-14	BOHUNICE-4	PWR	WER V-213	1471	505	471	SE	1976-12	1985-8	1985-12	88.2	91.2	DH, PH	
	SK-6	MOCHOVCE-1	PWR	WER V-213	1471	470	436	SE	1983-10	1988-7	1988-10	91.3	92.0	-	
	SK-7	MOCHOVCE-2	PWR	WER V-213	1471	470	436	SE	1983-10	1989-12	2000-4	90.1	91.2	-	
	SI-1	KRSKO	PWR	WH 2LP	1994	727	688	NEK	1975-3	1981-10	1983-1	91.6	91.9	-	
SOUTH AFRICA	ZA-1	KOEBERG-1	PWR	CP1	2775	970	930	ESKOM	1976-7	1984-4	1984-7	79.1	79.2	-	
	ZA-2	KOEBERG-2	PWR	CP1	2775	970	930	ESKOM	1976-7	1985-7	1985-11	84.6	85.9	-	
SPAIN	ES-6	ALMARAZ-1	PWR	WH 3LP	2947	1049	1011	CNAT	1973-7	1981-5	1983-9	88.2	89.5	-	
	ES-7	ALMARAZ-2	PWR	WH 3LP	2947	1044	1006	CNAT	1973-7	1983-10	1984-7	88.2	89.3	-	
	ES-8	ASCO-1	PWR	WH 3LP	2954	1033	995	ANAV	1974-5	1983-8	1984-12	88.5	89.4	-	
	ES-9	ASCO-2	PWR	WH 3LP	2941	1035	997	ANAV	1975-3	1985-10	1986-3	87.1	88.5	-	
	ES-10	COFREPES	BWR	BWR-6 (Mark 3)	3237	1102	1064	ID	1975-9	1984-10	1985-3	89.7	90.8	-	
	ES-11	TRILLO-1	PWR	PWR 3 loops	3010	1066	1003	CNAT	1979-8	1988-5	1988-8	89.2	90.3	-	
	ES-16	VANDELLOS-2	PWR	WH 3LP	2941	1087	1045	ANAV	1980-12	1987-12	1988-3	83.5	84.7	-	
	SWEDEN	SE-9	FORSMARK-1	BWR	AA-III, BWR-25	2927	1027	990	FKA	1973-6	1980-6	1980-12	88.0	88.9	-
		SE-11	FORSMARK-2	BWR	AA-III, BWR-25	3253	1157	1118	FKA	1975-1	1981-7	1981-7	82.1	83.3	-
		SE-14	FORSMARK-3	BWR	AA-IV, BWR-300	3300	1195	1172	FKA	1979-1	1985-3	1985-8	82.5	83.4	-
SE-12		OSKARSHAMN-3	BWR	AA-IV, BWR-300	3900	1450	1400	OKG	1980-5	1985-3	1985-8	73.9	75.4	-	

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating, PH process heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applics	
	Code	Name			Thermal	Gross									Net
SWEDEN	SE-4	RINGHALS-1	BWR	AA-1	2540	910	881	ABBATOM	1969-2	1974-10	1976-1	74.2	75.8	-	
	SE-7	RINGHALS-3	PWR	WH 3LP	3135	1117	1062	RAB	1972-9	1980-9	1981-9	82.8	85.5	-	
	SE-10	RINGHALS-4	PWR	WH 3LP	3300	1171	1117	RAB	1973-11	1982-6	1983-11	81.3	83.8	-	
SWITZERLAND	CH-1	BEZNAU-1	PWR	WH 2LP	1130	380	365	Axpo AG	1965-9	1969-7	1969-12	63.9	64.1	DH	
	CH-3	BEZNAU-2	PWR	WH 2LP	1130	380	365	Axpo AG	1968-1	1971-10	1972-3	87.9	88.3	DH	
	CH-4	GOESGEN	PWR	PWR 3 Loop	3002	1060	1010	KKG	1973-12	1979-2	1979-11	89.7	90.3	PH	
	CH-5	LEIBSTADT	BWR	BWR-6	3600	1275	1220	KKL	1974-1	1984-5	1984-12	77.5	78.9	-	
								GETSCO							
UK	GB-18A	DUNGENESS B-1	GCR	AGR	1500	615	545	EDF UK	1965-10	1983-4	1985-4	46.9	46.9	-	
	GB-18B	DUNGENESS B-2	GCR	AGR	1500	615	545	EDF UK	1965-10	1985-12	1989-4	50.1	50.2	-	
	GB-19A	HARTLEPOOL A-1	GCR	AGR	1500	655	590	EDF UK	1968-10	1983-8	1989-4	72.0	72.1	-	
	GB-19B	HARTLEPOOL A-2	GCR	AGR	1500	655	595	EDF UK	1968-10	1984-10	1989-4	72.9	73.0	-	
	GB-20A	HEYSHAM A-1	GCR	AGR	1500	625	485	EDF UK	1970-12	1983-7	1989-4	63.6	63.7	-	
	GB-20B	HEYSHAM A-2	GCR	AGR	1500	625	575	EDF UK	1970-12	1984-10	1989-4	65.2	65.3	-	
	GB-22A	HEYSHAM B-1	GCR	AGR	1550	680	620	EDF UK	1980-8	1988-7	1989-4	86.0	86.2	-	
	GB-22B	HEYSHAM B-2	GCR	AGR	1550	680	620	EDF UK	1980-8	1988-11	1989-4	83.6	83.7	-	
	GB-16A	HINKLEY POINT B-1	GCR	AGR	1494	655	485	EDF UK	1967-9	1976-10	1978-10	84.4	84.5	-	
	GB-16B	HINKLEY POINT B-2	GCR	AGR	1494	655	480	EDF UK	1967-9	1976-2	1976-9	86.2	86.3	-	
	GB-17A	HUNTERSTON B-1	GCR	AGR	1496	644	490	EDF UK	1967-11	1976-2	1976-2	70.5	70.8	-	
	GB-17B	HUNTERSTON B-2	GCR	AGR	1496	644	495	EDF UK	1967-11	1977-3	1977-3	77.3	77.4	-	
	GB-24	SEFVELL B	PWR	SNUPPS	3425	1250	1198	EDF UK	1988-7	1995-2	1995-9	82.0	82.1	-	
	GB-23A	TORNES-1	GCR	AGR	1623	682	595	EDF UK	1980-8	1988-5	1988-5	85.1	86.0	-	
	GB-23B	TORNES-2	GCR	AGR	1623	682	605	EDF UK	1980-8	1989-2	1989-2	84.5	85.3	-	
	UKRAINE	UA-40	KHEMLNITSKI-1	PWR	VVER V-320	3000	1000	950	NNEGC	1981-11	1987-12	1988-8	68.6	70.4	DH
		UA-41	KHEMLNITSKI-2	PWR	VVER V-320	3000	1000	950	PAIP	1985-2	2004-8	2005-12	80.1	81.5	DH
		UA-27	ROVNO-1	PWR	VVER V-213	1375	420	381	NNEGC	1973-8	1980-12	1981-9	83.9	84.5	DH
		UA-28	ROVNO-2	PWR	VVER V-213	1375	415	376	NNEGC	1973-10	1981-12	1982-7	80.2	80.7	DH
		UA-29	ROVNO-3	PWR	VVER V-320	3000	1000	950	PAIP	1980-2	1986-12	1987-5	67.6	69.5	DH

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating, PH process heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies	
	Code	Name			Thermal	Gross									Net
UKRAINE	UA-69	ROVNO-4	PWR	WER V-320	3000	1000	950	NNEG	1986-8	2004-10	2006-4	80.7	82.6	DH	
	UA-44	SOUTH UKRAINE-1	PWR	WER V-302	3000	1000	950	NNEG	1976-8	1982-12	1983-12	69.1	74.9	DH	
	UA-45	SOUTH UKRAINE-2	PWR	WER V-338	3000	1000	950	NNEG	1981-7	1985-1	1985-4	66.7	71.6	DH	
	UA-48	SOUTH UKRAINE-3	PWR	WER V-320	3000	1000	950	NNEG	1984-11	1989-9	1989-12	63.9	69.6	DH	
	UA-54	ZAPOROZHYE-1	PWR	WER V-320	3000	1000	950	NNEG	1980-4	1984-12	1985-12	69.8	71.8	DH	
	UA-56	ZAPOROZHYE-2	PWR	WER V-320	3000	1000	950	NNEG	1981-1	1985-7	1986-2	68.4	73.0	DH	
	UA-78	ZAPOROZHYE-3	PWR	WER V-320	3000	1000	950	NNEG	1982-4	1986-12	1987-3	74.0	76.4	DH	
	UA-79	ZAPOROZHYE-4	PWR	WER V-320	3000	1000	950	NNEG	1983-4	1987-12	1988-4	73.2	75.1	DH	
	UA-126	ZAPOROZHYE-5	PWR	WER V-320	3000	1000	950	NNEG	1985-11	1989-8	1989-10	77.3	80.2	DH	
	UA-127	ZAPOROZHYE-6	PWR	WER V-320	3000	1000	950	NNEG	1986-6	1995-10	1996-9	80.5	82.8	DH	
	USA	US-313	ANO-1	PWR	B&W LLP (DRYAMB)	2568	903	836	ENTERGY	1968-10	1974-8	1974-12	86.9	87.5	-
		US-368	ANO-2	PWR	CE 2LP (DRYAMB)	3026	1065	988	ENTERGY	1968-12	1978-12	1980-3	85.9	85.9	-
		US-334	BEAVER VALLEY-1	PWR	WH 3LP (DRYSUB)	2900	959	908	FENOC	1970-6	1976-6	1976-10	93.1	93.1	-
		US-412	BEAVER VALLEY-2	PWR	WH 3LP (DRYSUB)	2900	958	905	FENOC	1974-5	1987-8	1987-11	93.9	93.9	-
US-456		BRADWOOD-1	PWR	WH 4LP (DRYAMB)	3645	1270	1194	EXELON	1975-8	1987-7	1988-7	94.9	94.9	-	
US-457		BRADWOOD-2	PWR	WH 4LP (DRYAMB)	3645	1230	1160	EXELON	1975-8	1988-5	1988-10	95.8	95.8	-	
US-259		BROWNS FERRY-1	BWR	BWR-4 (Mark 1)	3458	1256	1200	TVA	1967-5	1973-10	1974-8	93.5	94.1	-	
US-260		BROWNS FERRY-2	BWR	BWR-4 (Mark 1)	3458	1259	1200	GE	1967-5	1974-8	1975-3	92.6	93.4	-	
US-296		BROWNS FERRY-3	BWR	BWR-4 (Mark 1)	3458	1260	1210	TVA	1968-7	1976-9	1977-3	91.6	92.5	-	
US-325		BRUNSWICK-1	BWR	BWR-4 (Mark 1)	2923	980	938	PROGRESS	1970-2	1976-12	1977-3	91.4	91.8	-	
US-324		BRUNSWICK-2	BWR	BWR-4 (Mark 1)	2923	960	932	PROGRESS	1970-2	1975-4	1975-11	92.1	92.4	-	
US-454		BYRON-1	PWR	WH 4LP (DRYAMB)	3645	1242	1164	EXELON	1975-4	1985-3	1985-9	95.6	95.6	-	
US-455		BYRON-2	PWR	WH 4LP (DRYAMB)	3645	1210	1136	EXELON	1975-4	1987-2	1987-8	95.3	95.3	-	
US-483		CALLAWAY-1	PWR	WH 4LP (DRYAMB)	3565	1275	1215	AmerenUE	1975-9	1984-10	1984-12	89.6	89.6	-	
US-317	CALVERT CLIFFS-1	PWR	CE 2LP (DRYAMB)	2737	918	877	EXELON	1968-6	1975-5	1975-5	94.2	94.3	-		
US-318	CALVERT CLIFFS-2	PWR	CE 2LP (DRYAMB)	2737	911	855	EXELON	1968-6	1976-12	1977-4	95.2	95.3	-		
US-413	CATAWBA-1	PWR	WH 4LP (ICECND)	3411	1188	1160	DUKEENER	1974-5	1985-1	1985-6	93.8	93.8	-		
US-414	CATAWBA-2	PWR	WH 4LP (ICECND)	3411	1188	1150	DUKEENER	1974-5	1986-5	1986-8	93.8	93.8	-		
US-461	CLINTON-1	BWR	BWR-6 (Mark 3)	3473	1098	1062	EXELON	1975-10	1987-4	1987-11	93.7	93.7	-		

Note: The column "Non-electrical applications" indicates the use of the facility to provide: DH district heating.

