

REFERENCE DATA SERIES No. 2
2019 Edition

Nuclear Power Reactors in the World



IAEA

International Atomic Energy Agency

REFERENCE DATA SERIES No. 2

NUCLEAR POWER REACTORS IN THE WORLD

2019 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 thirty-ninth edition of Reference Data Series No. 2 provides a detailed comparison of various statistics up to and including 31 December 2018. 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 (<https://pris.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. 2018

Country	Operational reactors		Reactors in long term shutdown		Reactors under construction		Nuclear electricity supplied in 2018	
	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	TW(e)-h	% of total
ARGENTINA	3	1633			1	25	6.5	4.7
ARMENIA	1	375					1.9	25.6
BANGLADESH					2	2160	NA	NA
BELARUS					2	2220	NA	NA
BELGIUM	7	5918					27.3	39.0
BRAZIL	2	1884			1	1340	14.8	2.7
BULGARIA	2	1966					15.4	34.7
BULGARIA	19	13554					94.4	14.9
CANADA	46	42858			11	10982	277.1	4.2
CZECH REP.	6	3932					28.3	34.5
FINLAND	4	2784			1	1600	21.9	32.4
FRANCE	58	63130			1	1630	395.9	71.7
GERMANY	7	9515					71.9	11.7
HUNGARY	4	1902					14.9	50.6
INDIA	22	6255			7	4824	35.4	3.1
IRAN, ISL. REP.	1	915					6.3	2.1
JAPAN	39	36974			2	2653	49.3	6.2
KOREA, REP. OF	24	22444			5	6700	127.1	23.7
MEXICO	2	1552					13.2	5.3
NETHERLANDS	1	482					3.3	3.1
PAKISTAN	5	1318			2	2028	9.3	6.8
ROMANIA	2	1300					10.5	17.2
RUSSIA	36	27252			6	4573	191.3	17.9
SLOVAKIA	4	1814			2	880	13.8	55.0
SLOVENIA	1	688					5.5	35.9
SOUTH AFRICA	2	1860					10.6	4.7
SPAIN	7	7121					53.4	20.4
SWEDEN	8	8613					65.9	40.3

TABLE 1. OVERVIEW OF POWER REACTORS AND NUCLEAR SHARE, 31 DEC. 2018 — continued

Country	Operational reactors		Reactors in long term shutdown		Reactors under construction		Nuclear electricity supplied in 2018	
	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	No. of units	Net capacity MW(e)	TW(e)-h	% of total
SWITZERLAND	5	3333					24.5	37.7
TURKEY					1	1114	NA	NA
UAE					4	5380	NA	NA
UK	15	8923			1	1630	59.1	17.7
UKRAINE	15	13107			2	2070	79.5	53.0
USA	98	99061			2	2234	808.0	19.3
Total	451	396911			55	56643	2562.8	NA

Note:

The total includes the following data from Taiwan, China:

— 5 units, 4448 MW in operation; 2 units, 2600 MW under construction;

— 26.7 TW(e)-h of nuclear electricity generation, representing 11.4% of the total electricity generated there.

TABLE 2. TYPE AND NET ELECTRICAL POWER OF OPERATIONAL REACTORS, 31 DEC. 2018

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														
ARMENIA	1	375					3	1633					3	1633
BELGIUM	7	5918											7	5918
BRAZIL	2	1884											2	1884
BULGARIA	2	1966											2	1966
CANADA							19	13554					19	13554
CHINA	43	41484					2	1354			1	20	46	42858
CZECH REP.	6	3932											6	3932
FINLAND	2	1014	2	1770									4	2784
FRANCE	58	63130											58	63130
GERMANY	6	8227	1	1288									7	9515
HUNGARY	4	1902											4	1902
INDIA	2	1864	2	300			18	4091					22	6255
IRAN, ISL. REP.	1	915											1	915
JAPAN	17	14649	22	22325			4	2535					39	36974
KOREA, REP. OF	20	19909	2	1552									24	22444
MEXICO													2	1552
NETHERLANDS	1	482											1	482
PAKISTAN	4	1228					1	90					5	1318
ROMANIA							2	1300					2	1300
RUSSIA	20	16578							14	9294	2	1380	36	27252
SLOVAKIA	4	1814											4	1814
SLOVENIA	1	688											1	688
SOUTH AFRICA	2	1860											2	1860
SPAIN	6	6057	1	1064									7	7121
SWEDEN	3	3071	5	5542									8	8613
SWITZERLAND	3	1740	2	1593									5	3333
UK	1	1198			14	7725							15	8923
UKRAINE	15	13107											15	13107
USA	65	65577	33	33484									98	99061
TOTAL	298	282443	73	71492	14	7725	49	24557	14	9294	3	1400	451	396911

Notes:

1. The totals include 5 units, 4448 MW in Taiwan, China.
2. During 2018, 9 reactors, 10358 MW were newly connected to the grid.

TABLE 3. TYPE AND NET ELECTRICAL POWER OF REACTORS UNDER CONSTRUCTION, 31 DEC. 2018

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	10782									1	200	11	10982
FINLAND	1	1600											1	1600
FRANCE	1	1630											1	1630
INDIA	2	1834							1	470			7	4824
JAPAN			2	2653	4	2520							2	2653
KOREA, REP. OF	5	6700											5	6700
PAKISTAN	2	2028											2	2028
RUSSIA	6	4573											6	4573
SLOVAKIA	2	880											2	880
TURKEY	1	1114											1	1114
UAE	4	5380											4	5380
UK	1	1630											1	1630
UKRAINE	2	2070											2	2070
USA	2	2234											2	2234
TOTAL	45	48200	4	5253	4	2520			1	470	1	200	55	56643

Notes:

1. The totals include 2 units (2 x BWR), 2600 MW in Taiwan, China.
2. During 2018, construction started on 5 reactors, 6339 MW.

TABLE 4. REACTOR YEARS OF EXPERIENCE, UP TO 31 DEC. 2018 — continued

Country	Operational reactors		Reactors in long term shutdown		Permanently shut down reactors		Total			
	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	8	8613		2321	5	2321	13	10934	459	
SWITZERLAND	5	3333		6	1	6	6	3339	219	11
UK	15	8923		4715	30	4715	45	13638	1604	7
UKRAINE	15	13107		3515	4	3515	19	16622	503	6
USA	98	99061		15046	35	15046	133	114107	4408	6
Total	451	396911		71389	172	71389	623	468300	17880	11

Notes:

1. The total includes the following data from Taiwan, China: — operational reactors: 5 units, 4448 MW; 224 years, 1 month.
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 2018

Country	Number of units and net capacity as of 31 Dec. of given year															
	1990		1995		2000		2005		2010		2015		2017		2018	
	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	1632	3	1633	3	1633
ARMENIA	1	376	1	376	1	376	1	376	1	376	1	375	1	375	1	375
BELGIUM	7	5501	7	5712	7	5801	7	5801	7	5801	7	5913	7	5918	7	5918
BRAZIL	1	626	1	626	2	1901	2	1901	2	1884	2	1884	2	1884	2	1884
BULGARIA	5	2585	6	3538	6	3760	4	2722	2	1906	2	1926	2	1926	2	1966
CANADA	20	13993	21	14902	14	9998	18	12584	18	12604	19	13524	19	13554	19	13554
CHINA	3	2188	3	2188	3	2188	9	6587	13	10065	31	26774	39	34514	46	42858
CZECH REP.	4	1632	4	1782	5	2611	6	3373	6	3675	6	3930	6	3930	6	3932
FINLAND	4	2310	4	2310	4	2656	4	2656	4	2716	4	2752	4	2769	4	2784
FRANCE	56	55808	56	58573	59	63080	59	63260	58	63130	58	63130	58	63130	58	63130
GERMANY	21	21250	19	20972	19	21283	17	20339	17	20490	8	10799	7	9515	7	9515
HUNGARY	4	1710	4	1729	4	1729	4	1755	4	1889	4	1889	4	1889	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	42	39752	39	36974
JAPAN	1	135	1	135	1	135	1	135	1	135	1	135	1	135	1	135
KAZAKHSTAN	9	7220	11	9115	16	12990	20	16810	21	18698	24	21733	24	22494	24	22444
KOREA, REP. OF	2	2760	2	2370	2	2370	1	1185	1	1185	2	1440	2	1552	2	1552
LITHUANIA	1	640	2	1256	2	1290	2	1450	2	1482	2	1482	1	482	1	482
MEXICO	2	539	2	510	1	449	1	450	2	425	2	425	3	690	5	1318
NETHERLANDS	1	125	1	125	2	425	2	425	2	425	2	1300	2	1300	2	1300
PAKISTAN	1	125	1	125	2	425	2	425	2	425	2	1300	2	1300	2	1300
ROMANIA	29	18898	30	19848	30	19848	31	21743	32	22693	35	25413	35	26142	36	27252
RUSSIA	4	1632	4	1632	6	2440	6	2442	4	1816	4	1814	4	1814	4	1814
SLOVAKIA	1	620	1	620	1	676	1	656	1	666	1	688	1	688	1	688
SLOVENIA	2	1840	2	1840	2	1840	2	1840	2	1860	2	1860	2	1860	2	1860
SOUTH AFRICA	9	7099	9	7468	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	8629	8	8613
SWEDEN	5	2942	5	3056	5	3170	5	3220	5	3238	5	3333	5	3333	5	3333
SWITZERLAND	5	2942	5	3056	5	3170	5	3220	5	3238	5	3333	5	3333	5	3333

TABLE 5. OPERATIONAL REACTORS AND NET ELECTRICAL POWER, 1990 TO 2018 — continued

Country	Number of units and net capacity as of 31 Dec. of given year																	
	1990		1995		2000		2005		2010		2015		2017		2018			
	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	8918	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	99	99952	98	99061		
WORLD	416	318253	434	341387	435	349984	441	368125	441	375277	441	382807	448	391721	451	396911		

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

- 1990: 6 units, 4828 MW; 1995: 6 units, 4884 MW; 2000: 6 units, 4884 MW; 2005: 6 units, 4982 MW; 2010: 6 units, 4982 MW; 2015: 6 units, 5052 MW; 2017: 5 units, 4448 MW; 2018: 5 units, 4448 MW.

TABLE 6. NUCLEAR ELECTRICITY PRODUCTION AND SHARE, FROM 1990 TO 2018

Country	Nuclear electricity supplied (TW-h) and percentage of nuclear share in given year															
	1990		1995		2000		2005		2010		2015		2017		2018	
	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	5.72	4.5	6.45	4.7
ARMENIA					1.84	33.0	2.50	42.7	2.29	39.4	2.57	34.5	2.41	2.41	1.90	25.6
BELGIUM	40.59	60.1	39.30	55.5	45.81	56.8	45.34	55.6	45.73	50.0	24.83	37.5	40.19	49.9	27.25	39.0
BRAZIL	2.06	1.0	2.33	1.0	5.59	1.9	9.20	2.5	13.77	3.1	13.89	2.8	14.85	2.7	14.79	2.7
BULGARIA	13.51	35.7	16.22	46.4	16.79	45.0	17.38	44.1	14.24	33.1	14.70	31.3	14.87	34.3	15.44	34.7
CANADA	69.87	14.8	93.98	17.3	69.12	11.8	86.83	14.5	85.50	15.1	95.84	16.6	95.13	14.6	94.45	14.9
CHINA	11.77	NA	12.13	1.2	16.02	1.2	50.33	2.0	70.96	1.8	161.20	3.0	232.80	3.9	277.06	4.2
CZECH REP.	18.13	35.1	18.13	29.9	12.71	18.7	23.25	30.5	26.44	33.3	25.34	32.5	26.78	33.1	28.26	34.5
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	381.85	71.6	395.91	71.7
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	72.16	11.6	71.87	11.7
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	15.22	50.0	14.86	50.6
HUNGARY	5.29	2.2	6.99	1.9	14.23	3.1	15.73	2.8	20.48	2.9	34.84	3.5	34.85	3.2	35.39	3.1
INDIA											3.20	1.3	6.37	2.2	6.30	2.1
IRAN, ISL. REP.											4.35	0.5	29.29	3.6	49.33	6.2
JAPAN	187.19	27.1	275.51	33.4	306.24	33.8	280.50	29.3	280.25	29.2	4.35	0.5	29.29	3.6	49.33	6.2
KAZAKHSTAN																
KOREA, REP. OF	50.26	49.1	60.21	36.1	103.54	40.7	137.59	44.7	141.89	32.2	157.20	31.7	141.28	27.1	127.08	23.7
LITHUANIA	15.70	NA	10.64	86.1	7.42	73.9	9.54	70.3								
MEXICO	2.78	2.6	7.53	6.0	7.92	3.9	10.32	5.0	5.59	3.6	11.18	6.8	10.57	6.0	13.20	5.3
NETHERLANDS	3.29	4.9	3.78	4.9	3.70	4.3	3.77	3.9	3.75	3.4	3.86	3.7	3.26	2.9	3.34	3.1
PAKISTAN	0.38	1.1	0.46	0.9	0.90	1.7	2.41	2.8	2.56	2.6	4.33	4.4	8.11	6.2	9.29	6.8
ROMANIA	109.62	NA	91.59	11.8	5.05	10.9	5.11	8.6	10.70	19.5	17.3	17.2	10.58	17.7	10.46	17.2
RUSSIA	11.16	NA	11.35	44.1	15.17	53.4	16.34	15.8	159.41	17.1	182.81	18.6	190.12	17.8	139.79	17.9
SLOVAKIA	4.39	NA	4.57	39.5	4.55	37.4	5.61	42.4	5.38	37.3	5.37	38.0	5.97	39.1	5.49	35.9
SLOVENIA	8.47	5.6	11.29	6.5	13.00	6.6	12.24	5.5	12.90	5.2	10.97	4.7	15.09	6.7	10.59	4.7
SOUTH AFRICA	51.98	35.9	53.49	34.1	54.81	27.6	54.99	19.6	59.26	20.1	54.76	20.3	63.06	21.2	53.36	20.4
SPAIN	65.27	45.9	67.17	46.6	54.81	39.0	69.58	44.9	55.73	38.1	54.46	34.3	63.06	39.6	65.87	40.3
SWEDEN	22.40	42.6	23.58	39.9	25.05	38.2	22.11	38.0	25.34	38.0	22.16	33.5	19.59	33.4	24.50	37.7
SWITZERLAND																

TABLE 6. NUCLEAR ELECTRICITY PRODUCTION AND SHARE, FROM 1990 TO 2018 — continued

Country	Nuclear electricity supplied (TW·h) and percentage of nuclear share in given year															
	1990		1995		2000		2005		2010		2015		2017		2018	
	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	63.89	19.1	59.11	17.7
UKRAINE	71.26	NA	65.78	37.8	72.56	47.3	83.40	48.5	83.95	48.1	82.41	56.5	80.41	55.1	79.53	53.0
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	805.65	20.1	808.03	19.3
WORLD	1890.35		2190.94		2443.85		2626.34		2629.82		2441.34		2502.82		2562.76	

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

1990: 31.54 TW(e)·h of nuclear electricity generation, representing 38.32% of the total electricity generated there;

1995: 33.8 TW(e)·h of nuclear electricity generation, representing 28.79% of the total electricity generated there;

2000: 37 TW(e)·h of nuclear electricity generation, representing 21.19% of the total electricity generated there;

2005: 38.4 TW(e)·h of nuclear electricity generation, representing 17.93% of the total electricity generated there;

2010: 39.89 TW(e)·h of nuclear electricity generation, representing 19.3% of the total electricity generated there;

2015: 35.14 TW(e)·h of nuclear electricity generation, representing 16.32% of the total electricity generated there;

2017: 21.56 TW(e)·h of nuclear electricity generation, representing 9.33% of the total electricity generated there;

2018: 26.66 TW(e)·h of nuclear electricity generation, representing 11.43% of the total electricity generated there.

TABLE 7. ANNUAL CONSTRUCTION STARTS AND CONNECTIONS TO THE GRID, 1954 TO 2018

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	35222	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	19775	19	15313	284	168317
1983	14	11286	23	19236	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	3679	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	6644	3	1842	439	371707
2008	10	10609			438	371557
2009	12	13626	2	1068	437	370697
2010	16	16013	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	9517	447	390491
2017	4	4254	4	3373	448	391721
2018	5	6339	9	10358	451	396911

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 2017		2018	
	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months	No. Months
ARGENTINA																
BRAZIL	1	89	1	113	1	176										
BULGARIA	5	101	2	97												
CANADA			3	73												
CHINA	3	93			1	167										
CZECH REP.	15	86	3	93	4	124										
FRANCE	6	103														
GERMANY	2	90														
HUNGARY	1	152	3	120	4	122										
INDIA																
IRAN, ISL. REP	8	49	10	46	3	42										
JAPAN	4	62	2	61	5	56										
KOREA, REP. OF	1	116														
LITHUANIA	1	151	1	210												
MEXICO																
PAKISTAN					1	83										
ROMANIA					1	169										
RUSSIA	4	72	1	109	2	150										
SLOVAKIA	2	96														
SPAIN	4	98	1	80												
UK	6	58	1	113												
UKRAINE	22	146	1	221	1	272										
USA																
TOTAL	85	93	29	82	23	121	20	59	12	77	29	68	14	68	9	104

Notes:

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

TABLE 9. CONSTRUCTION STARTS DURING 2018

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation
	Code	Name			Thermal	Gross					
BANGLADESH	BD-2	ROOPPUR-2	PWR	VVER V-523	3200	1200	1080	NPCBL AEM	2018-7	—	—
KOREA, REP. OF	KR-30	SHIN-KORI-6	PWR	APR-1400	3983	1400	1340	KHNP DHICKOPC	2018-9	—	—
RUSSIA	RU-166	KURSK 2-1	PWR	VVER V-510K	3300	1255	1175	REA AEM	2018-4	2022-6	2023-9
TURKEY	TR-1	AKKUYU-1	PWR	VVER V-509	3200	1200	1114	ANC AEM	2018-4	—	—
UK	GB-25A	HINKLEY POINT C-1	PWR	EPR-1750	4524	1720	1630	EDF-CGN AREVA	2018-12	—	—

Note: During 2018, construction started on 5 reactors (6339 MW).

TABLE 10. CONNECTIONS TO THE GRID DURING 2018

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	First criticality	Grid connection
	Code	Name			Thermal	Gross					
CHINA	CN-30	HAYANG-1	PWR	AP-1000	3415	1250	1126	SDNPC WH	2009-9	2018-8	2018-8
	CN-31	HAYANG-2	PWR	AP-1000	3415	1250	1126	SDNPC WH	2010-6	2018-9	2018-10
	CN-28	SANMEN-1	PWR	AP-1000	3400	1251	1157	SMNPC WH/MIHI	2009-4	2018-6	2018-6
	CN-29	SANMEN-2	PWR	AP-1000	3400	1251	1157	SMNPC WH/MIHI	2009-12	2018-8	2018-8
	CN-32	TAISHAN-1	PWR	EPR-1750	4590	1750	1660	TNPC AREVA	2009-11	2018-6	2018-6
	CN-46	TIANWAN-4	PWR	VVER V-428M	3000	1126	1060	JNPC IZ	2013-9	2018-9	2018-10
	CN-47	YANGJIANG-5	PWR	ACPR-1000	2905	1086	1021	YJNPC CFHI	2013-9	2018-5	2018-5
RUSSIA	RU-163	LENINGRAD 2-1	PWR	VVER V-491	3200	1187	1101	REA AEM	2008-10	2018-2	2018-3
	RU-64	ROSTOV-4	PWR	VVER V-320	3000	1030	950	REA AEM	2010-6	2017-12	2018-2

Note: During 2018, 9 reactors (10358 MW) were newly connected to the grid.

TABLE 11. SCHEDULED CONNECTIONS TO THE GRID DURING 2019

Country	Reactor		Type	Capacity (MW)			Operator	NSSS supplier	Construction start	First criticality	Grid date
	Code	Name		Thermal	Gross	Net					
KOREA, REP. OF	KR-26	SHIN-KORI-4	PWR	3983	1400	1340	KHNP	DHICKOPC	2009-8	2019-4	2019-4
RUSSIA	RU -151	AKADEMIK LOMONOSOV-1	PWR	150	38	32	REA	AEM	2007-4	—	—
	RU -152	AKADEMIK LOMONOSOV-2	PWR	150	38	32	REA	AEM	2007-4	—	—
SLOVAKIA	SK -10	MOCHOVCE-3	PWR	1375	471	440	SE	SKODA	1987-1	2019-4	2019-4

Note: During 2019, 4 reactors (1844 MW) are expected to connect to grid.

TABLE 12. REACTORS PLANNED FOR CONSTRUCTION AS KNOWN ON 31 DEC. 2018

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Expected construction start
	Code	Name			Thermal	Gross	Net			
CHINA	CN -73	BAMROSHAN	PWR	CPR-1000	2905	1080	900			
	CN -57	CHANGJIANG-3	PWR		1930	650	610			
	CN -58	CHANGJIANG-4	PWR		1930	650	610			
	CN -59	FANGCHENGANG-5	PWR				1000			
	CN -60	FANGCHENGANG-6	PWR				1000			
	CN -85	GUOHE-1	PWR	CAP-1400	4040	1534	1400	SNPDP		
	CN -86	GUOHE-2	PWR	CAP-1400	4040	1534	1400	SNPDP		
	CN -76	HAIYANG-3	PWR	AP-1000	3415	1253	1126	SDNPC	WH	
	CN -77	HAIYANG-4	PWR	AP-1000	3415	1253	1126	SDNPC	WH	
	CN -80	HONGSHIDING-1	PWR				0			
	CN -81	HONGSHIDING-2	PWR	ACPR1000			0	HSDNPC	DEC	
	CN -65	JIYANG-1	PWR				1000			
	CN -66	JIYANG-2	PWR				1000			
	CN -67	JIYANG-3	PWR				1000			
	CN -68	JIYANG-4	PWR				1000			
	CN -87	LUFENG-1	PWR	CPR-1000			1000	LFNPC		
	CN -88	LUFENG-2	PWR	CPR-1000			1000	LFNPC		
	CN -61	PENGZE-1	PWR				1250			
	CN -62	PENGZE-2	PWR				1250			
	CN -63	PENGZE-3	PWR				1250			
CN -64	PENGZE-4	PWR				1250				
CN -78	SANMEN-3	PWR	AP-1000		3400	1251	SMNPC	WH/MIH		
CN -79	SANMEN-4	PWR	AP-1000		3400	1251	SMNPC	WH/MIH		
CN -71	SANMING-1	FBR	BN-800		2100	860	FSNPC			
CN -72	SANMING-2	FBR	BN-800		2100	860	FSNPC			
CN -74	TAOHUAIJIANG-1	PWR				0				
CN -75	TAOHUAIJIANG-2	PWR				0				
CN -69	XIANNING-1	PWR				0				
CN -70	XIANNING-2	PWR				0				

TABLE 12. REACTORS PLANNED FOR CONSTRUCTION AS KNOWN ON 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Expected construction start
	Code	Name			Thermal	Gross	Net			
CHINA	CN -82	XUDABU-1	PWR	CPR-1000	2905	1080	1000	LNPC	DEC	—
	CN -83	XUDABU-2	PWR	CPR-1000	2905	1080	1000	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	1265	1185	PAKS II	AEM	—
	HU -6	PAKS-6	PWR	VVER V-527	3200	1265	1185	PAKS II	AEM	—
INDIA	IN -33	GORAKHPUR-1	PHWR	PHWR-700		700	630	NPCIL		—
	IN -34	GORAKHPUR-2	PHWR	PHWR-700		700	630	NPCIL		—
IRAN,ISL.REP	IR -2	BUSHEHR-2	PWR	VVER V-528	3000	1000	915	NPPDCO	JSC ASE	—
	IR -5	BUSHEHR-3	PWR	VVER V-528	3000	1000	915	NPPDCO	JSC ASE	—
	IR -9	DARKHOVAIN	PWR	IR-360	1113	360	330	NPPDCO		—
JAPAN	JP -76	HAMAOKA-6	BWR	ABWR	3926	1400	1350	CHUBU		—
	JP -69	HIGASHI DORI-1 (TEPCO)	BWR	ABWR	3926	1385	1343	TEPCO	H/G	—
	JP -74	HIGASHI DORI-2 (TEPCO)	BWR	ABWR	3926	1385	1343	TEPCO		—
	JP -72	HIGASHI DORI-2 (TOHOKU)	BWR	ABWR	3926		1067	TOHOKU		—
	JP -62	KAMINOSEKI-1	BWR	ABWR	3926	1373	1325	CHUGOKU		—
	JP -63	KAMINOSEKI-2	BWR	ABWR	3926	1373	1325	CHUGOKU		—
	JP -75	SENDAI-3	PWR	APWR	4466	1590	1590	KYUSHU		—
	JP -67	TSURUGA-3	PWR	APWR	4466	1538	1538	JAPCO	MHI	—
JP -68	TSURUGA-4	PWR	APWR	4466	1538	1538	JAPCO	MHI	—	
RUSSIA	RU -171	BALTIC-2	PWR	VVER V-491	3200	1194	1109	REA	AEM	—
	RU -202	BASHKIR-1	PWR	VVER V-510	3300	1255	1115	REA	AEM	—
	RU -203	BASHKIR-2	PWR	VVER V-510	3300	1255	1115	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	—