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies
	Code	Name			Thermal	Gross								
USA	US-397	COLUMBIA	BWR	BWR-5 (Mark 2)	3486	1190	1131	ENERGY	1972-8	1984-5	1984-12	89.2	89.5	-
	US-445	COMANCHE PEAK-1	PWR	WH 4LP (DRYAMB)	3612	1259	1205	LUMINANT	1974-12	1990-4	1990-8	93.3	93.3	-
	US-446	COMANCHE PEAK-2	PWR	WH 4LP (DRYAMB)	3612	1250	1195	LUMINANT	1974-12	1993-4	1993-8	92.2	92.2	-
	US-315	COOK-1	PWR	WH 4LP (ICECND)	3304	1131	1030	AEP	1969-3	1975-2	1975-8	88.9	88.9	-
	US-316	COOK-2	PWR	WH 4LP (ICECND)	3468	1231	1168	AEP	1969-3	1978-3	1978-8	88.8	88.8	-
	US-298	COOPER	BWR	BWR-4 (Mark 1)	2419	801	769	ENERGY	1968-6	1974-5	1974-7	93.0	93.0	-
	US-346	DAVIS BESSE-1	PWR	B&W RLP (DRYAMB)	2817	925	894	FENOC	1970-9	1977-8	1978-5	88.1	88.1	-
	US-275	DIABLO CANYON-1	PWR	WH 4LP (DRYAMB)	3411	1197	1138	PG&E	1968-4	1984-11	1985-5	92.2	92.2	-
	US-323	DIABLO CANYON-2	PWR	WH 4LP (DRYAMB)	3411	1197	1118	PG&E	1970-12	1985-10	1986-3	91.7	91.8	-
	US-237	DRESDEN-2	BWR	BWR-3 (Mark 1)	2957	950	894	EXELON	1966-1	1970-6	1970-6	96.1	96.1	-
	US-249	DRESDEN-3	BWR	BWR-3 (Mark 1)	2957	935	879	EXELON	1966-10	1971-7	1971-11	96.8	96.8	-
	US-331	DUANE ARNOLD-1	BWR	BWR-4 (Mark 1)	1912	624	601	NEXTERA	1970-6	1974-5	1975-2	93.9	93.9	-
	US-348	FARLEY-1	PWR	WH 3LP (DRYAMB)	2775	918	874	SOUTHERN	1970-10	1977-8	1977-12	92.3	92.3	-
	US-364	FARLEY-2	PWR	WH 3LP (DRYAMB)	2775	928	883	SOUTHERN	1970-10	1981-5	1981-7	93.1	93.1	-
	US-341	FERMI-2	BWR	BWR-4 (Mark 1)	3486	1198	1115	DTEDISON	1972-9	1986-9	1988-1	86.2	86.2	-
	US-333	FITZPATRICK	BWR	BWR-4 (Mark 1)	2536	849	813	EXELON	1968-9	1975-2	1975-7	93.4	93.6	-
	US-244	GINNA	PWR	WH 2LP (DRYAMB)	1775	608	560	EXELON	1966-4	1969-12	1970-7	95.2	95.2	-
	US-416	GRAND GULF-1	BWR	BWR-6 (Mark 3)	4408	1500	1401	ENERGY	1974-5	1984-10	1985-7	80.0	80.2	-
	US-400	HARRIS-1	PWR	WH 3LP (DRYAMB)	2900	980	964	PROGRESS	1978-1	1987-5	1987-5	91.4	91.4	-
	US-321	HATCH-1	BWR	BWR-4 (Mark 1)	2804	911	876	SOUTHERN	1968-9	1974-11	1975-12	93.8	93.8	-
	US-366	HATCH-2	BWR	BWR-4 (Mark 1)	2804	921	883	SOUTHERN	1968-9	1978-9	1979-9	93.3	93.3	-
	US-354	HOPE CREEK-1	BWR	BWR-4 (Mark 1)	3840	1240	1172	PSEG	1976-3	1986-8	1986-12	93.3	93.3	-
	US-247	INDIAN POINT-2	PWR	WH 4LP (DRYAMB)	3216	1067	998	ENERGY	1966-10	1973-6	1974-8	91.4	91.4	-
	US-286	INDIAN POINT-3	PWR	WH 4LP (DRYAMB)	3216	1085	1030	ENERGY	1968-11	1976-4	1976-8	92.6	92.7	-
	US-373	LASALLE-1	BWR	BWR-5 (Mark 2)	3546	1207	1137	EXELON	1973-9	1982-9	1984-1	95.7	95.7	-
	US-374	LASALLE-2	BWR	BWR-5 (Mark 2)	3546	1207	1140	EXELON	1973-9	1984-4	1984-10	95.5	95.5	-
	US-352	LIMERICK-1	BWR	BWR-4 (Mark 2)	3515	1194	1134	EXELON	1974-6	1985-4	1986-2	95.2	95.2	-
	US-353	LIMERICK-2	BWR	BWR-4 (Mark 2)	3515	1194	1134	EXELON	1974-6	1985-4	1986-2	94.7	94.7	-
	US-369	MCGUIRE-1	PWR	WH 4LP (ICECND)	3411	1215	1158	DUKEENER	1971-4	1981-9	1981-12	92.6	92.6	-
	US-370	MCGUIRE-2	PWR	WH 4LP (ICECND)	3411	1215	1158	DUKEENER	1971-4	1983-5	1984-3	93.2	93.2	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applics
	Code	Name			Thermal	Gross								
USA	US-336	MILLSTONE-2	PWR	CE 2LP (DRYAMB)	2700	918	869	DOMINION CE	1989-11	1975-11	1975-12	91.6	91.7	-
	US-423	MILLSTONE-3	PWR	WH 4LP (DRYSUB)	3650	1280	1210	DOMINION WH	1974-8	1986-2	1986-4	92.1	92.1	-
	US-263	MONTECELLO	BWR	BWR-3 (Mark 1)	2004	691	628	NSP	1967-6	1971-3	1971-6	89.0	89.0	-
	US-220	NINE MILE POINT-1	BWR	BWR-2 (Mark 1)	1850	642	613	EXELON GE	1965-4	1969-11	1969-12	94.0	94.0	-
	US-410	NINE MILE POINT-2	BWR	BWR-5 (Mark 2)	3988	1320	1277	EXELON GE	1975-8	1987-8	1988-3	93.7	93.7	-
	US-338	NORTH ANNA-1	PWR	WH 3LP (DRYSUB)	2940	990	948	DOMINION WH	1971-2	1978-4	1978-6	90.4	92.6	-
	US-339	NORTH ANNA-2	PWR	WH 3LP (DRYSUB)	2940	1011	944	DOMINION WH	1971-2	1980-8	1980-12	89.9	92.5	-
	US-269	OCONEE-1	PWR	B&W LLP (DRYAM)	2568	891	847	DUKEENER B&W	1967-11	1973-5	1973-7	92.8	92.8	-
	US-270	OCONEE-2	PWR	B&W LLP (DRYAM)	2568	891	848	DUKEENER B&W	1967-11	1973-12	1974-9	94.1	94.1	-
	US-287	OCONEE-3	PWR	B&W LLP (DRYAM)	2568	900	859	DUKEENER B&W	1967-11	1974-9	1974-12	95.1	95.1	-
	US-255	PALISADES	PWR	CE 2LP (DRYAMB)	2565	850	805	ENTERGY CE	1967-3	1971-12	1971-12	89.1	89.1	-
	US-528	PALO VERDE-1	PWR	CE80 2LP (DRYA)	3990	1414	1311	APS	1976-5	1985-6	1986-1	91.9	91.9	-
	US-529	PALO VERDE-2	PWR	CE80 2LP (DRYA)	3990	1414	1314	APS	1976-6	1986-5	1986-9	93.1	93.1	-
	US-530	PALO VERDE-3	PWR	CE80 2LP (DRYA)	3990	1414	1312	APS	1976-6	1987-11	1988-1	92.2	92.2	-
	US-277	PEACH BOTTOM-2	BWR	BWR-4 (Mark 1)	3951	1412	1300	EXELON GE	1968-1	1974-2	1974-7	96.1	96.1	-
	US-278	PEACH BOTTOM-3	BWR	BWR-4 (Mark 1)	3951	1412	1331	EXELON GE	1968-1	1974-9	1974-12	95.6	95.6	-
	US-440	PERRY-1	BWR	BWR-6 (Mark 3)	3758	1303	1240	FENOC GE	1974-10	1986-12	1987-11	91.8	91.8	-
	US-266	POINT BEACH-1	PWR	WH 2LP (DRYAMB)	1800	640	591	NEXTERA WH	1967-7	1970-11	1970-12	93.0	93.0	-
	US-301	POINT BEACH-2	PWR	WH 2LP (DRYAMB)	1800	640	591	NEXTERA WH	1968-7	1972-8	1972-10	93.0	93.0	-
	US-282	PRAIRIE ISLAND-1	PWR	WH 2LP (DRYAMB)	1677	566	522	NSP	1968-6	1973-12	1973-12	91.5	91.5	-
	US-306	PRAIRIE ISLAND-2	PWR	WH 2LP (DRYAMB)	1677	560	519	NSP	1969-6	1974-12	1974-12	87.0	87.0	-
	US-254	QUAD CITIES-1	BWR	BWR-3 (Mark 1)	2957	940	908	EXELON GE	1967-2	1972-4	1973-2	96.2	96.2	-
	US-265	QUAD CITIES-2	BWR	BWR-3 (Mark 1)	2957	940	911	EXELON GE	1967-2	1972-5	1973-3	95.8	95.8	-
	US-458	RIVER BEND-1	PWR	BWR-6 (Mark 3)	3091	1016	967	ENTERGY GE	1977-3	1985-12	1986-6	90.1	90.1	-
	US-261	ROBINSON-2	PWR	WH 3LP (DRYAMB)	2339	780	741	PROGRESS WH	1967-4	1970-9	1971-3	85.7	85.8	-
	US-272	SALEM-1	PWR	WH 4LP (DRYAMB)	3459	1254	1169	PSEG WH	1968-9	1976-12	1977-6	89.0	89.2	-
	US-311	SALEM-2	PWR	WH 4LP (DRYAMB)	3459	1200	1158	PSEG WH	1968-9	1981-6	1981-10	90.2	90.3	-
	US-443	SEABROOK-1	PWR	WH 4LP (DRYAMB)	3648	1296	1246	NEXTERA WH	1976-7	1990-5	1990-8	93.1	93.1	-
	US-327	SEQUOYAH-1	PWR	WH 4LP (ICECND)	3455	1221	1152	TVA	1970-5	1980-7	1981-7	89.5	89.7	-
	US-328	SEQUOYAH-2	PWR	WH 4LP (ICECND)	3455	1200	1139	TVA	1970-5	1981-12	1982-6	92.0	92.0	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2019 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2010-2019	UCF % 2010-2019	Non-electrical applies
	Code	Name			Thermal	Gross								
USA	US-498	SOUTH TEXAS-1	PWR	WH 4LP (DRYAMB)	3853	1354	1280	STP	1975-12	1988-3	1988-8	90.9	90.9	-
	US-499	SOUTH TEXAS-2	PWR	WH 4LP (DRYAMB)	3853	1354	1280	STP	1975-12	1989-4	1989-6	86.1	86.1	-
	US-335	ST. LUCIE-1	PWR	CE 2LP (DRYAMB)	3020	1045	981	FPL	1970-7	1976-5	1976-12	84.8	84.8	-
	US-389	ST. LUCIE-2	PWR	CE 2LP (DRYAMB)	3020	1050	987	FPL	1977-6	1983-6	1983-8	87.6	87.9	-
	US-395	SUMMER-1	PWR	WH 3LP (DRYAMB)	2900	1006	973	SCE&G	1973-3	1982-11	1984-1	89.5	89.5	-
	US-280	SURRY-1	PWR	WH 3LP (DRYSUB)	2587	890	838	DOMINION	1968-6	1972-7	1972-12	91.5	91.7	-
	US-281	SURRY-2	PWR	WH 3LP (DRYSUB)	2587	890	838	DOMINION	1968-6	1973-3	1973-5	92.0	92.0	-
	US-387	SUSQUEHANNA-1	BWR	BWR-4 (Mark 2)	3952	1330	1257	PPL SUSQ	1973-11	1982-11	1983-6	87.9	87.9	-
	US-388	SUSQUEHANNA-2	BWR	BWR-4 (Mark 2)	3952	1330	1257	PPL SUSQ	1973-11	1984-7	1985-2	90.0	90.0	-
	US-250	TURKEY POINT-3	PWR	WH 3LP (DRYAMB)	2644	829	837	FPL	1967-4	1972-11	1972-12	87.3	87.4	-
	US-251	TURKEY POINT-4	PWR	WH 3LP (DRYAMB)	2644	829	821	FPL	1967-4	1973-6	1973-9	89.9	89.9	-
	US-424	VOGTLE-1	PWR	WH 4LP (DRYAMB)	3626	1229	1150	SOUTHERN	1976-8	1987-3	1987-6	94.7	94.7	-
	US-425	VOGTLE-2	PWR	WH 4LP (DRYAMB)	3626	1229	1152	SOUTHERN	1976-8	1989-4	1989-5	94.5	94.5	-
	US-382	WATERFORD-3	PWR	CE 2LP (DRYAMB)	3716	1250	1168	ENTERGY	1974-11	1985-3	1985-9	89.1	89.3	-
	US-390	WATTS BAR-1	PWR	WH 4LP (ICECND)	3459	1210	1157	TVA	1973-7	1996-2	1996-5	90.2	90.2	-
	US-391	WATTS BAR-2	PWR	WH 4LP (ICECND)	3411	1218	1164	TVA	1973-9	2016-6	2016-10	79.8	79.8	-
US-482	WOLF CREEK	PWR	WH 4LP (DRYAMB)	3565	1285	1200	WCNOC	1977-5	1985-6	1985-9	83.3	83.3	-	

Notes:

1. Status as of 31 December 2019. 443 reactors (392098 MW(e)) were connected to the grid, including 4 units (3844 MW(e)) in Taiwan, China.

TAIWAN, CHINA TW -3 KUOSHENG-1
 TAIWAN, CHINA TW -4 KUOSHENG-2
 TAIWAN, CHINA TW -5 MAANSHAN-1
 TAIWAN, CHINA TW -6 MAANSHAN-2

2. Factor Totals were calculated without 2019 data from seven reactor units in Germany, as information for these units was not submitted by Germany at the time of publication.

TABLE 15. REACTORS IN LONG TERM SHUTDOWN, 31 DEC. 2019

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Long term shutdown date
	Code	Name			Thermal	Gross	Net						

Note: Status as of 31 December 2019, no reactor was in long term shutdown.

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross	Net						
ARMENIA	AM-18	ARMENIAN-1	PWR	1375	408	376	ANPPC/JSC	FAEA	1969-7	1976-12	1977-10	1989-2
BELGIUM	BE-1	BR-3	PWR	41	12	10	CEN/SCK	WH	1957-11	1962-10	1962-10	1987-6
BULGARIA	BG-1	KOZLODUY-1	PWR	1375	440	408	KOZNP	AEE	1970-4	1974-7	1974-10	2002-12
	BG-2	KOZLODUY-2	PWR	1375	440	408	KOZNP	AEE	1970-4	1975-8	1975-11	2002-12
	BG-3	KOZLODUY-3	PWR	1375	440	408	KOZNP	AEE	1973-10	1980-12	1981-1	2006-12
	BG-4	KOZLODUY-4	PWR	1375	440	408	KOZNP	AEE	1973-10	1982-5	1982-6	2006-12
CANADA	CA-2	DOUGLAS POINT	PHWR	704	218	206	OH	AECL	1960-2	1967-1	1968-9	1984-5
	CA-3	GENTILLY-1	HWLWR	792	266	250	HQ	AECL	1966-9	1971-4	1972-5	1977-6
	CA-12	GENTILLY-2	PHWR	2156	675	635	HQ	AECL	1974-4	1982-12	1983-10	2012-12
	CA-5	PICKERING-2	PHWR	1744	542	515	OPG	OH/AECL	1966-9	1971-10	1971-12	2007-5
	CA-6	PICKERING-3	PHWR	1744	542	515	OPG	OH/AECL	1967-12	1972-5	1972-6	2008-10
	CA-1	ROLPHTON NPD	PHWR	92	25	22	OH	CGE	1958-1	1962-6	1962-10	1987-8
FRANCE	FR-9	BUGEY-1	GCR	1954	555	540	EDF	FRAM	1965-12	1972-4	1972-7	1994-5
	FR-2	CHINON A-1	GCR	300	80	70	EDF	LEVIVIER	1957-2	1963-6	1964-2	1973-4
	FR-3	CHINON A-2	GCR	800	230	180	EDF	LEVIVIER	1959-8	1965-2	1965-2	1985-6
	FR-4	CHINON A-3	GCR	1170	480	360	EDF	GTM	1961-3	1966-8	1966-8	1990-6
	FR-5	CHOOZ-A (ARDENNES)	PWR	1040	320	305	SENA	A/F/W	1962-1	1967-4	1967-4	1991-10
	FR-6	EL-4 (MONTS D'ARREE)	HWGCR	250	75	70	EDF	GAEA	1962-7	1967-7	1968-6	1985-7
	FR-1B	G-2 (MARCOULE)	GCR	260	43	39	COGEMA	SACM	1955-3	1959-4	1959-4	1980-2
	FR-1	G-3 (MARCOULE)	GCR	260	43	40	COGEMA	SACM	1956-3	1960-4	1960-4	1984-6
	FR-10	PHENIX	FBR	345	142	130	CEA/EDF	CNCLINEY	1968-11	1973-12	1974-7	2010-2
	FR-7	ST. LAURENT A-1	GCR	1650	500	390	EDF	FRAM	1963-10	1969-3	1969-6	1990-4
	FR-8	ST. LAURENT A-2	GCR	1475	530	465	EDF	FRAM	1966-1	1971-8	1971-11	1992-5
	FR-24	SUPER-PHENIX	FBR	3000	1242	1200	EDF	ASPALDO	1976-12	1986-1	1986-12	1998-12
GERMANY	DE-4	AVR JUELICH	HTGR	46	15	13	AVR	BBK	1961-8	1967-12	1969-5	1988-12
	DE-12	BIBLIS-A	PWR	3517	1225	1167	RWE	KWU	1970-1	1974-8	1975-2	2011-8

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019 — continued

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross	Net						
GERMANY	DE -18	BIBLIS-B	PWR	3733	1300	1240	RWE	KWU	1972-2	1976-4	1977-1	2011-8
	DE -13	BRUNSBUETTEL	BWR	2292	806	771	KKB	KWU	1970-4	1976-7	1977-2	2011-8
	DE -23	GRAFENRHEINFELD	PWR	3765	1345	1275	E.ON	KWU	1981-1	1981-12	1982-6	2015-6
	DE -502	GREIFSWALD-1	PWR	1375	440	408	EWN	EE	1970-3	1973-12	1974-7	1990-2
	DE -503	GREIFSWALD-2	PWR	1375	440	408	EWN	EE	1970-3	1974-12	1975-4	1990-2
	DE -504	GREIFSWALD-3	PWR	1375	440	408	EWN	EE	1972-4	1977-10	1978-5	1990-2
	DE -505	GREIFSWALD-4	PWR	1375	440	408	EWN	EE	1972-4	1979-9	1979-11	1990-2
	DE -506	GREIFSWALD-5	PWR	1375	440	408	EWN	EE	1976-12	1989-4	1989-11	1989-11
	DE -3	GUNDREMMINGEN-A	BWR	801	250	237	KGB	AEG,GE	1962-12	1966-12	1967-4	1977-1
	DE -26	GUNDREMMINGEN-B	BWR	3840	1344	1284	GGG	KWU	1976-7	1984-7	1984-7	2017-12
	DE -7	HDR GROSSWELZHEIM	BWR	100	27	25	HDR	AEG,KWU	1965-1	1969-10	1970-8	1971-4
	DE -16	ISAR-1	BWR	2575	912	878	E.ON	KWU	1972-5	1977-12	1979-3	2011-8
	DE -8	KNK II	FBR	58	21	17	KBG	IA	1974-9	1978-4	1979-3	1991-8
	DE -20	KRUJEMMEL	BWR	3690	1402	1346	KKK	KWU	1974-4	1983-9	1984-3	2011-8
	DE -6	LINGEN	BWR	520	268	183	KWL	AEG	1964-10	1968-7	1968-10	1977-1
	DE -22	MUELHEIM-KAERLICH	PWR	3760	1302	1219	GGG	BBR	1975-1	1986-3	1987-8	1988-9
	DE -2	MZFR	PWR	200	57	52	KBG	SIEMENS	1961-12	1966-3	1966-12	1984-5
	DE -15	NECKARWESTHEIM-1	PWR	2497	840	785	EnKK	KWU	1972-2	1976-6	1976-12	2011-8
	DE -11	NIEDERACHBACH	HWGCR	321	106	100	KKN	SIEM,KWU	1966-6	1973-1	1973-1	1974-7
	DE -5	OBRIGHEIM	PWR	1050	357	340	EnBW	SIEM,KWU	1965-3	1968-10	1969-3	2005-5
	DE -14	PHILIPPSBURG-1	BWR	2575	926	890	EnKK	KWU	1970-10	1979-5	1980-3	2011-8
	DE -24	PHILIPPSBURG-2	PWR	3950	1468	1402	EnKK	KWU	1977-7	1984-12	1985-4	2019-12
	DE -501	RHEINSBERG	PWR	265	70	62	EWN	EE	1960-1	1966-5	1966-10	1990-6
	DE -10	STADE	PWR	1900	672	640	E.ON	KWU	1967-12	1972-1	1972-5	2003-11
	DE -19	THTR-300	HTGR	760	308	296	HKG	HRB	1971-5	1985-11	1987-6	1988-9
	DE -17	UNTERWESER	PWR	3900	1410	1345	E.ON	KWU	1972-7	1978-9	1979-9	2011-8
DE -1	VAK KAHL	BWR	60	16	15	VAK	GE-AEG	1968-7	1961-6	1962-2	1985-11	
DE -9	WUERGASSEN	BWR	1912	670	640	PE	AEG,KWU	1968-1	1971-12	1975-11	1994-8	
ITALY	IT -4	CAORSO	BWR	2651	882	860	SOGIN	AMN/GETS	1970-1	1978-5	1981-12	1990-7
	IT -3	ENRICO FERMI	PWR	870	270	260	SOGIN	EL/WEST	1961-7	1964-10	1965-1	1990-7
	IT -2	GARIGLIANO	BWR	506	160	150	SOGIN	GE	1959-11	1964-1	1964-6	1982-3

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019 — continued

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross	Net						
ITALY	IT-1	LATINA	GCR	660	160	153	SOGIN	TNPG	1958-11	1963-5	1964-1	1987-12
JAPAN	JP-20	FUGEN ATR	HWLWR	557	165	148	JAEA	HITACHI	1972-5	1978-7	1979-3	2003-3
	JP-5	FUKUSHIMA-DAIICHI-1	BWR	1380	460	439	TEPCO	GE/GETSC	1967-7	1970-11	1971-3	2011-5
	JP-9	FUKUSHIMA-DAIICHI-2	BWR	2381	784	760	TEPCO	GE/T	1969-6	1973-12	1974-7	2011-5
	JP-10	FUKUSHIMA-DAIICHI-3	BWR	2381	784	760	TEPCO	TOSHIBA	1970-12	1974-10	1976-3	2011-5
	JP-16	FUKUSHIMA-DAIICHI-4	BWR	2381	784	760	TEPCO	HITACHI	1973-2	1978-2	1978-10	2011-5
	JP-17	FUKUSHIMA-DAIICHI-5	BWR	2381	784	760	TEPCO	TOSHIBA	1972-5	1977-9	1978-4	2013-12
	JP-18	FUKUSHIMA-DAIICHI-6	BWR	3293	1100	1067	TEPCO	GE/T	1973-10	1979-5	1979-10	2013-12
	JP-25	FUKUSHIMA-DAINI-1	BWR	3293	1100	1067	TEPCO	TOSHIBA	1976-3	1981-7	1982-4	2019-9
	JP-26	FUKUSHIMA-DAINI-2	BWR	3293	1100	1067	TEPCO	HITACHI	1979-5	1983-6	1984-2	2019-9
	JP-35	FUKUSHIMA-DAINI-3	BWR	3293	1100	1067	TEPCO	TOSHIBA	1981-3	1984-12	1985-6	2019-9
	JP-38	FUKUSHIMA-DAINI-4	BWR	3293	1100	1067	TEPCO	HITACHI	1981-5	1986-12	1987-8	2019-9
	JP-12	GENKAI-1	PWR	1650	559	529	KYUSHU	MHI	1971-9	1975-2	1975-10	2015-4
	JP-27	GENKAI-2	PWR	1650	559	529	KYUSHU	MHI	1977-2	1980-6	1981-3	2019-4
	JP-11	HAMAOKA-1	BWR	1593	540	515	CHUBU	TOSHIBA	1971-6	1974-8	1976-3	2009-1
	JP-24	HAMAOKA-2	BWR	2436	840	806	CHUBU	TOSHIBA	1974-6	1978-5	1978-11	2009-1
	JP-23	IKATA-1	PWR	1650	566	538	SHIKOKU	MHI	1973-9	1977-2	1977-9	2016-5
	JP-32	IKATA-2	PWR	1650	566	538	SHIKOKU	MHI	1978-8	1981-8	1982-3	2018-5
	JP-1	JPDR	BWR	90	13	12	JAEA	GE	1960-12	1963-10	1965-3	1976-3
	JP-4	MIHAMA-1	PWR	1031	340	320	KEPCO	WH	1967-2	1970-8	1970-11	2015-4
JP-6	MIHAMA-2	PWR	1456	500	470	KEPCO	MHI	1968-5	1972-4	1972-7	2015-4	
JP-31	MONJU	FBR	714	280	246	JAEA	T/H/F/M	1986-5	1995-8	NA	2017-12	
JP-15	OHI-1	PWR	3423	1175	1120	KEPCO	WH	1972-10	1977-12	1979-3	2018-3	
JP-19	OHI-2	PWR	3423	1175	1120	KEPCO	WH	1972-12	1978-10	1979-12	2018-3	
JP-22	ONAGAWA-1	BWR	1593	524	498	TOHOKU	TOSHIBA	1980-7	1983-11	1984-6	2018-12	
JP-7	SHIMANE-1	BWR	1380	460	439	CHUGOKU	HITACHI	1970-7	1973-12	1974-3	2015-4	
JP-2	TOKAI-1	GCR	587	166	137	JAPCO	GEC	1961-3	1965-11	1966-7	1998-3	
JP-3	TSURUGA-1	BWR	1070	357	340	JAPCO	GE	1966-11	1969-11	1970-3	2015-4	
KAZAKHSTAN	KZ-10	AKTAU	FBR	1000	90	52	MAEC-KAZ	MAEC-KAZ	1964-10	1973-7	1973-7	1999-4
KOREA, REP. OF	KR-1	KORI-1	PWR	1729	607	576	KHNP	WH	1972-8	1977-6	1978-4	2017-6

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross						
KOREA, REP. OF	KR-3	WOLSONG-1	PHWR	2061	683	661	AECL	1977-10	1982-12	1983-4	2019-12
LITHUANIA	LT-46	IGNALINA-1	LWGR	4800	1300	1185	MAEP	1977-5	1983-12	1985-5	2004-12
	LT-47	IGNALINA-2	LWGR	4800	1300	1185	MAEP	1978-1	1987-8	1987-12	2009-12
NETHERLANDS	NL-1	DODEWAARD	BWR	183	60	55	RDM	1965-5	1968-10	1969-3	1997-3
RUSSIA	RU-1	APS-1 OBNINSK	LWGR	30	6	5	MSM	1951-1	1954-6	1954-12	2002-4
	RU-3	BELOYARSK-1	LWGR	286	108	102	REA	1958-6	1964-4	1964-4	1983-1
	RU-6	BELOYARSK-2	LWGR	530	160	146	REA	1962-1	1967-12	1969-12	1990-1
	RU-141	BILIBINO-1	LWGR	62	12	11	REA	1970-1	1974-1	1974-4	2019-1
	RU-15	LENINGRAD-1	LWGR	3200	1000	925	REA	1970-3	1973-12	1974-11	2018-12
	RU-4	NOVOVORONEZH-1	PWR	760	210	197	REA	1957-7	1964-9	1964-12	1988-2
	RU-8	NOVOVORONEZH-2	PWR	1320	365	336	REA	1964-6	1969-12	1970-4	1990-8
	RU-9	NOVOVORONEZH-3	PWR	1375	417	385	REA	1967-7	1971-12	1972-6	2016-12
	SLOVAKIA	SK-1	BOHUNICE A1	HWGCR	560	143	93	JAVYS	1958-8	1972-12	1972-12
SK-2		BOHUNICE-1	PWR	1375	440	408	JAVYS	1972-4	1978-12	1980-4	2006-12
SK-3		BOHUNICE-2	PWR	1375	440	408	JAVYS	1972-4	1980-3	1981-1	2008-12
SPAIN	ES-1	JOSE CABRERA-1	PWR	510	150	141	UFG	1964-6	1968-7	1969-8	2006-4
	ES-2	SANTA MARIA DE GARONA	BWR	1381	466	446	NUCLEONOR GE	1966-9	1971-3	1971-5	2007-8
	ES-3	VANDELLOS-1	GCR	1670	500	480	HIFRENZA CEA	1968-6	1972-5	1972-8	1990-7
SWEDEN	SE-1	AGESTA	PHWR	80	12	10	SVAFO	1957-12	1964-5	1964-5	1974-6
	SE-6	BARSEBACK-1	BWR	1800	615	600	BKAB	1971-2	1975-5	1975-7	1999-11
	SE-8	BARSEBACK-2	BWR	1800	615	600	BKAB	1973-7	1977-3	1977-3	2005-5
	SE-2	OSKARSHAMN-1	BWR	1375	492	473	OKG	1966-8	1971-8	1972-2	2017-6
	SE-3	OSKARSHAMN-2	BWR	1800	661	638	OKG	1969-9	1974-10	1975-1	2016-12
SE-5	RINGHALS-2	PWR	2652	963	852	RAB	1970-10	1974-8	1975-5	2019-12	