TABLE 12. REACTORS PLANNED FOR CONSTRUCTION AS KNOWN ON 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Expected construction start	
	Code	Name			Thermal	Gross	Net				
RUSSIA	RU -178	CENTRAL-2	PWR	VVER V-510	3300	1255	0	REA	AEM	—	
	RU -175	KOLA 2-1	PWR	-	3200	1200	0	REA	AEM	—	
	RU -176	KOLA 2-2	PWR	-	3200	1200	1100	REA	AEM	—	
	RU -189	KURSK 2-2	PWR	VVER V-510K	3300	1255	1175	REA	AEM	2019-5	
	RU -190	KURSK 2-3	PWR	VVER V-510K	3300	1255	1175	REA	AEM	—	
	RU -191	KURSK 2-4	PWR	VVER V-510K	3300	1255	1175	REA	AEM	—	
	RU -165	LENINGRAD 2-3	PWR	VVER V-491	3200	1199	1111	REA	AEM	—	
	RU -167	LENINGRAD 2-4	PWR	VVER V-491	3200	1199	1111	REA	AEM	—	
	RU -181	NIZHEGORODSK-1	PWR	VVER V-510	3300	1255	1175	REA	AEM	—	
	RU -182	NIZHEGORODSK-2	PWR	VVER V-510	3300	1255	1175	REA	AEM	—	
	RU -187	SEVERSK-1	PWR	VVER V-510	3300	1255	0	REA	AEM	—	
	RU -188	SEVERSK-2	PWR	VVER V-510	3300	1255	0	REA	AEM	—	
	RU -198	SMOLENSK 2-1	PWR	VVER V-510	3300	1255	0	REA	AEM	—	
	RU -199	SMOLENSK 2-2	PWR	VVER V-510	3300	1255	0	REA	AEM	—	
	RU -204	SOUTH URALS-1	FBR	BN-1200	3000	1220	0	REA	AEM	—	
	RU -205	SOUTH URALS-2	FBR	BN-1200	3000	1220	0	REA	AEM	—	
	TURKEY	TR -2	AKKUYU-2	PWR	VVER V-509	3200	1200	1114	ANC	AEM	—
		TR -3	AKKUYU-3	PWR	VVER V-509	3200	1200	1114	ANC	AEM	—
		TR -4	AKKUYU-4	PWR	VVER V-509	3200	1200	1114	ANC	AEM	—
USA	US -5033	FERMI-3	BWR	ESBWR	4500	1600	1520			—	
	US -5017	NORTH ANNA-3	PWR	US-APWR		1500	1500			—	
	US -5012	SOUTH TEXAS-3	BWR	ABWR	3926	1400	1350			—	
	US -5013	SOUTH TEXAS-4	BWR	ABWR	3926	1400	1350			—	
	US -5040	TURKEY POINT-6	PWR	AP-1000	3750	1250	1117			—	
	US -5041	TURKEY POINT-7	PWR	AP-1000	3750	1250	1117			—	
	US -5018	WILLIAM STATES LEE III-1	PWR	AP-1000	3750	1250	1117			—	
	US -5019	WILLIAM STATES LEE III-2	PWR	AP-1000	3750	1250	1117			—	

Note: Status as of 31 December 2018, 81 reactors (73191 MW) were known as planned.

TABLE 13. REACTORS UNDER CONSTRUCTION, 31 DEC. 2018

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 Prototyp	100	29	CNEA	CNEA	2014-2	—	—	—	
BANGLADESH	BD-1	ROOPPUR-1	PWR	VVER V-523	3200	1200	NPCBL	AEM	2017-11	—	—	—	
	BD-2	ROOPPUR-2	PWR	VVER V-523	3200	1200	NPCBL	AEM	2018-7	—	—	—	
BELARUS	BY-1	BELARUSIAN-1	PWR	VVER V-491	3200	1194	BelNPP	JSC ASE	2013-11	—	—	—	
	BY-2	BELARUSIAN-2	PWR	VVER V-491	3200	1194	BelNPP	JSC ASE	2014-4	—	—	—	
BRAZIL	BR-3	ANGRA-3	PWR	PRE KONVOI	3900	1405	ELETRONU	KWU	2010-6	2025-9	2025-9	2026-1	
CHINA	CN-55	FANGCHENGANG-3	PWR	HPR1000	3150	1180	GFNPC	CFHI	2015-12	—	—	—	
	CN-56	FANGCHENGANG-4	PWR	HPR1000	3150	1180	GFNPC	CFHI	2016-12	—	—	—	
	CN-51	FUQING-5	PWR	HPR1000	3060	1150	FQNP	NPIC	2015-5	—	—	—	
	CN-52	FUQING-6	PWR	HPR1000	3060	1150	FQNP	NPIC	2015-12	—	—	—	
	CN-49	HONGYANHE-5	PWR	ACPR-1000	2905	1119	LHNPC	DEC	2015-3	—	—	—	
	CN-50	HONGYANHE-6	PWR	ACPR-1000	2905	1119	LHNPC	DEC	2015-7	—	—	—	
	CN-44	SHIDAO BAY-1	HTGR	HTR-PM	500	211	HSNPC	TSINGHUA	2012-12	—	—	—	
	CN-33	TAISHAN-2	PWR	EPR-1750	4590	1750	TNPC	AREVA	2010-4	—	—	—	
	CN-53	TIANWAN-5	PWR	CNP-1000	2905	1118	JNPC	SHE	2015-12	—	—	—	
	CN-54	TIANWAN-6	PWR	CNP-1000	2905	1118	JNPC	CFHI	2016-9	—	—	—	
	CN-48	YANGJIANG-6	PWR	ACPR-1000	2905	1086	YJNPC	CFHI	2013-12	—	—	—	
	FINLAND	FI-5	OLKILUOTO-3	PWR	EPR	4300	1720	TVO	AREVA	2005-8	—	—	2020-1
	FRANCE	FR-74	FLAMANVILLE-3	PWR	EPR	4300	1650	EDF	AREVA	2007-12	—	—	—
	INDIA	IN-30	KAKRAPAR-3	PHWR	PHWR-700	2166	700	NPCIL	NPCIL	2010-11	—	—	—
IN-31		KAKRAPAR-4	PHWR	PHWR-700	2166	700	NPCIL	NPCIL	2010-11	—	—	—	
IN-35		KUDANKULAM-3	PWR	VVER V-412	3000	1000	NPCIL	JSC ASE	2017-6	2022-9	—	2023-3	

TABLE 13. REACTORS UNDER CONSTRUCTION, 31 DEC. 2018 — 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	VVER V-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	—	—	—
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-26	SHIN-KORI-4	PWR	APR-1400	3983	1400	1340	DHICKOPC	2009-8	—	—	—
	KR-29	SHIN-KORI-5	PWR	APR-1400	3983	1400	1340	DHICKOPC	2017-4	—	—	—
	KR-30	SHIN-KORI-6	PWR	APR-1400	3983	1400	1340	DHICKOPC	2018-9	—	—	—
PAKISTAN	PK-6	KANUPP-2	PWR	ACP-1000	3060	1100	1014	PAEC	2015-8	2020-6	2020-7	2020-7
	PK-7	KANUPP-3	PWR	ACP-1000	3060	1100	1014	PAEC	2016-5	—	—	—
RUSSIA	RU-151	AKADEMIK LOMONOSOV-1	PWR	KL-T-40S 'Float	150	38	32	REA	2007-4	—	—	2019-12
	RU-152	AKADEMIK LOMONOSOV-2	PWR	KL-T-40S 'Float	150	38	32	REA	2007-4	—	—	2019-12
	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-164	LENINGRAD 2-2	PWR	VVER V-491	3200	1199	1111	REA	2010-4	2011-11	2021-12	2022-1
	RU-162	NOVOORONEZH 2-2	PWR	VVER V-392M	3200	1195	1114	REA	2009-7	—	—	2019-12
SLOVAKIA	SK-10	MOCHOVCE-3	PWR	VVER V-213	1375	471	440	SE	1987-1	2019-4	2019-4	2019-6
	SK-11	MOCHOVCE-4	PWR	VVER V-213	1375	471	440	SE	1987-1	2020-4	2020-4	2020-6
TURKEY	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	2012-7	—	—	—

TABLE 13. REACTORS UNDER CONSTRUCTION, 31 DEC. 2018 — 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 -02	BARAKAH-2	PWR	APR-1400	3983	1400	1345	NAWAH	KEPCO	2013-4	—	—	—
	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	—	—	—
	GB -25A	HINKLEY POINT C-1	PWR	EPR-1750	4524	1720	1630	EDF-CGN	AREVA	2018-12	—	—	—
UKRAINE	UA -51	KHMELNITSKI-3	PWR	VVER	3132	1089	1035	NNEG	JSC ASE	1986-3	—	—	—
	UA -52	KHMELNITSKI-4	PWR	VVER	3132	1089	1035	NNEG	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 2018, 55 reactors (56643 MW) were under construction, including 2 units (2600 MW) in Taiwan, China.
 TAIWAN,CHINA TW -7 LUNG MEN 1 BWR ABWR 3926 1350 1300 TPC GE 1999-3
 TAIWAN,CHINA TW -8 LUNG MEN 2 BWR ABWR 3926 1350 1300 TPC GE 1999-8

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics
	Code	Name			Thermal	Gross								
ARGENTINA	AR-1	ATUCHA-1	PHWR	PHWR KWU	1179	362	NASA	SIEMENS	1968-6	1974-3	1974-6	78.8	78.9	-
	AR-3	ATUCHA-2	PHWR	PHWR KWU	2160	745	NASA	SIEMENS	1981-7	2014-6	2016-5	67.6	67.6	-
	AR-2	EMBALSE	PHWR	CANDU 6	2015	648	NASA	AECL	1974-4	1983-4	1984-1	39.9	39.9	-
ARMENIA	AM -19	ARMENIAN-2	PWR	VVER V-270	1375	408	ANPPCJSC	FAEA	1975-7	1980-1	1980-5	67.5	69.7	-
BELGIUM	BE-2	DOEL-1	PWR	WH 2LP	1311	454	EBL+EDF	ACECOWEN	1969-7	1974-8	1975-2	77.8	78.5	-
	BE-4	DOEL-2	PWR	WH 2LP	1311	454	EBL+EDF	ACECOWEN	1971-9	1975-8	1975-12	76.9	77.7	-
	BE-5	DOEL-3	PWR	WH 3LP	3054	1056	EBL+EDF	FRAMACEC	1975-1	1982-6	1982-10	44.0	44.1	-
	BE-7	DOEL-4	PWR	WH 3LP	2988	1090	EBL+EDF	ACECOWEN	1978-12	1985-4	1985-7	76.1	76.6	-
	BE-3	TIHANGE-1	PWR	Framatome 3 lo	2873	1009	EBL	ACLFL	1970-6	1975-3	1975-10	63.6	64.2	-
	BE-6	TIHANGE-2	PWR	WH 3LP	3064	1055	EBL	FRAMACEC	1976-4	1982-10	1983-6	53.0	53.2	-
	BE-8	TIHANGE-3	PWR	WH 3LP	3000	1089	EBL	ACECOWEN	1978-11	1985-6	1985-9	77.2	78.4	-
	BRAZIL	BR-1	ANGRA-1	PWR	WH 2LP	1882	640	ELETRONU WH		1971-5	1982-4	1985-1	82.7	83.0
	BR-2	ANGRA-2	PWR	PRE KONVOI	3764	1350	ELETRONU KWU		1976-1	2000-7	2001-2	90.5	91.5	-
BULGARIA	BG-5	KOZLODUY-5	PWR	VVER V-320	3000	1000	KOZNPFP AEE		1980-7	1987-11	1988-12	88.4	88.8	DH
	BG-6	KOZLODUY-6	PWR	VVER V-320	3000	1000	KOZNPFP AEE		1982-4	1991-8	1993-12	87.3	88.1	DH
CANADA	CA-8	BRUCE-1	PHWR	CANDU 791	2620	830	BRUCEPOW OHIAECL		1971-6	1977-1	1977-9	87.6	87.6	-
	CA-9	BRUCE-2	PHWR	CANDU 791	2620	830	BRUCEPOW OHIAECL		1970-12	1976-9	1977-9	87.8	87.8	-
	CA-10	BRUCE-3	PHWR	CANDU 750A	2550	830	BRUCEPOW OHIAECL		1972-7	1977-12	1978-2	81.0	81.0	-
	CA-11	BRUCE-4	PHWR	CANDU 750A	2550	830	BRUCEPOW OHIAECL		1972-9	1978-12	1979-1	83.1	83.1	-
	CA-18	BRUCE-5	PHWR	CANDU 750B	2832	872	BRUCEPOW OHIAECL		1978-6	1984-12	1985-3	88.9	89.1	-
	CA-19	BRUCE-6	PHWR	CANDU 750B	2690	891	BRUCEPOW OHIAECL		1978-1	1984-6	1984-9	90.2	90.4	-
	CA-20	BRUCE-7	PHWR	CANDU 750B	2832	872	BRUCEPOW OHIAECL		1979-5	1986-2	1986-4	87.9	88.0	-
	CA-21	BRUCE-8	PHWR	CANDU 750B	2690	872	BRUCEPOW OHIAECL		1979-8	1987-3	1987-5	85.7	85.8	-
	CA-22	DARLINGTON-1	PHWR	CANDU 850	2776	934	OPG OHIAECL		1982-4	1990-12	1992-11	80.6	81.5	-