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019 — continued

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross	Net						
SWITZERLAND	CH-8	MUEHNS	HWGCR	208	390	6	EOS	NGA	1962-4	1968-1	NA	1969-1
	CH-2	LUCHENBERG	BWR	1097	373	373	BKW	GETSCO	1967-3	1971-7	1972-11	2019-12
UK	GB-3A	BERKELEY-1	GCR	620	166	138	ML	TNPG	1957-1	1962-6	1962-6	1989-3
	GB-3B	BERKELEY-2	GCR	620	166	138	ML	TNPG	1957-1	1962-6	1962-10	1988-10
	GB-4A	BRADWELL-1	GCR	481	146	123	ML	TNPG	1957-1	1962-7	1962-7	2002-3
	GB-4B	BRADWELL-2	GCR	481	146	123	ML	TNPG	1957-1	1962-7	1962-11	2002-3
	GB-1A	CALDER HALL-1	GCR	268	60	49	SL	UKAEA	1953-8	1956-8	1956-10	2003-3
	GB-1B	CALDER HALL-2	GCR	268	60	49	SL	UKAEA	1953-8	1957-2	1957-2	2003-3
	GB-1C	CALDER HALL-3	GCR	268	60	49	SL	UKAEA	1953-8	1958-3	1958-5	2003-3
	GB-1D	CALDER HALL-4	GCR	268	60	49	SL	UKAEA	1953-8	1959-4	1959-4	2003-3
	GB-2A	CHAPELCROSS-1	GCR	260	60	48	ML	UKAEA	1955-10	1959-2	1959-3	2004-6
	GB-2B	CHAPELCROSS-2	GCR	260	60	48	ML	UKAEA	1955-10	1959-7	1959-8	2004-6
	GB-2C	CHAPELCROSS-3	GCR	260	60	48	ML	UKAEA	1955-10	1959-11	1959-12	2004-6
	GB-2D	CHAPELCROSS-4	GCR	260	60	48	ML	UKAEA	1955-10	1960-1	1960-3	2004-6
GB-14	DOUNREAY DFR	FBR	60	15	11	UKAEA	UKAEA	1955-3	1962-10	1962-10	1977-3	
GB-15	DOUNREAY PFR	FBR	600	250	234	UKAEA	TNPG	1966-1	1975-1	1976-7	1994-3	
GB-9A	DUNGENESS A-1	GCR	840	230	225	ML	TNPG	1960-7	1965-9	1965-10	2006-12	
GB-9B	DUNGENESS A-2	GCR	840	230	225	ML	TNPG	1960-7	1965-11	1965-12	2006-12	
GB-7A	HINKLEY POINT A-1	GCR	900	267	235	ML	EE/B&W/T	1957-11	1965-2	1965-3	2000-5	
GB-7B	HINKLEY POINT A-2	GCR	900	267	235	ML	EE/B&W/T	1957-11	1965-3	1965-5	2000-5	
GB-6A	HUNTERSTON A-1	GCR	595	173	150	ML	GEC	1957-10	1964-2	1964-2	1990-3	
GB-6B	HUNTERSTON A-2	GCR	595	173	150	ML	GEC	1957-10	1964-6	1964-7	1989-12	
GB-11A	OLDBURY A-1	GCR	730	230	217	ML	TNPG	1962-5	1967-11	1967-12	2012-2	
GB-11B	OLDBURY A-2	GCR	660	230	217	ML	TNPG	1962-5	1968-4	1968-9	2011-6	
GB-10A	SIZEWELL A-1	GCR	1010	245	210	ML	EE/B&W/T	1961-4	1966-1	1966-3	2006-12	
GB-10B	SIZEWELL A-2	GCR	1010	245	210	ML	EE/B&W/T	1961-4	1966-4	1966-9	2006-12	
GB-8A	TRAWSFYNYDD-1	GCR	850	235	195	ML	APC	1959-7	1965-1	1965-3	1991-2	
GB-8B	TRAWSFYNYDD-2	GCR	850	235	195	ML	APC	1959-7	1965-2	1965-3	1991-2	
GB-5	WINDSCALE AGR	GCR	120	36	24	UKAEA	UKAEA	1958-11	1963-2	1963-3	1981-4	
GB-12	WINFRITH SGHWR	SGHWR	318	100	92	UKAEA	ICL/FE	1963-5	1967-12	1968-1	1990-9	

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross						
UK	GB-13A	WYLFA-1	GCR	1650	530	490	EE/B&W/T	1963-9	1971-1	1971-11	2015-12
	GB-13B	WYLFA-2	GCR	1920	540	490	EE/B&W/T	1963-9	1971-7	1972-1	2012-4
UKRAINE	UA-25	CHERNOBYL-1	LWGR	3200	800	740	FAEA	1970-3	1977-9	1978-5	1996-11
	UA-26	CHERNOBYL-2	LWGR	3200	1000	925	FAEA	1973-2	1978-12	1979-5	1991-10
	UA-42	CHERNOBYL-3	LWGR	3200	1000	925	FAEA	1976-3	1981-12	1982-6	2000-12
	UA-43	CHERNOBYL-4	LWGR	3200	1000	925	FAEA	1979-4	1983-12	1984-3	1986-4
USA	US-155	BIG ROCK POINT	BWR	240	71	67	GE	1960-5	1962-12	1963-3	1997-8
	US-014	BONUS	BWR	50	18	17	DOE/PRWR	1960-1	1964-8	1965-9	1968-6
	US-302	CRYSTAL RIVER-3	PWR	2568	890	860	PROGRESS	1968-9	1977-1	1977-3	2013-2
	US-144	CVTR	PHWR	65	19	17	CVPA	1960-1	1963-12	1963-12	1967-1
	US-10	DRESDEN-1	BWR	700	207	197	EXELON	1956-5	1960-4	1960-7	1978-10
	US-011	ELK RIVER	BWR	58	24	22	RCPA	1959-1	1963-8	1964-7	1968-2
	US-16	FERMI-1	FBR	200	65	61	DTEDISON	1956-8	1966-8	1966-8	1972-11
	US-285	FORT CALHOUN-1	PWR	1500	512	482	EXELON	1968-6	1973-8	1973-9	2016-10
	US-267	FORT ST. VRAIN	HTGR	842	342	330	PSCC	1968-9	1976-12	1979-7	1989-8
	US-018	GE VALLECITOS	BWR	50	24	24	GE	1956-1	1957-10	1957-10	1963-12
	US-213	HADDAM NECK	PWR	1825	603	560	CYAPC	1964-5	1967-8	1968-1	1996-12
	US-077	HALLAM	X	256	84	75	AEC/NPPD	1959-1	1963-9	1963-11	1964-9
	US-133	HUMBOLDT BAY	BWR	220	65	63	PG&E	1960-11	1963-4	1963-8	1976-7
	US-013	INDIAN POINT-1	PWR	615	277	257	ENTERGY	1956-5	1962-9	1962-10	1974-10
	US-305	KEWAUNEE	PWR	1772	595	566	DOMINION	1968-8	1974-4	1974-6	2013-5
	US-409	LACROSSE	BWR	165	55	48	DPC	1963-3	1968-4	1969-11	1987-4
	US-309	MAINE YANKEE	PWR	2630	900	860	MYAPC	1968-10	1972-11	1972-12	1997-8
	US-245	MILLSTONE-1	BWR	2011	684	641	DOMINION	1966-5	1970-11	1971-3	1998-7
	US-219	OYSTER CREEK	BWR	1930	652	619	EXELON	1964-12	1969-9	1969-12	2018-9
	US-130	PATHFINDER	BWR	220	63	59	NMC	1959-1	1966-7	1966-8	1967-10
US-171	PEACH BOTTOM-1	HTGR	115	42	40	EXELON	1962-1	1967-1	1967-6	1974-11	
US-293	PILGRIM-1	BWR	2028	711	677	ENTERGY	1968-8	1972-7	1972-12	2019-5	
US-012	PIQUA	X	46	12	12	CofPiqua	1960-1	1963-7	1963-11	1966-1	
US-312	RANCHO SECO-1	PWR	2772	917	873	SMUD	1969-4	1974-10	1975-4	1989-6	

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2019 — continued

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shut down
	Code	Name		Thermal	Gross	Net						
USA	US -206	SAN ONOFRE-1	PWR	1347	456	436	SCE	WH	1964-5	1967-7	1968-1	1992-11
	US -361	SAN ONOFRE-2	PWR	3438	1127	1070	SCE	CE	1974-3	1982-9	1983-8	2013-6
	US -362	SAN ONOFRE-3	PWR	3438	1127	1080	SCE	CE	1974-3	1983-9	1984-4	2013-6
	US -146	SAXTON	PWR	24	3	3	SNEC	GE	1960-1	1967-3	1967-3	1972-5
	US -001	SHIPPINGPORT	PWR	236	68	60	DOE DUQU	WH	1954-1	1957-12	1958-5	1982-10
	US -322	SHOREHAM	BWR	2436	849	820	LIPA	GE	1972-11	1986-8	1986-8	1989-5
	US -289	THREE MILE ISLAND-1	PWR	2568	880	819	EXELON	B&W	1968-5	1974-6	1974-9	2019-9
	US -320	THREE MILE ISLAND-2	PWR	2772	959	880	GPU	B&W	1969-11	1978-4	1978-12	1979-3
	US -344	TROJAN	PWR	3411	1155	1095	PORTGE	WH	1970-2	1975-12	1976-5	1992-11
	US -271	VERMONT YANKEE	BWR	1912	635	605	ENTERGY	GE	1967-12	1972-9	1972-11	2014-12
	US -29	YANKEE NPS	PWR	600	180	167	YAEC	WH	1957-11	1960-11	1961-7	1991-10
	US -295	ZION-1	PWR	3250	1085	1040	EXELON	WH	1968-12	1973-6	1973-12	1998-2
	US -304	ZION-2	PWR	3250	1085	1040	EXELON	WH	1968-12	1973-12	1974-9	1998-2

Note: Status as of 31 December 2019, 186 reactors (82083 MW(e)) have been permanently shut down, including 2 units (1208 MW(e)) in Taiwan, China.