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

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF %		Non-electrical applics	
	Code	Name			Thermal	Gross	Net						2014-	2018		
CANADA	CA-23	DARLINGTON-2	PHWR	CANDU 850	2776	934	878	OPG	OHA/EACL	1981-9	1990-1	1990-10	50.9	51.4	-	
	CA-24	DARLINGTON-3	PHWR	CANDU 850	2776	934	878	OPG	OHA/EACL	1984-9	1992-12	1993-2	83.8	84.6	-	
	CA-25	DARLINGTON-4	PHWR	CANDU 850	2776	934	878	OPG	OHA/EACL	1985-7	1993-4	1993-6	88.7	89.4	-	
	CA-4	PICKERING-1	PHWR	CANDU 500A	1744	542	515	OPG	OHA/EACL	1966-6	1971-4	1971-7	77.7	78.4	-	
	CA-7	PICKERING-4	PHWR	CANDU 500A	1744	542	515	OPG	OHA/EACL	1968-6	1973-5	1973-6	72.4	72.9	-	
	CA-13	PICKERING-5	PHWR	CANDU 500B	1744	540	516	OPG	OHA/EACL	1968-5	1982-12	1983-5	83.1	84.4	-	
	CA-14	PICKERING-6	PHWR	CANDU 500B	1744	540	516	OPG	OHA/EACL	1974-11	1983-11	1984-2	80.1	81.4	-	
	CA-15	PICKERING-7	PHWR	CANDU 500B	1744	540	516	OPG	OHA/EACL	1975-10	1984-11	1985-1	79.2	79.8	-	
	CA-16	PICKERING-8	PHWR	CANDU 500B	1744	540	516	OPG	OHA/EACL	1976-3	1986-1	1986-2	68.1	68.6	-	
	CA-17	POINT LEPREAU	PHWR	CANDU 6	2180	705	660	NBEPCC	OHA/EACL	1976-9	1982-9	1983-2	81.7	81.7	-	
	CHINA	CN-84	CEFR	FBR	BN-20	65	25	20	C/AE	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	83.9	83.9	-
		CN-2	DAYA BAY-1	PWR	M310	2905	984	944	DNMC	FRAM	1987-8	1993-8	1994-2	90.8	90.8	-
		CN-3	DAYA BAY-2	PWR	M310	2905	984	944	DNMC	FRAM	1988-4	1994-2	1994-5	89.9	90.0	-
		CN-38	FANGCHENGANG-1	PWR	CPR-1000	2905	1086	1000	GFNPC	DEC	2010-7	2015-10	2016-1	88.9	89.0	-
		CN-39	FANGCHENGANG-2	PWR	CPR-1000	2905	1086	1000	GFNPC	DEC	2010-12	2016-7	2016-10	91.2	91.3	-
CN-24		FANGJIANSHAN-1	PWR	CPR-1000	2905	1089	1012	GNPC	NPIC	2008-12	2014-11	2014-12	91.1	91.4	-	
CN-25		FANGJIANSHAN-2	PWR	CPR-1000	2905	1089	1012	GNPC	NPIC	2009-7	2015-1	2015-2	90.7	91.0	-	
CN-20		FUJING-1	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2008-11	2014-8	2014-11	87.7	87.8	-	
CN-21		FUJING-2	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2009-6	2015-8	2015-10	85.1	85.2	-	
CN-42		FUJING-3	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2010-12	2016-9	2016-10	86.5	86.6	-	
CN-43		FUJING-4	PWR	CNP-1000	2905	1089	1000	FQNP	NPIC	2012-11	2017-9	2018-10	82.3	82.4	-	
CN-30		HAIYANG-1	PWR	AP-1000	3415	1250	1170	SDNPC	WH	2009-9	2018-8	2018-10	94.2	94.2	-	
CN-31		HAIYANG-2	PWR	AP-1000	3415	1250	1170	SDNPC	WH	2010-6	2018-10	2019-1	-	-	-	
CN-16		HONGYANHE-1	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2007-8	2013-2	2013-6	85.9	86.5	-	
CN-17		HONGYANHE-2	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2008-3	2013-11	2014-5	83.9	84.7	-	
CN-26		HONGYANHE-3	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2009-3	2015-3	2015-8	89.6	90.5	-	
CN-27		HONGYANHE-4	PWR	CPR-1000	2905	1119	1061	LHNPC	DEC	2009-8	2016-4	2016-6	87.9	88.6	-	

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	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	90.2	90.8	-	
	CN-7	LING AO-2	PWR	M310	2905	990	950	DNMC	1997-11	2002-9	2003-1	92.6	93.0	-	
	CN-12	LING AO-3	PWR	CPR-1000	2905	1086	1007	DNMC	2005-12	2010-7	2010-9	89.1	89.5	-	
	CN-13	LING AO-4	PWR	CPR-1000	2905	1086	1007	DNMC	2006-6	2011-5	2011-8	91.4	91.6	-	
	CN-18	NINGDE-1	PWR	CPR-1000	2905	1089	1018	NDNP	2008-2	2012-12	2013-4	82.9	83.0	-	
	CN-19	NINGDE-2	PWR	CPR-1000	2905	1089	1018	NDNP	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	90.0	90.0	-	
	CN-35	NINGDE-4	PWR	CPR-1000	2905	1089	1018	NDNP	2010-9	2016-3	2016-7	93.5	93.5	-	
	CN-4	QINSHAN 2-1	PWR	CNP-600	1930	650	610	NPQJVC	1996-6	2002-2	2002-4	90.2	90.2	-	
	CN-5	QINSHAN 2-2	PWR	CNP-600	1930	650	610	NPQJVC	1997-4	2004-3	2004-5	90.1	90.1	-	
	CN-14	QINSHAN 2-3	PWR	CNP-600	1930	660	619	NPQJVC	2008-4	2010-8	2010-10	90.8	90.9	-	
	CN-15	QINSHAN 2-4	PWR	CNP-600	1930	660	619	NPQJVC	2007-1	2011-11	2011-12	90.0	90.3	-	
	CN-8	QINSHAN 3-1	PHWR	CANDU 6	2064	728	677	TQNPC	1998-6	2002-11	2002-12	90.3	90.8	-	
	CN-9	QINSHAN 3-2	PHWR	CANDU 6	2064	728	677	TQNPC	1998-9	2003-6	2003-7	89.3	89.8	-	
	CN-1	QINSHAN-1	PWR	CNP-300	966	310	298	CNNO	1985-3	1991-12	1994-4	86.2	86.3	-	
	CN-28	SANMEN-1	PWR	AP-1000	3400	1251	1157	SMNPC	2009-4	2018-6	2018-9	99.8	100.0	-	
	CN-29	SANMEN-2	PWR	AP-1000	3400	1251	1157	SMNPC	2009-12	2018-8	2018-11	85.1	85.1	-	
	CN-32	TAISHAN-1	PWR	EPR-1750	4590	1750	1660	TNPC	2009-11	2018-6	2018-12	84.5	84.5	-	
	CN-10	TIANWAN-1	PWR	VVER V-428	3000	1060	990	JNPC	1999-10	2006-5	2007-5	88.6	88.9	-	
	CN-11	TIANWAN-2	PWR	VVER V-428	3000	1060	990	JNPC	2000-9	2007-5	2007-8	91.5	91.8	-	
	CN-45	TIANWAN-3	PWR	VVER V-428M	3000	1126	1045	JNPC	2012-12	2018-2	2018-2	90.8	91.5	-	
	CN-46	TIANWAN-4	PWR	VVER V-428M	3000	1126	1045	JNPC	2013-9	2018-10	2018-12	-	-	-	
	CN-22	YANGJIANG-1	PWR	CPR-1000	2905	1086	1000	YJNPC	2008-12	2013-12	2014-3	89.3	89.4	-	
	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	89.5	89.9	-	
	CN-41	YANGJIANG-4	PWR	CPR-1000	2905	1086	1000	YJNPC	2012-11	2017-1	2017-3	86.7	86.9	-	
	CN-47	YANGJIANG-5	PWR	ACPR-1000	2905	1086	1000	YJNPC	2013-9	2018-5	2018-7	99.1	99.9	-	
	CZECH REP.	CZ-4	DUKOVANY-1	PWR	VVER V-213	1444	500	468	CEZ	1979-1	1985-2	1985-5	77.9	78.8	-
		CZ-5	DUKOVANY-2	PWR	VVER V-213	1444	500	471	CEZ	1979-1	1986-1	1986-3	73.0	74.3	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applies
	Code	Name			Thermal	Gross	Net								
CZECH REP.	CZ-8	DUKOVANY-3	PWR	VVER V-213	1444	500	468	CEZ	SKODA	1979-3	1986-11	1986-12	72.8	73.8	-
	CZ-9	DUKOVANY-4	PWR	VVER V-213	1444	500	471	CEZ	SKODA	1987-3	1987-6	1987-7	77.6	78.4	-
	CZ-23	TEMLIN-1	PWR	VVER V-320	3120	1082	1027	CEZ	SKODA	1987-2	2000-12	2002-6	81.0	81.7	DH
	CZ-24	TEMLIN-2	PWR	VVER V-320	3120	1082	1027	CEZ	SKODA	1987-2	2002-12	2003-4	74.0	74.1	DH
FINLAND	FI-1	LOVISA-1	PWR	VVER V-213	1500	531	507	FORTUMPH AEE	FORTUMPH AEE	1971-5	1977-2	1977-5	91.4	92.6	-
	FI-2	LOVISA-2	PWR	VVER V-213	1500	531	507	FORTUMPH AEE	FORTUMPH AEE	1972-8	1980-11	1981-1	90.5	91.6	-
	FI-3	OLKILUOTO-1	BWR	AA-III, BWR-25	2500	910	880	TVO	ASEASTAL	1974-2	1978-9	1979-10	92.2	92.9	-
	FI-4	OLKILUOTO-2	BWR	AA-III, BWR-25	2500	920	890	TVO	ASEASTAL	1975-11	1980-2	1982-7	90.9	91.5	-
FRANCE	FR-54	BELLEVILLE-1	PWR	P4 REP 1300	3817	1363	1310	EDF	FRAM	1980-5	1987-10	1988-6	76.3	77.8	-
	FR-55	BELLEVILLE-2	PWR	P4 REP 1300	3817	1363	1310	EDF	FRAM	1980-8	1988-7	1989-1	78.8	80.0	-
	FR-32	BLAYAIS-1	PWR	CP1	2785	951	910	EDF	FRAM	1977-1	1981-6	1981-12	77.8	83.3	-
	FR-33	BLAYAIS-2	PWR	CP1	2785	951	910	EDF	FRAM	1977-1	1982-7	1983-2	84.9	86.1	-
	FR-34	BLAYAIS-3	PWR	CP1	2785	951	910	EDF	FRAM	1978-4	1983-8	1983-11	65.6	66.7	-
	FR-35	BLAYAIS-4	PWR	CP1	2785	951	910	EDF	FRAM	1978-4	1983-5	1983-10	78.7	79.6	-
	FR-13	BUGEY-2	PWR	CP0	2785	945	910	EDF	FRAM	1972-11	1978-5	1979-3	78.5	82.0	-
	FR-14	BUGEY-3	PWR	CP0	2785	945	910	EDF	FRAM	1973-9	1978-9	1979-3	85.7	89.3	-
	FR-15	BUGEY-4	PWR	CP0	2785	917	880	EDF	FRAM	1974-6	1979-3	1979-7	76.7	77.7	-
	FR-16	BUGEY-5	PWR	CP0	2785	917	880	EDF	FRAM	1974-7	1979-7	1980-1	49.0	49.6	-
	FR-50	CATTENOM-1	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1979-10	1986-11	1987-4	73.9	75.9	-
	FR-53	CATTENOM-2	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1980-7	1987-9	1988-2	75.1	76.9	-
	FR-60	CATTENOM-3	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1982-6	1990-7	1991-2	82.9	86.0	-
	FR-65	CATTENOM-4	PWR	P4 REP 1300	3817	1362	1300	EDF	FRAM	1983-9	1991-5	1992-1	81.9	87.2	-
	FR-40	CHINON B-1	PWR	CP2	2785	954	905	EDF	FRAM	1977-3	1982-11	1984-2	79.8	81.1	-
	FR-41	CHINON B-2	PWR	CP2	2785	954	905	EDF	FRAM	1977-3	1983-11	1984-8	67.9	73.0	-
FR-56	CHINON B-3	PWR	CP2	2785	954	905	EDF	FRAM	1980-10	1986-10	1987-3	82.1	82.8	-	
FR-57	CHINON B-4	PWR	CP2	2785	954	905	EDF	FRAM	1981-2	1987-11	1988-4	80.1	81.0	-	
FR-62	CHOOZ B-1	PWR	N4 REP 1450	4270	1560	1500	EDF	FRAM	1984-1	1996-8	2000-5	78.2	81.5	-	
FR-70	CHOOZ B-2	PWR	N4 REP 1450	4270	1560	1500	EDF	FRAM	1985-12	1997-4	2000-9	82.3	84.4	-	

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

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applies
	Code	Name			Thermal	Gross								
FRANCE	FR-72	CIVAUX-1	PWR	N4 REP 1450	4270	1561	1495	EDF	1988-10	1987-12	2002-1	75.3	78.2	-
	FR-73	CIVAUX-2	PWR	N4 REP 1450	4270	1561	1495	EDF	1991-4	1999-12	2002-4	76.8	79.0	-
	FR-42	CRUAS-1	PWR	CP2	2785	956	915	EDF	1978-8	1984-4	1984-4	68.6	69.3	-
	FR-43	CRUAS-2	PWR	CP2	2785	956	915	EDF	1978-11	1984-9	1985-4	77.6	80.7	-
	FR-44	CRUAS-3	PWR	CP2	2785	956	915	EDF	1979-4	1984-5	1984-9	68.8	69.6	-
	FR-45	CRUAS-4	PWR	CP2	2785	956	915	EDF	1979-10	1984-10	1985-2	68.2	69.2	-
	FR-22	DAMPIERRE-1	PWR	CP1	2785	937	890	EDF	1975-2	1980-3	1980-9	84.2	85.8	-
	FR-29	DAMPIERRE-2	PWR	CP1	2785	937	890	EDF	1975-4	1980-12	1981-2	74.5	76.7	-
	FR-30	DAMPIERRE-3	PWR	CP1	2785	937	890	EDF	1975-9	1981-1	1981-5	79.6	82.9	-
	FR-31	DAMPIERRE-4	PWR	CP1	2785	937	890	EDF	1975-12	1981-8	1981-11	69.7	71.0	-
	FR-11	FESSENHEIM-1	PWR	CP0	2785	920	880	EDF	1971-9	1977-4	1978-1	79.7	82.8	-
	FR-12	FESSENHEIM-2	PWR	CP0	2785	920	880	EDF	1972-2	1977-10	1978-4	55.5	57.8	-
	FR-46	FLAMANVILLE-1	PWR	P4 REP 1300	3817	1382	1330	EDF	1979-12	1985-12	1986-12	63.3	64.5	-
	FR-47	FLAMANVILLE-2	PWR	P4 REP 1300	3817	1382	1330	EDF	1980-5	1986-7	1987-3	79.5	82.1	-
	FR-61	GOLFECH-1	PWR	P4 REP 1300	3817	1363	1310	EDF	1982-11	1990-6	1991-2	85.1	89.1	-
	FR-68	GOLFECH-2	PWR	P4 REP 1300	3817	1363	1310	EDF	1984-10	1993-6	1994-3	80.4	81.9	-
	FR-20	GRAVELINES-1	PWR	CP1	2785	951	910	EDF	1975-2	1980-3	1980-11	73.4	76.6	-
	FR-21	GRAVELINES-2	PWR	CP1	2785	951	910	EDF	1975-3	1980-8	1980-12	74.5	81.9	-
	FR-27	GRAVELINES-3	PWR	CP1	2785	951	910	EDF	1975-12	1980-12	1981-6	79.2	80.4	-
	FR-28	GRAVELINES-4	PWR	CP1	2785	951	910	EDF	1976-4	1981-6	1981-10	75.0	77.0	-
	FR-51	GRAVELINES-5	PWR	CP1	2785	951	910	EDF	1979-10	1984-8	1985-1	60.5	61.8	-
	FR-52	GRAVELINES-6	PWR	CP1	2785	951	910	EDF	1979-10	1985-8	1985-10	71.4	75.0	-
	FR-58	NOGENT-1	PWR	P4 REP 1300	3817	1363	1310	EDF	1981-5	1987-10	1988-2	79.3	81.7	-
	FR-59	NOGENT-2	PWR	P4 REP 1300	3817	1363	1310	EDF	1982-1	1988-12	1989-5	81.8	83.1	-
	FR-36	PALUEL-1	PWR	P4 REP 1300	3817	1382	1330	EDF	1977-8	1984-6	1985-12	78.3	81.2	-
	FR-37	PALUEL-2	PWR	P4 REP 1300	3817	1382	1330	EDF	1978-1	1984-9	1985-12	29.7	30.1	-
	FR-38	PALUEL-3	PWR	P4 REP 1300	3817	1382	1330	EDF	1979-2	1985-9	1986-2	64.2	71.1	-
	FR-39	PALUEL-4	PWR	P4 REP 1300	3817	1382	1330	EDF	1980-2	1986-4	1986-6	82.5	86.6	-
	FR-63	PENLY-1	PWR	P4 REP 1300	3817	1382	1330	EDF	1982-9	1990-5	1990-12	81.4	82.8	-
	FR-64	PENLY-2	PWR	P4 REP 1300	3817	1382	1330	EDF	1984-8	1992-2	1992-11	80.5	81.7	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics
	Code	Name			Thermal	Gross								
FRANCE	FR-48	ST. ALBAN-1	PWR	P4 REP 1300	3817	1381	EDF	FRAM	1979-1	1985-8	1986-5	72.2	78.0	-
	FR-49	ST. ALBAN-2	PWR	P4 REP 1300	3817	1381	EDF	FRAM	1979-7	1986-7	1987-3	76.8	81.6	-
	FR-17	ST. LAURENT B-1	PWR	CP2	2785	956	EDF	FRAM	1976-5	1981-1	1983-8	74.8	78.2	-
	FR-23	ST. LAURENT B-2	PWR	CP2	2785	956	EDF	FRAM	1976-7	1981-6	1983-8	74.9	77.6	-
	FR-18	TRICASTIN-1	PWR	CP1	2785	955	EDF	FRAM	1974-11	1980-5	1980-12	68.4	72.6	-
	FR-19	TRICASTIN-2	PWR	CP1	2785	955	EDF	FRAM	1974-12	1980-8	1980-12	70.3	80.8	-
	FR-25	TRICASTIN-3	PWR	CP1	2785	955	EDF	FRAM	1975-4	1981-2	1981-5	68.0	76.9	-
	FR-26	TRICASTIN-4	PWR	CP1	2785	955	EDF	FRAM	1975-5	1981-6	1981-11	73.4	75.2	-
	GERMANY	DE-32	BROKDORF	PWR	PWR	3900	1480	PElectra	KWU	1976-1	1986-10	1986-12	82.0	82.3
DE-33		EMSLAND	PWR	Konvoi	3850	1406	KLE	KWU	1982-8	1988-4	1988-6	92.7	93.5	-
DE-27		GROHNDE	PWR	PWR	3900	1430	PElectra	KWU	1976-6	1984-9	1985-2	82.3	83.7	-
DE-28		GUNDREMMINGEN-C	BWR	BWR-72	3840	1344	KEG	KWU	1976-7	1984-11	1985-1	86.6	88.0	-
DE-31		ISAR-2	PWR	Konvoi	3950	1485	PElectra	KWU	1982-9	1988-1	1988-4	91.7	92.3	-
DE-44		NECKARWESTHEIM-2	PWR	Konvoi	3850	1400	EnKK	KWU	1982-11	1989-1	1989-4	89.3	89.9	-
DE-24		PHILIPPSTADT	PWR	PWR	3950	1468	EnKK	KWU	1977-7	1984-12	1985-4	80.4	81.6	-
HUNGARY		HU-1	PAKS-1	PWR	VVER V-213	1485	500	PAKS Zrt	AEE	1974-8	1982-12	1983-8	87.3	87.7
	HU-2	PAKS-2	PWR	VVER V-213	1485	500	PAKS Zrt	AEE	1974-8	1984-9	1984-11	90.3	90.6	DH
	HU-3	PAKS-3	PWR	VVER V-213	1485	500	PAKS Zrt	AEE	1979-10	1986-9	1986-12	89.1	89.6	DH
	HU-4	PAKS-4	PWR	VVER V-213	1485	500	PAKS Zrt	AEE	1979-10	1987-8	1987-11	91.1	92.3	DH
INDIA	IN-13	KAIGA-1	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1989-9	2000-10	2000-11	93.1	96.9	-
	IN-14	KAIGA-2	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1989-12	1999-12	2000-3	89.5	92.9	-
	IN-15	KAIGA-3	PHWR	Horizontal Pre	800	220	NPCIL	NPCIL	2002-3	2007-4	2007-5	83.5	85.2	-
	IN-16	KAIGA-4	PHWR	Horizontal Pre	800	220	NPCIL	NPCIL	2002-5	2011-1	2011-1	91.3	91.6	-
	IN-9	KAKRAPAR-1	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1984-12	1992-11	1993-5	41.6	41.6	-
	IN-10	KAKRAPAR-2	PHWR	Horizontal Pre	801	220	NPCIL	NPCIL	1985-4	1995-3	1995-9	31.8	32.4	-
	IN-25	KUDANKULAM-1	PWR	VVER V-412	3000	1000	NPCIL	MAEP	2002-3	2013-10	2014-12	50.3	50.3	-
	IN-26	KUDANKULAM-2	PWR	VVER V-412	3000	1000	NPCIL	MAEP	2002-7	2016-8	2017-3	40.2	40.2	-