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2019

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	Licence expiration
	Code	Name							
ARMENIA	AM-18	ARMENIAN-1	1989-2	Others	Other			ANPPCJSC	
BELGIUM	BE-1	BR-3	1987-6	2,5	ID	4,9,10	4	CEN/SCK	
BULGARIA	BG-1	KOZLODUY-1	2002-12	Others	Dd+PD+SE	6	3,6,7	E-03492	2031
	BG-2	KOZLODUY-2	2002-12	Others	Dd+PD+SE	6	3,6,7	E-03493	2031
	BG-3	KOZLODUY-3	2006-12	Others	Dd+PD+SE	6	3,7	E-00174	2031
	BG-4	KOZLODUY-4	2006-12	Others	Dd+PD+SE	6	3,6,7	E-0008	2031
CANADA	CA-1	ROLPHTON NPD	1987-8	2	Dd+PD+SE	8		AECL	
	CA-2	DOUGLAS POINT	1984-5	2	Dd+SE	8	7	AECL	
	CA-3	GENTILLY-1	1977-6	2	Dd+PD+SE	8	7	AECL/HQ	
	CA-5	PICKERING-2	2007-5	2	Dd+PD+SE	8		OPG	
	CA-6	PICKERING-3	2008-10	2	ISD			OPG	
FRANCE	FR-10	PHENIX	2010-2	Others	ID				
	FR-2	CHINON A-1	1973-4	1,2	ID			EDF	
	FR-24	SUPER-PHENIX	1998-12	Others	ID	9	3,6	NERSA	
	FR-3	CHINON A-2	1985-6	1,2	ID			EDF	2025
	FR-4	CHINON A-3	1990-6	1,2	ID	9		EDF	
	FR-5	CHOOZ-A (ARDENNES)	1991-10	Others	ID	11		SENA	2019
	FR-6	EL-4 (MONTS D'ARREE)	1985-7	1,2	ID			EDF	2015
	FR-7	ST. LAURENT A-1	1990-4	1,2	ID			EDF	2027
	FR-8	ST. LAURENT A-2	1992-5	1,2	ID			EDF	2025
	FR-9	BUGEY-1	1994-5	1,2	ID	9		EDF	2020
GERMANY	DE-1	VAK KAHL	1985-11	Others	Other			VAK	2010
	DE-10	STADE	2003-11	2	ID	3,4,6		PElectra	2023
	DE-11	NIEDERAICHBACH	1974-7	6	Other			KIT	1995
	DE-12	BIBLIS-A	2011-8	7	ID		3,7	RWE	
	DE-13	BRUNSBUETTEL	2011-8	7	ID	1	3	KKB	
	DE-14	PHILIPPSBURG-1	2011-8	7	ID	1	3	EnKK	
	DE-15	NECKARWESTHEIM-1	2011-8	7	ID	1	3	EnKK	
	DE-16	ISAR-1	2011-8	7	ID	2	2,3	PElectra	2038
	DE-17	UNTERWESER	2011-8	7	ID	2	2,3	E.ON	2035
	DE-18	BIBLIS-B	2011-8	7	ID	2		RWE	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2019 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	Licence expiration	
	Code	Name								
GERMANY	DE -19	THTR-300	1988-9	6,Others	Other			HKG		
	DE -2	MZFR	1984-5	Others	Other			KTE		
	DE -20	KRUJEMMEL	2011-8	7	ID	1	3	KKK		
	DE -22	MUELHEIM-KAERLICH	1988-9	7	Other			RWE		
	DE -23	GRAFENRHEINFELD	2015-6	7	ID		2,3	PElectra	2035	
	DE -3	GUNDREMMINGEN-A	1977-1	6,8	ID			KGG		
	DE -4	AVR JUELICH	1988-12	7	ID	3,4				
	DE -5	BRIGHEIM	2005-5	7	ID			EnKK		
	DE -501	RHEINBERG	1990-6	1,3,6,7	ID	9	4,7	G 01 KKR		
	DE -502	GREIFSWALD-1	1990-2	1,3,6,7	ID	3,9	7	G 01 KGR		
	DE -503	GREIFSWALD-2	1990-2	1,3,6,7	ID	3,9	3,7	G 01 KGR		
	DE -504	GREIFSWALD-3	1990-2	1,3,6,7	ID	3,9	7	G 01 KGR		
	DE -505	GREIFSWALD-4	1990-7	1,3,6,7	ID	3	3,7	G 01 KGR		
	DE -506	GREIFSWALD-5	1989-11	1,2,3,6,7	ID	1,3,9	3,7	G 01 KGR		
	DE -6	LINGEN	1977-1	2,5,6	ID	1,3,4,9		RWE AG	1998	
	DE -7	HDR GROSSWELZHEIM	1971-4	5	Other			KIT		
	DE -8	KNK II	1991-8	5	Other			KTE		
	DE -9	WUERGASSEN	1994-8	2	ID			E.ON		
	ITALY	IT -1	LATINA	1987-12	7,Others	Other	3,6		SOGIN	2043
		IT -2	GARIGLIANO	1982-3	3,4,Others	ID	3,6,9		SOGIN	2033
IT -3		ENRICO FERMI	1990-7	7,Others	ID	6		SOGIN	2036	
IT -4		CAORSO	1990-7	7,Others	ID	4,9		SOGIN	2034	
JAPAN	JP -1	JPDR	1976-3	Others	ID	3		JAERI	2002	
	JP -10	FUKUSHIMA-DAIICHI-3	2011-5	Others	Other			TEPCO DL		
	JP -11	HAMAOKA-1	2009-1	6	Dd+SE	3,4,6,7		CHUBU DL	2037	
	JP -12	GENKAI-1	2015-4	3	Dd+PD+SE	6		KYUSHU		
	JP -15	OHI-1	2018-3	3	Dd+PD+SE	8		KEPCO	2049	
	JP -16	FUKUSHIMA-DAIICHI-4	2011-5	Others	Other			TEPCO DL		
	JP -17	FUKUSHIMA-DAIICHI-5	2013-12	Others	Other			TEPCO DL		
	JP -18	FUKUSHIMA-DAIICHI-6	2013-12	Others	Other			TEPCO DL		
	JP -19	OHI-2	2018-3	3	Dd+PD+SE	8		KEPCO	2049	
	JP -2	TOKAI-1	1988-3	2	Dd+PD+SE	3,4,6,7,9		JAPCO	2030	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2019 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	Licence expiration	
	Code	Name								
JAPAN	JP -20	FUGEN-ATR	2003-3	2	ID	1,6	5	JAEA	2034	
	JP -23	IKATA-1	2016-5	Others	Dd+SE	7	2	SHIKOKU	2056	
	JP -24	HAMAOKA-2	2009-1	6	Dd+SE	3,4,6,7		CHUBU DL	2037	
	JP -3	TSURUGA-1	2015-4	3	Dd+PD+SE	3,4,6,7		JAPCO	2040	
	JP -31	MONJU	2017-12	7	ID	1,2	1		2047	
	JP -32	IKATA-2	2018-5	Others	Other	1		SHIKOKU		
	JP -4	MIHAMA-1	2015-4	3	Dd+PD+SE	3,6,8		KEPCO	2046	
	JP -5	FUKUSHIMA-DAIICHI-1	2011-5	Others	Other			TEPCO DL		
	JP -6	MIHAMA-2	2015-4	3	Dd+PD+SE	3,6,8		KEPCO	2046	
	JP -7	SHIMANE-1	2015-4	6	Other			CHUGOKU		
KAZAKHSTAN	JP -9	FUKUSHIMA-DAIICHI-2	2011-5	Others	Other			TEPCO DL		
	KZ -10	AKTAU	1999-4	2,5	Dd+PD+SE	1,6	4,7	MAEC-KAZ		
	KR -1	KORI-1	2017-6	7,Others	ID	1		KHNP		
	KOREA, REP. OF	LT -46	IGNALINA-1	2004-12	7,Others	ID	3,9	2,3,7	INPP	2038
		LT -47	IGNALINA-2	2009-12	7,Others	ID	3,9	2,3,7	INPP	2038
	LITHUANIA	NL -1	DODEWAARD	1997-3	2,Others	Dd+SE	7		BV GKN	2055
		RU -3	BELOYARSK-1	1983-1	Others	Other			EA	
	NETHERLANDS	RU -4	NOVOVORONEZH-1	1988-2	Others	Other			EA	
		RU -6	BELOYARSK-2	1990-1	Others	Other			EA	
	RUSSIA	RU -8	NOVOVORONEZH-2	1990-8	Others	Other			EA	
SK -1		BOHUNICE A1	1977-2	4	Dd+PD+SE	3,6		JAVVS		
SLOVAKIA	SK -2	BOHUNICE-1	2006-12	7	ID	3,4,9	7	JAVVS	2015	
	SK -3	BOHUNICE-2	2008-12	7	ID			JAVVS	2031	
SPAIN	ES -1	JOSE CABRERA-1	2006-4	Others	ID	1		NN	2032	
	ES -2	SANTA MARIA DE GARONA	2017-8	Others	ID	8		ENRESA		
SWEDEN	ES -3	VANDELLOS-1	1990-7	4	Dd+PD+SE	7	4	VAB		
	SE -1	AGESTA	1974-6	2	Dd+SE	7	4	OKG		
SWITZERLAND	SE -2	OSKARSHAMN-1	2017-6	2	ID	1,6	4	OKG		
	SE -3	OSKARSHAMN-2	2016-12	2	ID	1	4	OKG		
LUGENS	SE -6	BARSEBACK-1	1999-11	Others	Other	1,6	4	BKAB	2033	
	SE -8	BARSEBACK-2	2005-5	Others	Other	1,6	4	BKAB	2033	
	CH -8	LUGENS	1969-1	4	Dd+SE	1	4	EOS	2004	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2019 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	Licence expiration
	Code	Name							
UK	GB-10A	SIZEWELL A-1	2006-12	2,8	Dd+SE	8		Magnox S	2110
	GB-10B	SIZEWELL A-2	2006-12	2,8	Dd+SE	8		Magnox S	2110
	GB-12	WINFRITH SGHWR	1990-9	Others	ID	10,11		UKAEA	2019
	GB-14	DOUNREAY DFR	1977-3	Others	Dd+PD+SE	5		DSR	2333
	GB-15	DOUNREAY PFR	1994-3	Others	Dd+PD+SE	5		Magnox N	2333
	GB-1A	CALDER HALL-1	2003-3	2,8	Dd+PD+SE	8		SL	2117
	GB-1B	CALDER HALL-2	2003-3	2,8	Dd+PD+SE	8		SL	2117
	GB-1C	CALDER HALL-3	2003-3	2,8	Dd+PD+SE	8		SL	2117
	GB-1D	CALDER HALL-4	2003-3	2,8	Dd+PD+SE	8		SL	2117
	GB-2A	CHAPELCROSS-1	2004-6	2,8	Dd+PD+SE	8		Magnox N	2128
	GB-2B	CHAPELCROSS-2	2004-6	2,8	Dd+PD+SE	8		Magnox N	2128
	GB-2C	CHAPELCROSS-3	2004-6	2,8	Dd+PD+SE	8		Magnox N	2128
	GB-2D	CHAPELCROSS-4	2004-6	2,8	Dd+PD+SE	8		Magnox N	2128
	GB-3A	BERKELEY-1	1989-3	2,8	Dd+SE	8		Magnox S	2083
	GB-3B	BERKELEY-2	1988-10	2,8	Dd+SE	8		Magnox S	2083
	GB-4A	BRADWELL-1	2002-3	2,8	Dd+SE	8		Magnox S	2104
	GB-4B	BRADWELL-2	2002-3	2,8	Dd+SE	8		Magnox S	2104
	GB-5	WINDSCALE AGR	1981-4	Others	Dd+PD+SE	7		SL	2065
	GB-6A	HUNTERSTON A-1	1990-3	2,8	Dd+PD+SE	8		Magnox N	2090
	GB-6B	HUNTERSTON A-2	1989-12	2,8	Dd+PD+SE	8		Magnox N	2090
GB-7A	HINKLEY POINT A-1	2000-5	2,8	Dd+PD+SE	8		Magnox S	2104	
GB-7B	HINKLEY POINT A-2	2000-5	2,8	Dd+PD+SE	8		Magnox S	2104	
GB-8A	TRAWSFYNDD-1	1991-2	2,8	Dd+PD+SE	8		Magnox N	2098	
GB-8B	TRAWSFYNDD-2	1991-2	2,8	Dd+PD+SE	8		Magnox N	2098	
GB-9A	DUNGENESS A-1	2006-12	2,8	Dd+PD+SE	8		Magnox N	2111	
GB-9B	DUNGENESS A-2	2006-12	2,8	Dd+PD+SE	8		Magnox S	2111	
USA	US-001	SHIPPINGPORT	1982-10	3	Dd+PD+SE	8		DOE DUQU	1989
	US-011	ELK RIVER	1968-2	1,Others	ID			RCPA	1974
	US-012	PIQUA	1966-1	4,5	ISD	11		CoPIqua	
	US-013	INDIAN POINT-1	1974-10	5	Dd+PD+SE			ENERGY	
	US-014	BONUS	1968-6	5,6	ISD			DOE/PRWR	
	US-018	GE VALLECITOS	1963-12	1	Dd+SE			GE&PGEC	1970

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2019 — continued

Country	Reactor		Shut down	Shut down reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	Licence expiration
	Code	Name							
USA	US -077	HALLAM	1964-9	5	Dd+SE			AEC&NPPD	1971
	US -10	DRESDEN-1	1978-10	6	Dd+SE	9,11	7	EXELON	
	US -130	PATHFINDER	1967-10	5	Dd+SE	11		NMC	
	US -133	HUMBOLDT BAY	1976-7	5	Dd+PD+SE	3,4,6		PG&E	2013
	US -144	CVTR	1967-1	7,Others	Dd+SE			CVPA	2009
	US -146	SAXTON	1972-5	Others	ID		7	GPUNC	2005
	US -155	BIG ROCK POINT	1997-8	2,Others	ID	9,11		CPC	2007
	US -16	FERMI-1	1972-11	4,5	Dd+SE	1,9		DTEISON	2025
	US -171	PEACH BOTTOM-1	1974-11	1	Dd+SE	4		EXELON	2008
	US -206	SAN ONOFRE-1	1992-11	Others	Dd+PD+SE	4		SCE	2007
	US -213	HADDAM NECK	1996-12	6	ID	4,6		CYAPC	
	US -245	MILLSTONE-1	1998-7	6	Dd+PD+SE			DOMINRES	1996
	US -267	FORT ST. VRAIN	1989-8	1,Others	ID			PSCC	2005
	US -29	YANKEE NPS	1991-10	5,7	ID	4,6		YAEC	
	US -295	ZION-1	1998-2	5,6	Dd+PD+SE	1,9		CommonEd	
	US -304	ZION-2	1998-2	5,6	Dd+PD+SE	1,9		COMMED	
	US -305	KEWAUNEE	2013-5	2,6	Dd+SE			DOMINRES	
	US -309	MAINE YANKEE	1997-8	6	ID	4	7	MYAPC	2005
	US -312	RANCHO SECO-1	1989-6	5,6	Dd+PD+SE			SMUD	2009
	US -320	THREE MILE ISLAND-2	1979-3	4,5	Other	9,11	4	GPU	
	US -322	SHOREHAM	1989-5	7,Others	ID			LIPA	1995
	US -344	TROJAN	1992-11	6	Dd+PD+SE	9		PORTGE	2005
	US -409	LACROSSE	1987-4	2	Dd+PD+SE	9	7	DPC	

TABLE 17. DEFINITIONS FOR REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED

Shutdown reason	Description	Decommissioning strategy	Description
1	The technology or process being used became obsolete	ID	Immediate dismantling and removal of all radioactive materials
2	The process was no longer profitable	Dd+SE	Deferred dismantling, placing all radiological areas into safe enclosure
3	Changes in licensing	Dd+PD+SE	Deferred dismantling, including partial dismantling and placing remaining radiological areas into safe enclosure
4	After an operating incident	ISD	In situ disposal, involving encapsulation of radioactive materials and subsequent restriction of access
5	Other technological reasons		
6	Other economical reasons		
7	Public acceptance or political reasons	Other	None of the above
8	After major component failure or deterioration		
Other	None of the above		
Fuel Management	Description	Current decommissioning phase	Description
1	Transfer to a reactor facility	1	Drawing up the Final Decommissioning Plan
2	Transfer away from a reactor facility	2	Reactor core defuelling
3	Storage in an on-site facility	3	Waste conditioning on-site - only for decommissioning waste
4	Storage in an off-site facility	4	Waste shipment off-site - only for decommissioning waste
5	Shipment to a reprocessing plant	5	Safe enclosure preparation
6	Underwater storage period	6	Partial dismantling
7	Dry storage period	7	Active safe enclosure period
8	Encapsulation	8	Passive safe enclosure period
		9	Final dismantling
		10	Final survey
		11	Licence terminated - legal act at the end of the decommissioning process

TABLE 18. PERFORMANCE FACTORS BY REACTOR CATEGORY, 2017 to 2019

Reactor category	Reactors reporting to IAEA PRIS (see note)							
	Number of units	Availability factor (%)	Planned cap. loss factor (%)	Capacity factor (%)	Forced loss rate (%)	Operating factor (%)	Load factor (%)	
PWR	305	78.8	15.4	79.9	2.7	79.5	78.0	
PWR < 600 Mw(e)	42	75.2	21.8	75.9	1.5	77.3	74.8	
PWR >= 600 Mw(e)	263	79.0	14.9	80.2	2.8	79.9	78.2	
BWR	78	62.3	35.7	62.7	1.9	62.5	61.1	
BWR < 600 Mw(e)	7	39.6	59.1	40.4	1.2	54.4	39.7	
BWR >= 600 Mw(e)	71	62.9	35.2	63.2	1.9	63.1	61.6	
PHWR	49	76.0	18.8	76.6	3.9	76.5	75.9	
PHWR < 600 Mw(e)	26	77.8	16.6	78.8	4.1	76.2	77.7	
PHWR >= 600 Mw(e)	23	75.2	19.7	75.7	3.8	76.9	75.1	
LWGR	15	74.5	22.0	74.8	3.4	76.9	75.7	
LWGR < 600 Mw(e)	4	77.8	22.2	77.8	0.0	76.7	49.5	
LWGR >= 600 Mw(e)	11	74.5	22.0	74.8	3.4	77.0	75.8	
GCR	14	72.7	10.9	72.9	4.6	76.1	72.6	
FBR	2	72.7	23.2	73.5	2.7	76.7	73.9	
TOTAL	463	75.3	19.4	76.3	2.7	76.2	74.6	

Notes:

1. Reactors shut down during 2017 to 2019 (25 units) are considered.
2. Numbers do not include 2019 statistics from seven German reactors units, as information for these individual reactor units was not submitted by the time of publication.