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

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics	
	Code	Name			Thermal	Gross									Net
INDIA	IN-5	MADRAS-1	PHWR	Horizontal Pre	801	220	205	NPCIL	1971-1	1983-7	1984-1	62.4	71.8	DS	
	IN-6	MADRAS-2	PHWR	Horizontal Pre	801	220	205	NPCIL	1972-10	1985-9	1986-3	78.8	90.7	DS	
	IN-7	NARORA-1	PHWR	Horizontal Pre	801	220	202	NPCIL	1976-12	1989-7	1991-1	85.4	93.6	-	
	IN-8	NARORA-2	PHWR	Horizontal Pre	801	220	202	NPCIL	1977-11	1992-1	1992-7	84.5	91.4	-	
	IN-3	RAJASTHAN-1	PHWR	Horizontal Pre	346	100	90	NPCIL	1965-8	1972-11	1973-12	-	-	PH	
	IN-4	RAJASTHAN-2	PHWR	Horizontal Pre	693	200	187	NPCIL	1968-4	1980-11	1981-4	71.3	74.9	PH	
	IN-11	RAJASTHAN-3	PHWR	Horizontal Pre	801	220	202	NPCIL	1980-2	2000-3	2000-6	87.9	89.8	PH	
	IN-12	RAJASTHAN-4	PHWR	Horizontal Pre	801	220	202	NPCIL	1990-10	2000-11	2000-12	91.4	92.1	PH	
	IN-19	RAJASTHAN-5	PHWR	Horizontal Pre	801	220	202	NPCIL	2002-9	2009-12	2010-2	91.0	91.0	-	
	IN-20	RAJASTHAN-6	PHWR	Horizontal Pre	801	220	202	NPCIL	2003-1	2010-3	2010-3	76.5	76.5	-	
	IN-1	TARAPUR-1	BWR	BWR-1 (Mark 2)	530	160	150	NPCIL	1964-10	1969-4	1969-10	60.7	60.7	-	
	IN-2	TARAPUR-2	BWR	BWR-1 (Mark 2)	530	160	150	NPCIL	1964-10	1969-5	1969-10	66.7	67.6	-	
	IN-23	TARAPUR-3	PHWR	Horizontal Pre	1730	540	490	NPCIL	2000-5	2006-6	2006-8	91.8	92.6	-	
	IN-24	TARAPUR-4	PHWR	Horizontal Pre	1730	540	490	NPCIL	2000-3	2005-6	2005-9	88.3	90.6	-	
	IRAN, ISL. REP	IR-1	BUSHEHR-1	PWR	VVER V-446	3000	1000	915	NPPDCO	1975-5	2011-9	2013-9	70.4	70.8	-
	JAPAN	JP-25	FUKUSHIMA-DAINI-1	BWR	BWR-5	3293	1100	1067	TEPCO	1976-3	1981-7	1982-4	-	-	-
		JP-26	FUKUSHIMA-DAINI-2	BWR	BWR-5	3293	1100	1067	TEPCO	1979-5	1983-6	1984-2	-	-	-
		JP-35	FUKUSHIMA-DAINI-3	BWR	BWR-5	3293	1100	1067	TEPCO	1981-3	1984-12	1985-6	-	-	-
		JP-38	FUKUSHIMA-DAINI-4	BWR	BWR-5	3293	1100	1067	TEPCO	1981-5	1986-12	1987-8	-	-	-
		JP-27	GENKAI-2	PWR	M (2-loop)	1650	559	529	KYUSHU	1977-2	1980-6	1981-3	-	-	-
		JP-45	GENKAI-3	PWR	M (4-loop)	3423	1180	1127	KYUSHU	1988-6	1993-6	1994-3	14.2	14.2	DS
		JP-46	GENKAI-4	PWR	M (4-loop)	3423	1180	1127	KYUSHU	1992-7	1996-11	1997-7	10.5	10.5	DS
		JP-36	HAMAOKA-3	BWR	BWR-5	3293	1100	1056	CHUBU	1983-4	1987-1	1987-8	-	-	-
		JP-49	HAMAOKA-4	BWR	BWR-5	3293	1137	1092	CHUBU	1989-10	1993-1	1993-9	-	-	-
JP-60		HAMAOKA-5	BWR	ABWR	3926	1380	1325	CHUBU	2000-7	2004-4	2005-1	-	-	-	
JP-58		HIGASHI DORI-1 (TOHOKU)	BWR	BWR-5	3293	1100	1067	TOHOKU	2000-11	2005-3	2005-12	-	-	-	
JP-47		IKATA-3	PWR	M (3-loop)	2660	890	846	SHIKOKU	1990-10	1994-3	1994-12	42.4	42.4	DS	
JP-33		KASHIWAZAKI KARIWA-1	BWR	BWR-5	3293	1100	1067	TEPCO	1980-6	1985-2	1985-9	-	-	-	

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. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applies	
	Code	Name			Thermal	Gross									Net
JAPAN	JP-39	KASHIWAZAKI KARIWA-2	BWR	BWR-5	3293	1100	TEPCO	TOSHIBA	1985-11	1990-2	1990-9	-	-	-	
	JP-52	KASHIWAZAKI KARIWA-3	BWR	BWR-5	3293	1100	TEPCO	TOSHIBA	1989-3	1992-12	1993-8	-	-	-	
	JP-53	KASHIWAZAKI KARIWA-4	BWR	BWR-5	3293	1100	TEPCO	HITACHI	1990-3	1993-12	1994-8	-	-	-	
	JP-40	KASHIWAZAKI KARIWA-5	BWR	BWR-5	3293	1100	TEPCO	HITACHI	1985-6	1989-9	1990-4	-	-	-	
	JP-55	KASHIWAZAKI KARIWA-6	BWR	ABWR	3926	1356	TEPCO	TOSHIBA	1992-11	1996-1	1996-11	-	-	-	
	JP-56	KASHIWAZAKI KARIWA-7	BWR	ABWR	3926	1356	TEPCO	HITACHI	1993-7	1996-12	1997-7	-	-	-	
	JP-14	MISHAWAZAKI KARIWA-3	PWR	M (3-loop)	2440	826	KEPCO	MHI	1972-8	1976-2	1976-12	-	-	-	
	JP-50	OHI-3	PWR	M (4-loop)	3423	1180	KEPCO	MHI	1987-10	1991-6	1991-12	15.8	15.8	-	
	JP-51	OHI-4	PWR	M (4-loop)	3423	1180	KEPCO	MHI	1988-6	1992-6	1993-2	12.8	12.8	-	
	JP-22	ONAGAWA-1	BWR	BWR-4	1593	524	TOHOKU	TOHOKU	1980-7	1983-11	1984-6	-	-	-	
	JP-54	ONAGAWA-2	BWR	BWR-5	2436	825	796	TOHOKU	TOSHIBA	1991-4	1994-12	1995-7	-	-	-
	JP-57	ONAGAWA-3	BWR	BWR-5	2436	825	796	TOHOKU	TOSHIBA	1998-1	2001-5	2002-1	-	-	-
	JP-28	SENDAI-1	PWR	M (3-loop)	2660	890	846	KYUSHU	MHI	1979-12	1983-9	1984-7	56.6	56.6	-
	JP-37	SENDAI-2	PWR	M (3-loop)	2660	890	846	KYUSHU	MHI	1981-10	1985-4	1985-11	52.3	52.3	-
	JP-48	SHIKA-1	BWR	BWR-5	1593	540	505	HOKURIKU	HITACHI	1989-7	1993-1	1993-7	-	-	-
	JP-59	SHIKA-2	BWR	ABWR	3926	1206	1108	HOKURIKU	HITACHI	2001-8	2005-7	2006-3	-	-	-
	JP-41	SHIMANE-2	BWR	BWR-5	2436	820	789	CHUGOKU	HITACHI	1985-2	1988-7	1989-2	-	-	-
	JP-8	TAKAHAMA-1	PWR	M (3-loop)	2440	826	780	KEPCO	WH/MHI	1970-4	1974-3	1974-11	-	-	-
	JP-13	TAKAHAMA-2	PWR	M (3-loop)	2440	826	780	KEPCO	WH/MHI	1971-3	1975-1	1975-11	-	-	-
	JP-29	TAKAHAMA-3	PWR	M (3-loop)	2660	870	830	KEPCO	MHI	1980-12	1984-5	1985-1	42.7	42.7	DS
	JP-30	TAKAHAMA-4	PWR	M (3-loop)	2660	870	830	KEPCO	MHI	1981-3	1984-11	1985-6	47.2	47.2	DS
	JP-21	TOKAI-2	BWR	BWR-5	3293	1100	1060	JAPCO	GE	1973-10	1978-3	1978-11	-	-	-
	JP-43	TOMARI-1	PWR	M (2-loop)	1650	579	550	HEPCO	MHI	1985-4	1988-12	1989-6	-	-	-
	JP-44	TOMARI-2	PWR	M (2-loop)	1650	579	550	HEPCO	MHI	1985-6	1991-4	1991-4	-	-	-
	JP-64	TOMARI-3	PWR	M (3-loop)	2660	912	866	HEPCO	MHI	2004-11	2009-3	2009-12	-	-	-
	JP-34	TSURUGA-2	PWR	M (4-loop)	3411	1160	1108	JAPCO	MHI	1982-11	1986-6	1987-2	-	-	-
	KOREA, REP. OF	KR-7	HANBIT-1	PWR	WH F	2787	1029	995	KHNP	WH	1981-6	1986-3	78.0	78.7	-
		KR-8	HANBIT-2	PWR	WH F	2787	1026	988	KHNP	WH	1981-12	1986-11	66.9	67.1	-
		KR-11	HANBIT-3	PWR	OPR-1000	2825	1039	986	KHNP	DHICKAEC	1989-12	1994-10	70.2	70.5	-

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

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applies
	Code	Name			Thermal	Gross								
KOREA, REP. OF	KR-12	HANBIT-4	PWR	OPR-1000	2825	1022	970	DHICKAEC	1990-5	1995-7	1996-1	55.7	56.2	-
	KR-17	HANBIT-5	PWR	OPR-1000	2825	1048	992	DHICKOPC	1997-6	2001-12	2002-5	83.7	84.1	-
	KR-18	HANBIT-6	PWR	OPR-1000	2825	1049	993	DHICKOPC	1997-11	2002-9	2002-12	80.7	81.1	-
	KR-9	HANUL-1	PWR	France CPI	2775	1007	966	FRAM	1983-1	1988-4	1988-9	80.2	80.4	-
	KR-10	HANUL-2	PWR	France CPI	2775	1010	967	FRAM	1983-7	1989-4	1989-9	83.7	84.0	-
	KR-13	HANUL-3	PWR	OPR-1000	2825	1048	997	DHICKOPC	1993-7	1998-1	1998-8	70.6	70.8	-
	KR-14	HANUL-4	PWR	OPR-1000	2825	1053	999	DHICKOPC	1993-11	1998-12	1999-12	82.3	82.5	-
	KR-19	HANUL-5	PWR	OPR-1000	2825	1050	998	DHICKOPC	1999-10	2003-12	2004-7	84.7	85.0	-
	KR-20	HANUL-6	PWR	OPR-1000	2825	1049	997	DHICKOPC	2000-9	2005-1	2005-4	84.9	85.1	-
	KR-2	KORI-2	PWR	WH F	1892	681	640	KHNP	1977-12	1983-4	1983-7	76.9	78.8	-
	KR-5	KORI-3	PWR	WH F	2912	1044	1011	KHNP	1979-10	1985-1	1985-9	66.4	66.5	-
	KR-6	KORI-4	PWR	WH F	2912	1044	1012	KHNP	1980-4	1985-12	1986-4	73.0	73.1	-
	KR-21	SHIN-KORI-1	PWR	OPR-1000	2825	1044	996	KHNP	2006-6	2010-8	2011-2	74.1	74.4	-
	KR-22	SHIN-KORI-2	PWR	OPR-1000	2825	1045	996	KHNP	2007-6	2012-1	2012-7	86.9	87.3	-
	KR-25	SHIN-KORI-3	PWR	APR-1400	3983	1485	1416	KHNP	2008-10	2016-1	2016-12	74.2	74.3	-
	KR-23	SHIN-WOLSONG-1	PWR	OPR-1000	2825	1048	997	KHNP	2007-11	2012-1	2012-7	86.3	86.6	-
	KR-24	SHIN-WOLSONG-2	PWR	OPR-1000	2825	1050	993	KHNP	2008-9	2015-2	2015-7	79.8	79.9	-
	KR-3	WOLSONG-1	PHWR	CANDU 6	2061	683	661	AECU/DHI	1977-10	1982-12	1983-4	53.4	58.1	-
	KR-4	WOLSONG-2	PHWR	CANDU 6	2061	629	611	AECU/DHI	1982-9	1997-4	1997-7	85.4	90.3	-
	KR-15	WOLSONG-3	PHWR	CANDU 6	2061	653	641	AECU/DHI	1994-3	1998-3	1998-7	71.2	75.9	-
KR-16	WOLSONG-4	PHWR	CANDU 6	2061	630	622	AECU/DHI	1994-7	1999-5	1999-10	85.8	88.8	-	
MEXICO	MX-1	LAGUNA VERDE-1	BWR	BWR-5	2317	805	777	GE	1976-10	1989-4	1990-7	81.5	84.1	-
	MX-2	LAGUNA VERDE-2	BWR	BWR-5	2317	810	775	GE	1977-6	1994-11	1995-4	85.5	87.4	-
NETHERLANDS	NL-2	BORSSELE	PWR	KWU 2LP	1366	515	482	SiKWU	1969-7	1973-7	1973-10	84.7	85.9	-
	PK-2	CHASNUPP-1	PWR	CNP-300	999	325	300	PAEC	1993-8	2000-6	2000-9	80.2	80.5	-
PAKISTAN	PK-3	CHASNUPP-2	PWR	CNP-300	999	325	300	PAEC	2005-12	2011-3	2011-5	89.4	89.5	-
	PK-4	CHASNUPP-3	PWR	CNP-300	999	340	315	PAEC	2011-5	2016-10	2016-12	87.5	88.3	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics
	Code	Name			Thermal	Gross	Net								
PAKISTAN	PK-5	CHASNUPP-4	PWR	CNP-300	999	340	313	PAEC	GNNC	2011-12	2017-7	2017-9	95.6	96.8	-
	PK-1	KANUPP-1	PHWR	CANDU-137 MW	337	100	90	PAEC	CGE	1966-8	1971-10	1972-12	43.0	43.0	DS
ROMANIA	RO-1	CERNAVODA-1	PHWR	CANDU 6	2180	706	650	SNN	AECL	1982-7	1986-7	1996-12	90.5	91.6	DH
	RO-2	CERNAVODA-2	PHWR	CANDU 6	2180	705	650	SNN	AECL	1983-7	2007-8	2007-11	94.9	95.9	DH
RUSSIA	RU-96	BALAKOVO-1	PWR	VVER V-320	3000	1000	950	REA	AEM	1980-12	1985-12	1986-5	86.2	86.5	DH, PH
	RU-97	BALAKOVO-2	PWR	VVER V-320	3000	1000	950	REA	AEM	1981-8	1987-10	1988-1	82.4	82.5	DH, PH
	RU-98	BALAKOVO-3	PWR	VVER V-320	3000	1000	950	REA	AEM	1982-11	1988-12	1989-4	89.6	89.8	DH, PH
	RU-99	BALAKOVO-4	PWR	VVER V-320	3200	1000	950	REA	AEM	1984-4	1993-4	1993-12	91.3	91.4	DH, PH
	RU-21	BELOYARSK-3	FBR	BN-600	1470	600	560	REA	AEM	1969-1	1980-4	1981-11	82.6	82.6	DH, PH
	RU-116	BELOYARSK-4	FBR	BN-800	2100	885	820	REA	AEM	2006-7	2015-12	2016-10	67.7	68.8	-
	RU-141	BILIBINO-1	LWGR	EGP-6	62	12	11	REA	AEM	1970-1	1974-1	1974-4	69.8	69.8	DH
	RU-142	BILIBINO-2	LWGR	EGP-6	62	12	11	REA	AEM	1970-1	1974-12	1975-2	80.9	80.9	DH
	RU-143	BILIBINO-3	LWGR	EGP-6	62	12	11	REA	AEM	1970-1	1975-12	1976-2	81.7	81.7	DH
	RU-144	BILIBINO-4	LWGR	EGP-6	62	12	11	REA	AEM	1970-1	1976-12	1977-1	82.9	82.9	DH
	RU-30	KALININ-1	PWR	VVER V-338	3000	1000	950	REA	AEM	1977-2	1984-5	1985-6	84.8	84.8	DH, PH
	RU-31	KALININ-2	PWR	VVER V-338	3000	1000	950	REA	AEM	1982-2	1986-12	1987-3	84.6	84.6	DH, PH
	RU-36	KALININ-3	PWR	VVER V-320	3200	1000	950	REA	AEM	1985-10	2004-12	2005-11	82.0	82.0	DH, PH
	RU-37	KALININ-4	PWR	VVER V-320	3200	1000	950	REA	AEM	1986-8	2011-11	2012-12	89.7	89.7	DH, PH
	RU-12	KOLA-1	PWR	VVER V-230	1375	440	411	REA	AEM	1970-5	1973-6	1973-12	70.7	71.5	DH, PH
	RU-13	KOLA-2	PWR	VVER V-230	1375	440	411	REA	AEM	1970-5	1974-12	1975-2	84.3	84.6	DH, PH
RU-32	KOLA-3	PWR	VVER V-213	1375	440	411	REA	AEM	1977-4	1981-3	1982-12	85.6	85.6	DH, PH	
RU-33	KOLA-4	PWR	VVER V-213	1375	440	411	REA	AEM	1976-8	1984-10	1984-12	82.2	82.2	DH, PH	
RU-17	KURSK-1	LWGR	RBMK-1000	3200	1000	925	REA	AEM	1972-6	1976-12	1977-10	72.6	73.7	DH, PH	
RU-22	KURSK-2	LWGR	RBMK-1000	3200	1000	925	REA	AEM	1973-1	1979-8	1979-8	69.7	70.3	DH, PH	
RU-38	KURSK-3	LWGR	RBMK-1000	3200	1000	925	REA	AEM	1978-4	1983-10	1984-3	84.9	85.6	DH, PH	
RU-39	KURSK-4	LWGR	RBMK-1000	3200	1000	925	REA	AEM	1981-5	1985-12	1986-2	85.8	86.7	DH, PH	
RU-163	LENINGRAD 2-1	PWR	VVER V-491	3200	1187	1085	REA	AEM	2008-10	2018-3	2018-10	23.8	23.8	-	
RU-16	LENINGRAD-2	LWGR	RBMK-1000	3200	1000	925	REA	AEM	1970-6	1975-7	1976-2	67.7	68.0	DH, PH	

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

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics	
	Code	Name			Thermal	Gross									Net
RUSSIA	RU-34	LENINGRAD-3	LWGR	RBMK-1000	3200	1000	925	REA	1973-12	1979-12	1980-6	84.3	84.4	DH, PH	
	RU-35	LENINGRAD-4	LWGR	RBMK-1000	3200	1000	925	REA	1975-2	1981-2	1981-8	85.4	85.5	DH, PH	
	RU-161	NOVOVORONEZH 2-1	PWR	VVER V-392M	3200	1180	1114	REA	2008-6	2016-8	2017-2	72.7	75.2	-	
	RU-11	NOVOVORONEZH-4	PWR	VVER V-179	1375	417	385	REA	1967-7	1972-12	1973-3	69.8	70.7	DH, PH	
	RU-20	NOVOVORONEZH-5	PWR	VVER V-187	3000	1000	950	REA	1974-3	1980-5	1981-2	80.0	80.4	DH, PH	
	RU-59	ROSTOV-1	PWR	VVER V-320	3200	1000	950	REA	1981-9	2001-3	2001-12	87.7	87.8	-	
	RU-62	ROSTOV-2	PWR	VVER V-320	3200	1000	950	REA	1983-5	2010-3	2010-12	86.6	86.9	-	
	RU-63	ROSTOV-3	PWR	VVER V-320	3000	1000	950	REA	2009-9	2014-12	2015-9	81.1	82.1	-	
	RU-64	ROSTOV-4	PWR	VVER V-320	3000	1030	950	REA	2010-6	2018-2	2018-9	100.0	100.0	-	
	RU-23	SMOLENSK-1	LWGR	RBMK-1000	3200	1000	925	REA	1975-10	1982-12	1983-9	82.2	82.3	DH, PH	
	RU-24	SMOLENSK-2	LWGR	RBMK-1000	3200	1000	925	REA	1976-6	1985-5	1985-7	85.1	85.3	DH, PH	
	RU-67	SMOLENSK-3	LWGR	RBMK-1000	3200	1000	925	REA	1984-5	1990-1	1990-10	78.9	78.9	DH, PH	
	SLOVAKIA	SK-13	BOHUNICE-3	PWR	VVER V-213	1471	505	471	SE	1976-12	1984-8	1985-2	87.5	91.3	DH, PH
		SK-14	BOHUNICE-4	PWR	VVER V-213	1471	505	471	SE	1976-12	1985-8	1985-12	86.7	90.0	DH, PH
		SK-6	MOCHOVCE-1	PWR	VVER V-213	1471	470	436	SE	1983-10	1988-7	1988-10	90.5	91.2	-
		SK-7	MOCHOVCE-2	PWR	VVER V-213	1471	470	436	SE	1983-10	1989-12	2000-4	90.6	91.6	-
	SLOVENIA	SI-1	KRSKO	PWR	WH 2LP	1994	727	688	NEK	1975-3	1981-10	1983-1	93.4	93.7	-
SOUTH AFRICA	ZA-1	KOEBERG-1	PWR	CP1	2775	970	930	ESKOM	1976-7	1984-4	1984-7	82.8	83.0	-	
	ZA-2	KOEBERG-2	PWR	CP1	2775	970	930	ESKOM	1976-7	1985-7	1985-11	80.9	83.0	-	
SPAIN	ES-6	ALMARAZ-1	PWR	WH 3LP	2947	1049	1011	CNAT	1973-7	1981-5	1983-9	87.5	88.8	-	
	ES-7	ALMARAZ-2	PWR	WH 3LP	2947	1044	1006	CNAT	1973-7	1983-10	1984-7	90.2	91.1	-	
	ES-8	ASCO-1	PWR	WH 3LP	2954	1033	995	ANAV	1974-5	1983-8	1984-12	86.7	87.5	-	
	ES-9	ASCO-2	PWR	WH 3LP	2941	1035	997	ANAV	1975-3	1985-10	1986-3	89.3	90.1	-	
	ES-10	COFRENTES	BWR	BWR-6 (Mark 3)	3237	1102	1064	ID	1975-9	1984-10	1985-3	89.3	90.2	-	
	ES-11	TRILLO-1	PWR	PWR 3 loops	3010	1066	1003	CNAT	1979-8	1988-5	1988-8	89.9	90.8	-	
	ES-16	VANDELLOS-2	PWR	WH 3LP	2941	1087	1045	ANAV	1980-12	1987-12	1988-3	83.0	84.4	-	