TABLE 19. FULL OUTAGE STATISTICS DURING 2019

Reactor type	Number of operating reactors	Full outage hours per operating reactor	Planned outages (%)	Unplanned outages (%)	External outages (%)
PWR	301	1589	77.2	18.7	4.1
PWR < 600 Mw(e)	40	1625	92.7	6.9	0.4
PWR >= 600 Mw(e)	261	1583	74.7	20.6	4.7
BWR	72	2870	97.6	2.2	0.2
BWR < 600 Mw(e)	4	2320	97.3	2.7	0.0
BWR >= 600 Mw(e)	68	2902	97.6	2.2	0.2
PHWR	49	1894	80.2	19.5	0.3
PHWR < 600 Mw(e)	26	1884	82.5	17.5	0.0
PHWR >= 600 Mw(e)	23	1905	77.7	21.8	0.5
LWGR	14	1905	97.0	3.0	0.0
LWGR < 600 Mw(e)	4	1082	100.0	0.0	0.0
LWGR >= 600 Mw(e)	10	2234	96.4	3.6	0.0
GCR	14	3001	15.8	84.2	0.0
FBR	2	1969	90.9	9.1	0.0
ALL REACTORS	452	1881	80.1	17.5	2.4

Notes:

1. Only reactors in commercial operation are considered.
2. Reactors shut down during 2019 (13 units) are considered.
3. Numbers do not include 2019 statistics from seven German reactors units, as information for these individual reactor units was not submitted by the time of publication.

TABLE 20. DIRECT CAUSES OF FULL OUTAGES DURING 2019

Direct cause	Planned full outages				Unplanned full outages			
	Energy lost		Time lost		Energy lost		Time lost	
	GW·h	%	Hours	%	GW·h	%	Hours	%
Plant equipment problem/failure	19745	2.91	20070	2.61	55133	96.10	63246	96.32
Refuelling without maintenance	365508	53.90	394112	51.32				
Inspection, maintenance or repair combined with refuelling	37877	5.59	74371	9.68				
Inspection, maintenance or repair without refuelling	3142	0.46	2104	0.27	547	0.95	764	1.16
Testing of plant systems or components	11336	1.67	15655	2.04				
Major backfitting, refurbishment or upgrading activities with refuelling	239490	35.32	252085	32.83				
Major backfitting, refurbishment or upgrading activities without refuelling					71	0.12	172	0.26
Nuclear regulatory requirements					1494	2.60	1271	1.93
Human factor related					36	0.06	118	0.18
Fire	207	0.03	404	0.05	90	0.16	91	0.14
Fuel management limitation (including high flux tilt, stretch out or coast-down operation)	825	0.12	9135	1.19				
Other								
TOTAL	678130	100.00	767936	100.00	57371	100.00	65662	100.00

Notes:

1. Only reactors which have achieved full commercial operation in or before 2019 are counted.
2. Numbers do not include 2019 statistics from seven German reactors units, as information for these individual reactor units was not submitted by the time of publication.

TABLE 21. DIRECT CAUSES OF FULL OUTAGES, 2015 TO 2019

Direct outage cause	Planned full outages				Unplanned full outages			
	Energy lost		Time lost		Energy lost		Time lost	
	GW·h	%	Hours	%	GW·h	%	Hours	%
Plant equipment problem/failure								
Refuelling without maintenance	136469	3.74	134561	3.22	271170	93.23	323070	92.69
Inspection, maintenance or repair combined with refuelling	1678014	45.93	1875820	44.87	487	0.17	483	0.14
Inspection, maintenance or repair without refuelling	159228	4.36	279943	6.70				
Testing of plant systems or components	14279	0.39	12778	0.31	738	0.25	1086	0.31
Major backfitting, refurbishment or upgrading activities with refuelling	136302	3.73	162305	3.88				
Major backfitting, refurbishment or upgrading activities without refuelling	1521258	41.64	1658549	39.67				
Nuclear regulatory requirements	1575	0.04	3171	0.08	7324	2.52	8106	2.33
Human factor related					10213	3.51	13512	3.88
Fire					542	0.19	704	0.20
Fuel management limitation (including high flux tilt, stretch out or coast-down operation)	2406	0.07	2199	0.05	100	0.03	99	0.03
Other	4088	0.11	51117	1.22	300	0.10	1474	0.42
TOTAL	3653619	100.00	4180443	100.00	290874	100.00	348534	100.00

Notes:

1. Only reactors which have achieved full commercial operation in or before 2019 are counted.
2. Numbers do not include 2019 statistics from seven German reactors units, as information for these individual reactor units was not submitted by the time of publication.

TABLE 22. COUNTRIES: ABBREVIATIONS AND SUMMARY

Country code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	LT shut down	Shut down
AR	ARGENTINA	3	1		
AM	ARMENIA	1			1
BD	BANGLADESH		2		
BY	BELARUS		2		
BE	BELGIUM	7			1
BR	BRAZIL	2	1		
BG	BULGARIA	2			4
CA	CANADA	19			
CN	CHINA	48	11		6
CZ	CZECH REPUBLIC	6			
FI	FINLAND	4	1		
FR	FRANCE	58	1		12
DE	GERMANY	6			30
HU	HUNGARY	4			
IN	INDIA	22	7		
IR	IRAN, ISLAMIC REPUBLIC OF	1	1		
IT	ITALY				4
JP	JAPAN	33	2		27
KZ	KAZAKHSTAN				1
KR	KOREA, REPUBLIC OF				2
LT	LITHUANIA	24	4		2
MX	MEXICO	2			2
NL	NETHERLANDS	1			
PK	PAKISTAN	5	2		1
RO	ROMANIA	2			
RU	RUSSIA	38	4		8
SK	SLOVAKIA	4	2		3
SI	SLOVENIA	1			
ZA	SOUTH AFRICA	2			
ES	SPAIN	7			3

TABLE 22. COUNTRIES: ABBREVIATIONS AND SUMMARY — continued

Country code	Full name	Number of reactors, as of 31 Dec. 2019					
		Operational	Construction	LT shut down	Shut down	Planned	
SE	SWEDEN	7			6		
CH	SWITZERLAND	4			2		
TR	TURKEY		1			3	
UA	UKRAINE	15	2		4		
AE	UNITED ARAB EMIRATES		4				
GB	UNITED KINGDOM	15	2		30		
US	UNITED STATES OF AMERICA	96	2		37	8	
TOTAL		443	54		186	78	

Note: The total includes the following data from Taiwan, China:
 — 4 units in operation; 2 units under construction; 2 units in shutdown.

TABLE 23. REACTOR TYPES: ABBREVIATIONS AND SUMMARY

Type code	Full name	Number of reactors, as of 31 Dec. 2019				
		Operational	Construction	LT shut down	Shut down	Planned
BWR	Boiling Light-Water Cooled and Moderated Reactor	65	4		50	9
FBR	Fast Breeder Reactor	3	1		8	5
GCR	Gas Cooled, Graphite Moderated Reactor	14			38	
HTGR	High Temperature Gas Cooled Reactor		1		4	
HWGCR	Heavy-Water Moderated, Gas Cooled Reactor				4	
HWLWR	Heavy-Water Moderated, Boiling Light-Water Cooled Reactor				2	
LWGR	Light-Water Cooled, Graphite Moderated Reactor	13			11	
PHWR	Pressurized Heavy-Water Moderated and Cooled Reactor	48	4		9	2
PWR	Pressurized Light-Water Moderated and Cooled Reactor	300	44		57	62
SGHWR	Steam Generating Heavy-Water Reactor				1	
X	Other				2	
TOTAL		443	54		186	78

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY

Operator code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	LT shut down	Shut down
AEC/NPPD	ATOMIC ENERGY COMMISSION AND NEBRASKA PUBLIC POWER DISTRICT				
AEP	AMERICAN ELECTRIC POWER COMPANY, INC.	2		1	
AmerenUE	AMEREN UE; UNION ELECTRIC COMPANY	1			
ANAV	ASOCIACION NUCLEAR ASCO-VANDELLOS A.I.E. (ENDESA/ID)	3			
ANC	AKUYU NUCLEAR JOINT STOCK COMPANY		1		3
ANPPC/JSC	CLOSED JOINT STOCK COMPANY ARMENIAN NPP	1		1	
APS	ARIZONA PUBLIC SERVICE CO.	3			
AVR	ARBEITSGEMEINSCHAFT VERSUCHSREAKTOR GMBH			1	
Axpo AG	KERNKRAFTWERK BEZNAUCH-5312 DOTTINGEN	2			
BelNPP	REPUBLICAN UNITARY ENTERPRISE BELARUSIAN NUCLEAR POWER PLANT		2		
BHAVINI	BHARATIYA NABHIKIYA VIDYUT NIGAM LIMITED		1		
BKAB	BARSEBACK KRAFT AB			2	
BKW	BKW ENERGIE AG			1	
BRUCEPOW	BRUCE POWER	8			
BV GKN	BV GEMEENSCHAPPELIJKE KERNENERGIECENTRALE NEDERLAND (BV GKN)			1	
CEA/EDF	COMMISSARIAT A L'ENERGIE ATOMIQUE (80%)ELECTRICITE DE FRANCE (20%)			1	
CEN/SCK	CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE / STUDIECENTRUM VOOR KERNENERGIE			1	
CEZ	CZECH POWER CO., CEZ A.S.	6			
CFE	COMISION FEDERAL DE ELECTRICIDAD	2			
CHUBU	CHUBU ELECTRIC POWER CO., INC.	3		2	1
CHUGOKU	THE CHUGOKU ELECTRIC POWER CO., INC.		1	1	2
CAE	CHINA INSTITUTE OF ATOMIC ENERGY	1			
CNAT	CENTRALES NUCLEARES ALMARAZ-TRILLO (IDI/UG/ENDES/HC/NUCLENOR)	3			
CNEA	COMISION NACIONAL DE ENERGIA ATOMICA		1		
CNNO	CNNC NUCLEAR OPERATION MANAGEMENT COMPANY LIMITED.	1			
ColPiqua	CITY OF PIQUA GOVERNMENT			1	
COGEMA	COMPAGNIE GENERALE DES MATIERES NUCLEAIRES			2	
CPC	CONSUMERS POWER CO.			1	
CVPA	CAROLINAS-VIRGINIA NUCLEAR POWER ASSOC.			1	

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	LT shut down	Shut down
CYAPC	CONNECTICUT YANKEE ATOMIC POWER CO.				1
DNMC	DAYA BAY NUCLEAR POWER OPERATIONS AND MANAGEMENT CO., LTD.	6			1
DOE DUQU	DEPARTMENT OF ENERGY AND DUQUESNE LIGHT CO.				1
DOE/PRWR	DOE & PUERTO RICO WATER RESOURCES				1
DOMINION	DOMINION ENERGY	6			2
DPC	DAIRYLAND POWER COOPERATIVE				1
DTEDISON	DETROIT EDISON CO.	1			1
DUKEENER	DUKE ENERGY CORP.	7			1
E.ON	E.ON KERNKRAFT GMBH				4
EBL	ENGIE ELECTRABEL	3			
EBL+EDF	ENGIE ELECTRABEL + EDF BELGIUM + EDF LUMINUS	4			
EDF	ELECTRICITE DE FRANCE	58	1		8
EDF UK	EDF ENERGY	15			
EDF-CGN	EDF ENERGY - CHINA GENERAL NUCLEAR JOINT VENTURE	2			
ELETRONU	ELETRONBRAS ELETRONUCLEAR, S.A.		2		
ENBW	ENBW KRAFTWERKE AG		1		
ENERGYNW	ENERGY NORTHWEST	1			1
ENKK	ENBW KERNKRAFT GMBH	1			
ENERGY	ENERGY NUCLEAR OPERATIONS, INC.				3
EOS	ENERGIE DE L'OUEST SUISSE	9			3
EPDC	ELECTRIC POWER DEVELOPMENT CO., LTD.		1		1
EPZ	N.V. ELEKTRICITEITS-PRODUCTIEMAATSCHAPPIJ ZUID-NEDERLAND	1			
ESKOM	ESKOM	2			
EWN	ENERGIEWERKE NORD GMBH				6
EXELON	EXELON GENERATION CO. LLC	21			
FENOC	FIRST ENERGY NUCLEAR OPERATING CO.	4			7
FKA	FORSMARK KRAFTGRUPP AB	3			
FORTUMPH	FORTUM POWER AND HEAT OY (FORMER IVO)	2			
FPL	FLORIDA POWER & LIGHT CO.	4			
FONP	CNNC FUJIAN FUJIANG NUCLEAR POWER CO., LTD	4			
FSNPC	FUJIAN SANMING NUCLEAR POWER CO., LTD.		2		

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	L.T. shut down	Shut down
FV	FENNOVOIMA OY				1
GE	GENERAL ELECTRIC	2	2		1
GFNPC	GUANGXI FANGCHENGANG NUCLEAR POWER COMPANY, L.TD.				
GPU	GENERAL PUBLIC UTILITIES(OWNED BY FIRSTENERGY CORP.)				1
HDR	HEISSDAMPREAKTOR-BETRIEBSGESELLSCHAFT MBH.				1
HEPCO	HOKKAI DO ELECTRIC POWER CO., INC.	3			
HIFRENSA	HISPANO-FRANCESA DE ENERGIA NUCLEAR, S.A.				1
HKG	HOCHTEMPERATUR-KERNKRAFTWERK GMBH				1
HNPC	HAINAN NUCLEAR POWER COMPANY	2			
HOKURIKU	HOKURIKU ELECTRIC POWER CO.	2			
HQ	HYDRO QUEBEC				2
HSDNPC	SHANDONG HONGSHIDING NUCLEAR POWER PLANT				
HSNPC	HUANENG SHANDONG SHIDAO BAY NUCLEAR POWER COMPANY, LTD.		1		1
HZNP	CGN HUIZHOU NUCLEAR POWER CO.,LTD.		1		
ID	IBERDROLA, S.A.	1			
INPP	IGNALINA NUCLEAR POWER PLANT				2
JAEA	JAPAN ATOMIC ENERGY AGENCY				3
JAPCO	JAPAN ATOMIC POWER CO.	2			2
JAVYS	JADROVA A VYRADOVACIA SPOLOCNOST/NUCLEAR AND DECOMMISSIONING COMPANY, PLC./				3
JNPC	JIANGSU NUCLEAR POWER CORPORATION	4	2		
KBG	KERNKRAFTWERK-BETRIEBSGESELLSCHAFT MBH				2
KEPCO	KANSAI ELECTRIC POWER CO.	7			4
KGB	KERNKRAFTWERKE GUNDRREMNINGEN BETRIEBSGESELLSCHAFT MBH				1
KGG	KERNKRAFTWERK GUNDRREMNINGEN GMBH	1			2
KHNP	KOREA HYDRO AND NUCLEAR POWER CO.	24	4		2
KKB	KERNKRAFTWERK BRUNSBÜTTEL GMBH & CO. OHG				1
KKG	KERNKRAFTWERK GOESGEN-DAENIKEN AG	1			
KKK	KERNKRAFTWERK KRÜMMEL GMBH & CO. OHG				1
KKL	KERNKRAFTWERK LEIBSTADT	1			1
KKN	KERNKRAFTWERK NIEDERAICHBACH GMBH				1
KLE	KERNKRAFTWERKE LIPPE-EMS GMBH	1			

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	LT shut down	Shut down
KOZNPP	KOZLODZY NPP, PLC.	2			4
KWL	KERNKRAFTWERK LINGEN GMBH				1
KYUSHU	KYUSHU ELECTRIC POWER CO., INC.	4			2
LFNPC	CGN LUFENG NUCLEAR POWER CO., LTD		2		2
LHNPC	LIAONING HONGYANHE NUCLEAR POWER CO. LTD. (LHNPC)	4			
LIPA	LONG ISLAND POWER AUTHORITY				1
LNPC	LIAONIN NUCLEAR POWER COMPANY, LMT.				2
LUMINANT	LUMINANT GENERATION COMPANY, LLC	2			
MAEC-KAZ	MAEC-KAZATOMPROM LIMITED LIABILITY PARTNERSHIP «MANGISTAU ATOMIC ENERGY COMPLEX-KAZATOMPROM»				1
ML	MAGNOX, LTD				22
MSM	MINISTRY OF MEDIUM MACHINE BUILDING OF THE USSR (MINSREDMASH)				1
MTE	MINTOPENERGO OF UKRAINE - MINISTRY OF FUEL AND ENERGY OF UKRAINE				4
MYAPC	MAINE YANKEE ATOMIC POWER CO.				1
NASA	NUCLEOELECTRICA ARGENTINA S.A.	3			
NAWAH	NAWAH ENERGY COMPANY		4		
NBEPIC	NEW BRUNSWICK ELECTRIC POWER COMMISSION	1			
NDNP	FUJIAN NINGDE NUCLEAR POWER COMPANY, LTD.	4			
NEK	NUKLERANA ELEKTRARNA KRSKO	1			
NEXTERA	NEXTERA ENERGY RESOURCES, LLC	4			
NMC	NUCLEAR MANAGEMENT CO.				1
NNEGC	STATE ENTERPRISE "NATIONAL NUCLEAR ENERGY GENERATING COMPANY 'ENERGOATOM'"	15	2		
NPCBL	NUCLEAR POWER PLANT COMPANY BANGLADESH LIMITED	2	2		
NPCIL	NUCLEAR POWER CORPORATION OF INDIA, LTD.	22	6		2
NPDDCO	NUCLEAR POWER PRODUCTION & DEVELOPMENT CO. OF IRAN	1	1		2
NPOJVC	NUCLEAR POWER PLANT QINSHAN JOINT VENTURE COMPANY LTD.	4			
NSP	NORTHERN STATES POWER CO. (SUBSIDIARY OF XCEL ENERGY)	3			
NUCLENOR	NUCLENOR, S.A.				1
OH	ONTARIO HYDRO				2
OKG	OKG AKTIEBOLAG	1			2
OPG	ONTARIO POWER GENERATION	10			2
PAEC	PAKISTAN ATOMIC ENERGY COMMISSION	5	2		2

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	L.T. shut down	Shut down
PAKS II	MVM PAKS II, LTD.	4			2
PAKS Zrt	PAKS NUCLEAR POWER PLANT, LTD.				
PE	PREUSSELEKTRA KERNKRAFT GMBH&CO KG			1	
PElectra	PREUSSELEKTRA KERNKRAFT GMBH	3			
PG&E	PACIFIC GAS AND ELECTRIC COMPANY	2		1	
PORTGE	PORTLAND GENERAL ELECTRIC CO.	2		1	
PPL_SUSQ	PPL SUSQUEHANNA, LLC	4		1	
PROGRESS	PROGRESS ENERGY	3		1	
PSCC	PUBLIC SERVICE CO. OF COLORADO	2		1	
PSEG	PSEG NUCLEAR, LLC	3		1	
QNPC	QINSHAN NUCLEAR POWER COMPANY	3		1	
RAB	RINGHALS AB	38		7	20
RCFA	RURAL COOPERATIVE POWER ASSOC.		4	1	
REA	JOINT STOCK COMPANY 'CONCERN ROSENERGOATOM'			7	
RWE	RWE POWER AG			2	
SCE	SOUTHERN CALIFORNIA EDISON CO.	1		3	
SCE&G	SOUTH CAROLINA ELECTRIC & GAS CO.	2			
SDNPC	SHANDONG NUCLEAR POWER COMPANY, LTD.	4	2		2
SE	SLOVENSKE ELEKTRARNE, AS	1		1	
SENA	SOCIETE D'ENERGIE NUCLEAIRE FRANCO-BELGE DES ARDENNES	1		2	
SHIKOKU	SHIKOKU ELECTRIC POWER CO., INC	2		4	
SL	SELLAFIELD LIMITED	2		4	
SMNPC	SANMEN NUCLEAR POWER CO., LTD.	2		1	2
SMUD	SACRAMENTO MUNICIPAL UTILITY DISTRICT			1	
SNEC	SAXTON NUCLEAR EXPERIMENTAL REACTOR CORPORATION			1	
SNN	SOCIETATEA NATIONALA NUCLEARELECTRICA, S.A.	2			
SNPDP	STATE NUCLEAR POWER DEMONSTRATION PLANT CO., LTD.	2			
SOGIN	SOCIETA GESTIONE IMPANTI NUCLEARI S.P.A.	6		4	2
SOUTHERN	SOUTHERN NUCLEAR OPERATING COMPANY, INC.	2		1	
STP	STP NUCLEAR OPERATING CO.				
SVAFO	AB SVAFO				

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	L.T shut down	Shut down Planned
TEPCO	TOKYO ELECTRIC POWER COMPANY HOLDINGS, INC.	7			2
TNP/JC	TAISHAN NUCLEAR POWER JOINT VENTURE COMPANY LIMITED	2			
TOHOKU	TOHOKU ELECTRIC POWER CO., INC	3			1
TPC	TAIWAN POWER CO.	4	2		2
TQNPC	THE THIRD QINSHAN JOINT VENTURE COMPANY, LTD.	2			
TVA	TENNESSEE VALLEY AUTHORITY	7			
TVO	TEOLLISUUDEN VOIMA OYJ	2	1		
UFG	UNION FENOSA GENERATION, S.A.				1
UKAEA	UNITED KINGDOM ATOMIC ENERGY AUTHORITY				4
VAK	VERSUCHSATOMKRAFTWERK KAHL GMBH				1
WCNOC	WOLF CREEK NUCLEAR OPERATION CORP.	1			
YAEC	YANKEE ATOMIC ELECTRIC CO.				1
YJNPC	YANGJIANG NUCLEAR POWER COMPANY				
ZGZEC	CNPB GUODIAN ZHANGZHOU ENERGY CO.,LTD	6	1		
not specified					26
TOTAL		443	54		186
					78

TABLE 25. NSSS SUPPLIERS: ABBREVIATIONS AND SUMMARY

NSSS supplier code	Full name of nuclear steam supply system supplier	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	LT shut down	Shut down
A/FW	ASSOCIATION ACEC/FRAMATOME AND WESTINGHOUSE.				
ABBATOM	ABBATOM (FORMERLY ASEA-ATOM)	5			1
AC	ALLIS CHALMERS				4
ACECOWEN	ACECOWEN (ACEC-COCKERILL-WESTINGHOUSE)	4			3
ACLF	(ACECOWEN - CREUSOT LOIRE - FRAMATOME)	1			
AECL	ATOMIC ENERGY OF CANADA, LTD.	7			4
AECL/DAE	ATOMIC ENERGY OF CANADA LTDA AND DEPARTMENT OF ATOMIC ENERGY(INDIA)	1			
AECL/DHI	ATOMIC ENERGY OF CANADA LTD/DOOSAN HEAVY INDUSTRY & CONSTRUCTION	3			
AEE	ATOMENERGOEXPORT	8			12
AEG	ALLGEMEINE ELEKTRICITAETS-GESELLSCHAFT				1
AEG/GE	ALLGEMEINE ELEKTRICITAETS-GESELLSCHAFT, GENERAL ELECTRIC COMPANY (US)				1
AEG/KWU	ALLGEMEINE ELEKTRICITAETS GESELLSCHAFT, KRAFTWERK UNION AG				2
AEM	JSC ATOMENERGOMASH	38	7		2
AMN/GETS	ANSALDO MECCANICO NUCLEARE SPA / GENERAL ELECTRIC TECHNICAL SERVICES CO.	2			1
APC	ATOMIC POWER CONSTRUCTION, LTD.	2			2
AREVA	AREVA, 27-29, RUE LE PELETIER, 75433 PARIS CEDEX 09URL: WWW.AREVA.COM	2	4		1
ASEASTAL	ASEA-ATOM / STAL-LAVAL				1
ASPALDO	ASPALDO				1
B&W	BABCOCK & WILCOX CO.	5			5
BBK	BROWN BOVERI-KRUPP REAKTORBAU GMBH				1
BBR	BROWN BOVERI REAKTOR GMBH				1
CE	COMBUSTION ENGINEERING CO.	11			4
CEA	COMMISSARIAT A L'ENERGIE ATOMIQUE				1
CFHI	CHINA FIRST HEAVY INDUSTRIES	8			
CGE	CANADIAN GENERAL ELECTRIC	1	4		1
CNCLNEY	CNIM-CONSTRUCTIONS NAVALES ET INDUSTRIELLES DE MEDITERRANEE CL - CREUSOT LOI				1
CNEA	COMISION NACIONAL DE ENERGIA ATOMICA				1
CNNC	CHINA NATIONAL NUCLEAR CORPORATION	9			
CZEC	CHINA ZHONGYUAN ENGINEERING CORPORATION				2
DEC	DONGFANG ELECTRIC CORPORATION	11	3		3

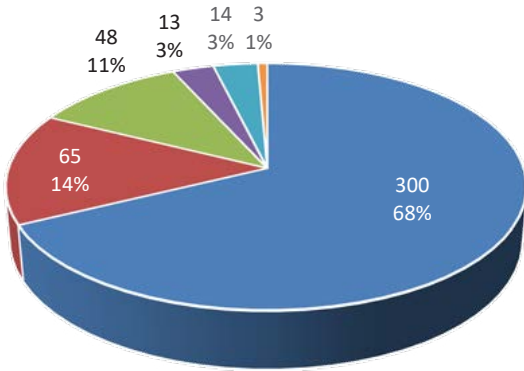
TABLE 25. NSSS SUPPLIERS: ABBREVIATIONS AND SUMMARY — continued

NSSS supplier code	Full name of nuclear steam supply system supplier	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	LT shut down	Shut down
DHICKAEC	DOOSAN HEAVY INDUSTRIES & CONSTRUCTION CO.LTD./KOREA ATOMICENERGY RESEARCH I	2			
DHICKOPC	DOOSAN HEAVY INDUSTRIES & CONSTRUCTION CO.LTD./KOREA POWER ENGINEERING COMPA	12	4		6
EE&B&WT	THE ENGLISH ELECTRIC CO., LTD / BABCOCK & WILCOX CO. / TAYLOR WOODROW CONSTR				1
EL/WEST	ELETTRONUCLEARE ITALIANA / WESTINGHOUSE ELECTRIC CORP.	1			5
FAEA	FEDERAL ATOMIC ENERGY AGENCY	66			3
FRAM	FRAMATOME	2			
FRAMACEC	FRAMACECO (FRAMATOME-ACEC-COCKERILL)				
GA	GENERAL ATOMIC CORP.				2
GAAA	GROUPEMENT ATOMIQUE ALSACIENNE ATLANTIQUE				1
GE	GENERAL ELECTRIC CO.	40	2		18
GE.AEG	GENERAL ELECTRIC COMPANY (US), ALLGEMEINE ELEKTRICITAETS- GESELLSCHAFT				1
GE/GETSC	GENERAL ELECTRIC CO. / GENERAL ELECTRIC TECHNICAL SERVICES CO.				1
GE/T	GENERAL ELECTRIC CO. / TOSHIBA CORPORATION				2
GEC	GENERAL ELECTRIC COMPANY (UK)				3
GETSCO	GENERAL ELECTRIC TECHNICAL SERVICES CO.	1			1
GNEPRWRA	GENERAL NUCLEAR ENGINEERING & PUERTO RICO WATER RESOURCES AUTHORITY (US)				1
GTM	GRANDS TRAVAUX DE MARSEILLE				1
H/G	HITACHI GE NUCLEAR ENERGY, LTD.	6	1		1
HITACHI	HITACHI, LTD.				
HRB	HOCHTEMPERATUR-REAKTORBAU GMBH				5
IA	INTERATOM INTERNATIONALE ATOMREAKTORBAU GMBH				1
ICL/FE	INTERNATIONAL COMBUSTION LTD. / FAIREY ENGINEERING LTD.				1
IZ	IZHORSKIYE ZAVODY	5			
JSC ASE	JSC ATOMSTROYEXPORT	1	7		1
KEPCO	KOREA ELECTRIC POWER CORPORATION		4		
KWU	SIEMENS KRAFTWERK UNION, AG	9	1		12
LEVIVIER	LEVIVIER				2
MAEC-KAZ	MAEC-KAZATOMPROMLIMITED LIABILITY PARTNERSHIP «MANGISTAU ATOMIC ENERGY COMPL				1
MAEP	MINATOMENERGOPROM, MINISTRY OF NUCLEAR POWER AND INDUSTRY	2			2
MHI	mitsubishi heavy industries, LTD.				5
MSM	MINISTRY OF MEDIUM MACHINE BUILDING OF THE USSR (MINSREDMASH)	15			2

TABLE 25. NSSS SUPPLIERS: ABBREVIATIONS AND SUMMARY — continued

NSSS supplier code	Full name of nuclear steam supply system supplier	Number of reactors, as of 31 Dec. 2019			
		Operational	Construction	L.T. shut down	Shut down
NGA	NATIONALE GESELLSCHAFT ZUR FORDERUNG DER INDUSTRIELLEN ATOMTECHNIK				
NNC	NATIONAL NUCLEAR CORPORATION	2			1
NPC	NUCLEAR POWER CO., LTD.	6			
NPCL	NUCLEAR POWER CORPORATION OF INDIA, LTD. VIKRAM SARABHAI BHAVAN, ANUSHAKTI NA	16	4		
NPIC	NUCLEAR POWER INSTITUTE OF CHINA	6	2		
OH/AECL	ONTARIO HYDRO / ATOMIC ENERGY OF CANADA, LTD.	18			2
PAA	PRODUCTION AMALGAMATION 'ATOMMASH', VOLGODONSK	4			
PAIP	PRODUCTION AMALGAMATION IZHORSKY PLANT 'ATOMMASH', VOLGODONSK, RUSSIA	11			
PPC	PWR POWER PROJECTS, LTD.	1			
RDM	ROTTERDAMSE DROOGDOK MAATSCHAPPIJ (RDM) IN ROTTERDAM (NL)	1			1
S/KWU	SIEMENS/KRAFTWERK UNION, AG.	1			
SACM	SOCIETE ALSACIENNE DE CONSTRUCTIONS MECANIQUE	1	1		2
SHE	SHANGHAI ELECTRIC	1			
SIEM:KWU	SIEMENS AG, KRAFTWERK UNION AG	2			2
SIEMENS	SIEMENS AG, POWER GENERATION	2			1
SKODA	SKODA CONCERN NUCLEAR POWER PLANT WORKS	10	2		1
T/H/F/M	TOSHIBA / HITACHI / FUJI ELECTRIC HOLDINGS / MITSUBISHI HEAVY INDUSTRIES	4			1
TNPG	THE NUCLEAR POWER GROUP, LTD.	4			10
TOS:HIBA	TOSHIBA CORPORATION	10			7
T/SINGHUA	T/SINGHUA UNIVERSITY		1		
UEC	UNITED ENGINEERS AND CONTRACTORS				1
UKAEA	UNITED KINGDOM ATOMIC ENERGY AUTHORITY				10
WH	WESTINGHOUSE ELECTRIC CORPORATION	68	2		16
WH/MI	WESTINGHOUSE ELECTRIC CORPORATION / MITSUBISHI HEAVY INDUSTRIES, LTD.	3			2
not specified			1		4.1
TOTAL		443	54		186
					78

Number of reactors



Net electrical power [GW]

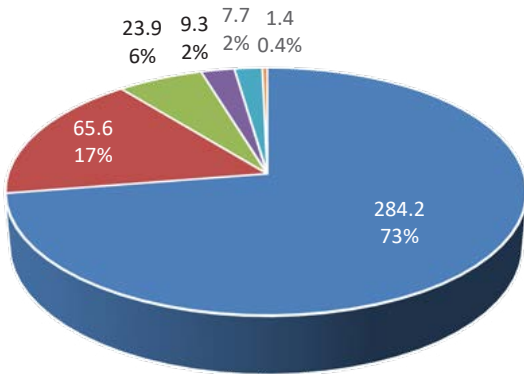
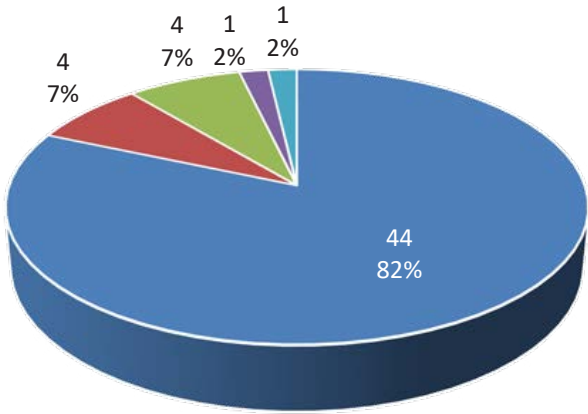


Figure 1. Number of operational reactors by type and net electrical power (as of 31 Dec. 2019).

Number of reactors



Net electrical power [GW]

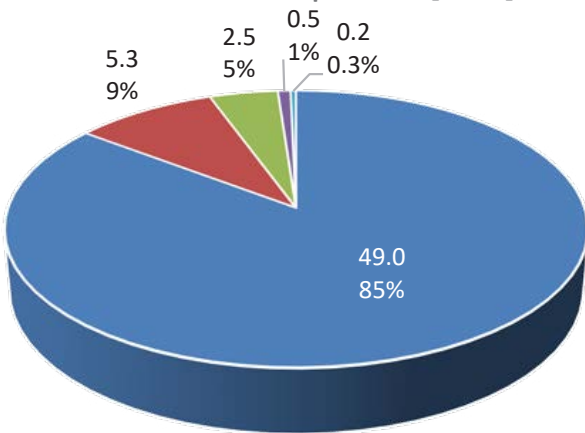


Figure 2. Reactors under construction by type and net electrical power (as of 31 Dec. 2019).

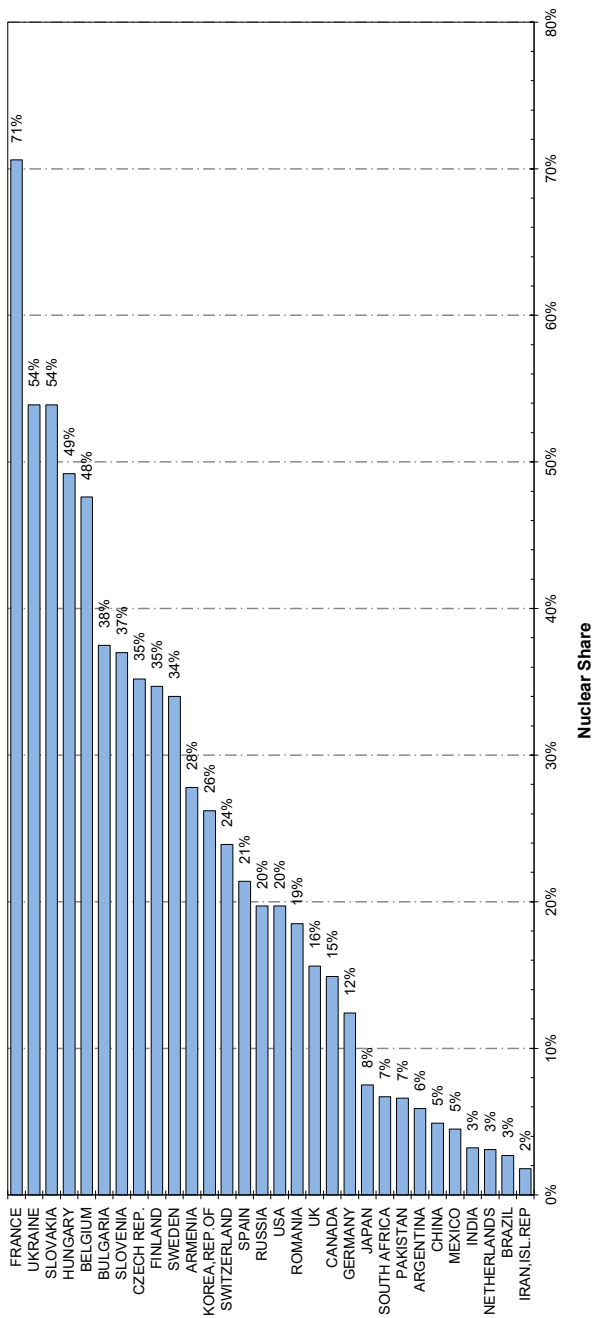


Figure 3. Nuclear share of electricity generation (as of 31 Dec. 2019).

Note: The nuclear share of electricity supplied in Taiwan, China was 13.4% of the total.

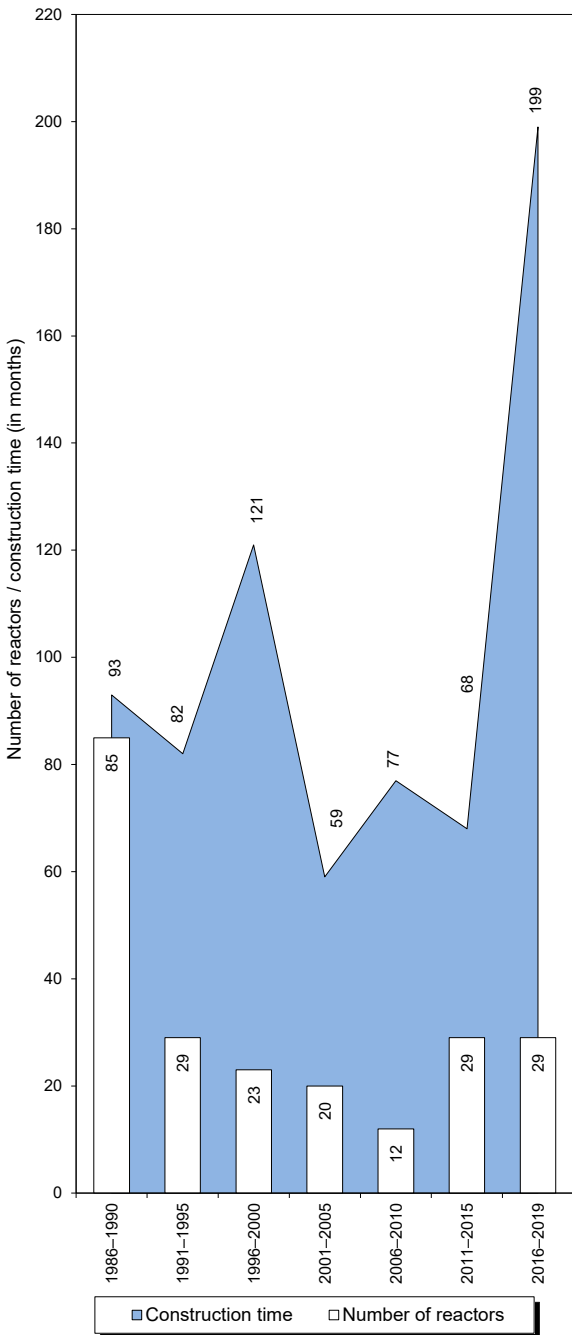


Figure 4. Worldwide median construction time in months (as of 31 Dec. 2019).

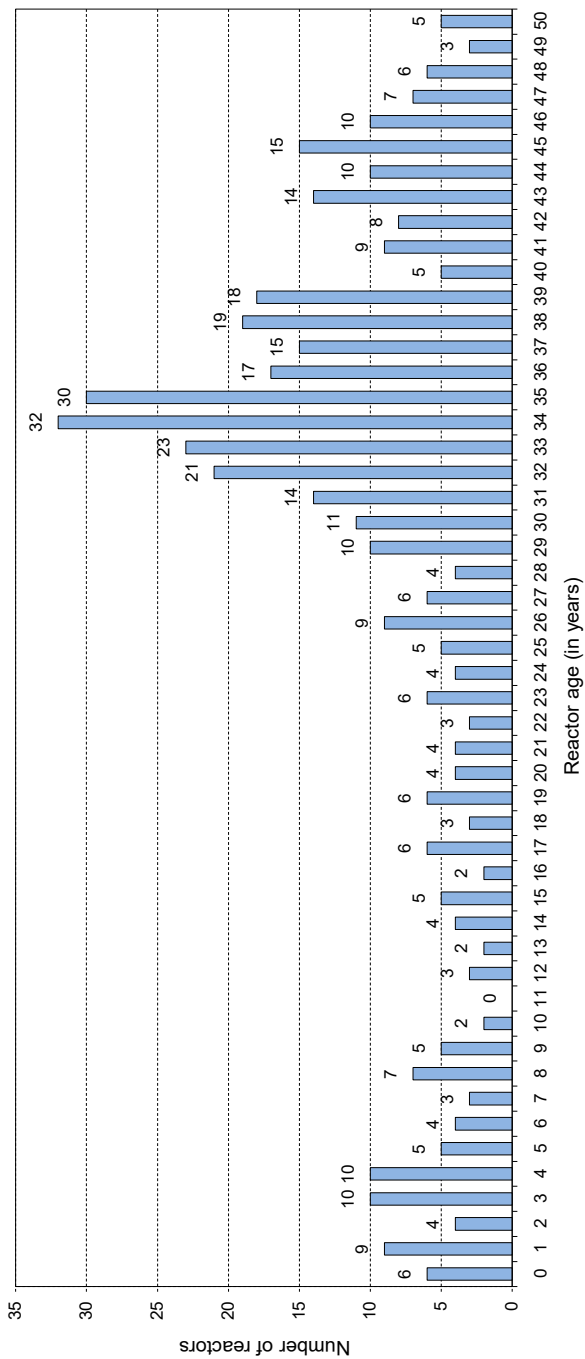


Figure 5. Number of operational reactors by age (as of 31 Dec. 2019).

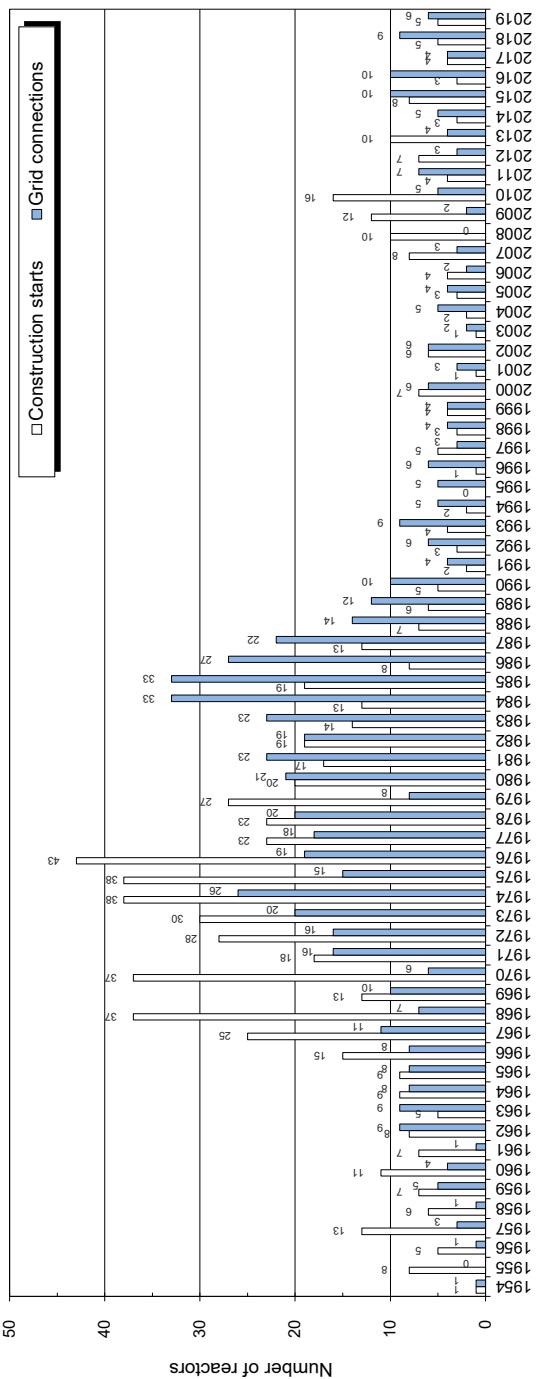


Figure 6. Annual construction starts and connections to the grid (1954 to 2019).



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