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. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)			Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applies	
	Code	Name			Thermal	Gross	Net									
SWEDEN	SE -9	FORSMARK-1	BWR	AA-III, BWR-25	2928	1022	986	FKA	ABBATOM	1973-6	1980-6	1980-12	89.7	90.8	-	
	SE -11	FORSMARK-2	BWR	AA-III, BWR-25	3253	1156	1116	FKA	ABBATOM	1981-7	1981-7	1981-7	84.8	86.5	-	
	SE -14	FORSMARK-3	BWR	AA-IV, BWR-300	3300	1159	1159	FKA	ABBATOM	1979-1	1985-3	1985-8	77.8	78.7	-	
	SE -12	OSKARSHAMN-3	BWR	AA-IV, BWR-300	3900	1450	1400	OKG	ABBATOM	1980-5	1985-3	1985-8	80.3	82.2	-	
	SE -4	RINGHALS-1	BWR	AA-I	2540	910	881	RAB	ABBATOM	1969-2	1974-10	1976-1	75.2	76.9	-	
	SE -5	RINGHALS-2	PWR	WH 3LP	2652	963	907	RAB	WH	1970-10	1974-8	1975-5	48.7	52.0	-	
	SE -7	RINGHALS-3	PWR	WH 3LP	3135	1117	1062	RAB	WH	1972-9	1980-9	1981-9	83.8	86.4	-	
	SE -10	RINGHALS-4	PWR	WH 3LP	3300	1171	1102	RAB	WH	1973-11	1982-6	1983-11	83.8	86.5	-	
	SWITZERLAND	CH -1	BEZNAU-1	PWR	WH 2LP	1130	380	365	Axpo AG	WH	1965-9	1969-7	1969-12	37.7	37.9	DH
		CH -3	BEZNAU-2	PWR	WH 2LP	1130	380	365	Axpo AG	WH	1968-1	1971-10	1972-3	87.3	88.0	DH
CH -4		GOESGEN	PWR	PWR 3 Loop	3002	1060	1010	KKG	KWU	1973-12	1979-2	1979-11	91.6	92.3	PH	
CH -5		LEIBSTADT	BWR	BWR-6	3600	1275	1220	KKL	GETSCO	1974-1	1984-5	1984-12	70.4	71.9	-	
CH -2		MUEHLEBERG	BWR	BWR-4	1097	390	373	BKW	GETSCO	1967-3	1971-7	1972-11	91.1	91.7	-	
UK	GB -18A	DUNGENESS B-1	GCR	AGR	1500	615	545	EDF UK	APC	1965-10	1983-4	1985-4	63.8	63.8	-	
	GB -18B	DUNGENESS B-2	GCR	AGR	1500	615	545	EDF UK	APC	1965-10	1985-10	1989-4	66.7	67.0	-	
	GB -19A	HARTLEPOOL A-1	GCR	AGR	1500	655	590	EDF UK	NPC	1968-10	1983-8	1989-4	66.5	66.7	-	
	GB -19B	HARTLEPOOL A-2	GCR	AGR	1500	655	595	EDF UK	NPC	1968-10	1984-10	1989-4	73.1	73.2	-	
	GB -20A	HEYSHAM A-1	GCR	AGR	1500	625	485	EDF UK	NPC	1970-12	1983-7	1989-4	55.6	55.6	-	
	GB -20B	HEYSHAM A-2	GCR	AGR	1500	625	575	EDF UK	NPC	1970-12	1984-10	1989-4	64.3	64.5	-	
	GB -22A	HEYSHAM B-1	GCR	AGR	1550	680	620	EDF UK	NPC	1980-8	1988-7	1989-4	86.6	86.7	-	
	GB -22B	HEYSHAM B-2	GCR	AGR	1550	680	620	EDF UK	NPC	1980-8	1988-11	1989-4	92.0	92.1	-	
	GB -16A	HINKLEY POINT B-1	GCR	AGR	1494	655	485	EDF UK	TNPG	1967-9	1976-10	1978-10	87.6	87.7	-	
	GB -16B	HINKLEY POINT B-2	GCR	AGR	1494	655	480	EDF UK	TNPG	1967-9	1976-2	1976-9	85.8	85.9	-	
	GB -17A	HUNTERSTON B-1	GCR	AGR	1496	644	490	EDF UK	TNPG	1967-11	1976-2	1976-2	72.2	72.6	-	
	GB -17B	HUNTERSTON B-2	GCR	AGR	1496	644	495	EDF UK	TNPG	1967-11	1977-3	1977-3	81.5	81.6	-	
	GB -24	SIZEWELL B	PWR	SNUPPS	3425	1250	1198	EDF UK	PPC	1988-7	1995-2	1995-9	87.8	87.8	-	
	GB -23A	TORNES-1	GCR	AGR	1623	682	595	EDF UK	NPC	1980-8	1988-5	1988-5	87.3	88.2	-	
	GB -23B	TORNES-2	GCR	AGR	1623	682	605	EDF UK	NPC	1980-8	1989-2	1989-2	83.9	84.3	-	

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. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF %		Non-electrical applics
	Code	Name			Thermal	Gross						Net	2014-2018	
UKRAINE	UA-40	KHIMELNITSKI-1	PWR	VVER V-320	3000	1000	950	NNEG	1981-11	1987-12	1988-8	70.6	73.7	DH
	UA-41	KHIMELNITSKI-2	PWR	VVER V-320	3000	1000	950	NNEG	1985-2	2004-8	2005-12	81.6	82.7	DH
	UA-27	ROVNO-1	PWR	VVER V-213	1375	420	381	NNEG	1973-8	1980-12	1981-9	88.7	89.3	DH
	UA-28	ROVNO-2	PWR	VVER V-213	1375	415	376	NNEG	1973-10	1981-12	1982-7	85.2	85.6	DH
	UA-29	ROVNO-3	PWR	VVER V-320	3000	1000	950	NNEG	1980-2	1986-12	1987-5	61.0	63.4	DH
	UA-69	ROVNO-4	PWR	VVER V-320	3000	1000	950	NNEG	1986-8	2004-10	2006-4	82.7	84.5	DH
	UA-44	SOUTH UKRAINE-1	PWR	VVER V-302	3000	1000	950	NNEG	1976-8	1982-12	1983-12	74.6	80.3	DH
	UA-45	SOUTH UKRAINE-2	PWR	VVER V-338	3000	1000	950	NNEG	1981-7	1985-1	1985-4	59.9	66.8	DH
	UA-48	SOUTH UKRAINE-3	PWR	VVER V-320	3000	1000	950	NNEG	1984-11	1989-9	1989-12	69.1	75.6	DH
	UA-54	ZAPOROZHYE-1	PWR	VVER V-320	3000	1000	950	NNEG	1980-4	1984-12	1985-12	65.8	67.7	DH
	UA-56	ZAPOROZHYE-2	PWR	VVER V-320	3000	1000	950	NNEG	1981-1	1985-7	1986-2	60.3	67.4	DH
	UA-78	ZAPOROZHYE-3	PWR	VVER V-320	3000	1000	950	NNEG	1982-4	1986-12	1987-3	67.9	69.7	DH
	UA-79	ZAPOROZHYE-4	PWR	VVER V-320	3000	1000	950	NNEG	1983-4	1987-12	1988-4	68.2	70.5	DH
	UA-126	ZAPOROZHYE-5	PWR	VVER V-320	3000	1000	950	NNEG	1985-11	1989-8	1989-10	77.8	81.6	DH
UA-127	ZAPOROZHYE-6	PWR	VVER V-320	3000	1000	950	NNEG	1986-6	1995-10	1996-9	79.5	82.6	DH	
USA	US-313	ANO-1	PWR	B&W LLP (DRYAMB)	2568	903	836	ENERGY	1968-10	1974-8	1974-12	88.0	89.2	-
	US-368	ANO-2	PWR	CE 2LP (DRYAMB)	3026	1065	988	ENERGY	1968-12	1978-12	1980-3	82.3	82.3	-
	US-334	BEAVER VALLEY-1	PWR	WH 3LP (DRYSUB)	2900	959	908	FENOC	1970-6	1976-6	1976-10	93.3	93.3	-
	US-412	BEAVER VALLEY-2	PWR	WH 3LP (DRYSUB)	2900	958	905	FENOC	1974-5	1987-8	1987-11	92.6	92.6	-
	US-456	BRADWOOD-1	PWR	WH 4LP (DRYAMB)	3645	1270	1194	EXELON	1975-8	1987-7	1988-7	96.0	96.0	-
	US-457	BRADWOOD-2	PWR	WH 4LP (DRYAMB)	3645	1230	1160	EXELON	1975-8	1988-5	1988-10	95.1	95.1	-
	US-259	BROWNS FERRY-1	BWR	BWR-4 (Mark 1)	3458	1155	1101	TVA	1967-5	1973-10	1973-10	93.2	93.2	-
	US-260	BROWNS FERRY-2	BWR	BWR-4 (Mark 1)	3458	1155	1104	GE	1967-5	1974-8	1975-3	95.6	95.6	-
	US-296	BROWNS FERRY-3	BWR	BWR-4 (Mark 1)	3458	1155	1105	TVA	1968-7	1976-9	1977-3	92.6	92.6	-
	US-325	BRUNSWICK-1	BWR	BWR-4 (Mark 1)	2923	990	938	PROGRESS	1970-2	1976-12	1977-3	93.0	93.5	-
	US-324	BRUNSWICK-2	BWR	BWR-4 (Mark 1)	2923	990	932	PROGRESS	1970-2	1975-4	1975-11	95.1	95.4	-
	US-454	BYRON-1	PWR	WH 4LP (DRYAMB)	3645	1242	1164	EXELON	1975-4	1985-3	1985-9	95.3	95.6	-
	US-455	BYRON-2	PWR	WH 4LP (DRYAMB)	3645	1210	1136	EXELON	1975-4	1987-2	1987-8	95.9	95.9	-
	US-483	CALLAWAY-1	PWR	WH 4LP (DRYAMB)	3565	1275	1215	AmerenUE	1975-9	1984-10	1984-12	91.1	91.1	-

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

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics
	Code	Name			Thermal	Gross								
USA	US-317	CALVERT CLIFFS-1	PWR	CE 2LP (DRYAMB)	2737	918	863	EXELON	1968-6	1975-1	1975-5	94.9	95.0	-
	US-318	CALVERT CLIFFS-2	PWR	CE 2LP (DRYAMB)	2737	911	855	EXELON	1968-6	1976-12	1977-4	96.8	96.9	-
	US-413	CATAWBA-1	PWR	WH 4LP (ICECND)	3411	1188	1160	DUKEENER	1974-5	1985-1	1985-6	92.9	92.9	-
	US-414	CATAWBA-2	PWR	WH 4LP (ICECND)	3411	1188	1150	DUKEENER	1974-5	1986-5	1986-8	94.9	94.9	-
	US-461	CLINTON-1	BWR	BWR-6 (Mark 3)	3473	1098	1062	EXELON	1975-10	1987-4	1987-11	94.2	94.2	-
	US-397	COLUMBIA	BWR	BWR-5 (Mark 2)	3486	1190	1131	ENERGYNW	1972-8	1984-5	1984-12	93.7	94.0	-
	US-445	COMANCHE PEAK-1	PWR	WH 4LP (DRYAMB)	3612	1259	1218	LUMINANT	1974-12	1990-4	1990-8	93.6	93.6	-
	US-446	COMANCHE PEAK-2	PWR	WH 4LP (DRYAMB)	3612	1250	1207	LUMINANT	1974-12	1993-4	1993-8	88.9	88.9	-
	US-315	COOK-1	PWR	WH 4LP (ICECND)	3304	1131	1030	AEP	1969-3	1975-2	1975-8	88.7	88.7	-
	US-316	COOK-2	PWR	WH 4LP (ICECND)	3468	1231	1168	AEP	1969-3	1978-3	1978-7	88.4	88.4	-
	US-298	COOPER	BWR	BWR-4 (Mark 1)	2419	801	769	ENERGY	1968-6	1974-5	1974-7	91.7	91.7	-
	US-346	DAVIS BESSE-1	PWR	B&W RLP (DRYAMB)	2817	925	894	FENOC	1970-9	1977-8	1978-7	89.9	89.9	-
	US-275	DIABLO CANYON-1	PWR	WH 4LP (DRYAMB)	3411	1197	1138	PG&E	1968-4	1984-11	1985-5	92.0	92.0	-
	US-323	DIABLO CANYON-2	PWR	WH 4LP (DRYAMB)	3411	1197	1118	PG&E	1970-12	1985-10	1986-3	93.7	93.7	-
	US-237	DRESDEN-2	BWR	BWR-3 (Mark 1)	2957	950	894	EXELON	1966-1	1970-4	1970-6	96.5	96.5	-
	US-249	DRESDEN-3	BWR	BWR-3 (Mark 1)	2957	935	879	EXELON	1966-10	1971-7	1971-11	97.0	97.0	-
	US-331	DUANE ARNOLD-1	BWR	BWR-4 (Mark 1)	1912	624	601	NEXTERA	1970-6	1974-5	1975-2	94.2	94.2	-
	US-348	FARLEY-1	PWR	WH 3LP (DRYAMB)	2775	918	874	SOUTHERN	1970-10	1977-8	1977-12	92.1	92.1	-
	US-364	FARLEY-2	PWR	WH 3LP (DRYAMB)	2775	928	883	SOUTHERN	1970-10	1981-5	1981-7	93.7	93.7	-
	US-341	FERMI-2	BWR	BWR-4 (Mark 1)	3486	1198	1095	DTEDISON	1972-9	1986-9	1988-1	84.7	84.7	-
	US-333	FITZPATRICK	BWR	BWR-4 (Mark 1)	2536	849	813	EXELON	1968-9	1975-2	1975-7	92.0	92.0	-
	US-244	GINNA	PWR	WH 2LP (DRYAMB)	1775	608	560	EXELON	1966-4	1969-12	1970-7	95.3	95.4	-
	US-416	GRAND GULF-1	BWR	BWR-6 (Mark 3)	4408	1500	1401	ENERGY	1974-5	1984-10	1985-7	72.5	72.5	-
	US-400	HARRIS-1	PWR	WH 3LP (DRYAMB)	2900	960	932	PROGRESS	1978-1	1987-1	1987-5	93.0	93.0	-
	US-321	HATCH-1	BWR	BWR-4 (Mark 1)	2804	911	876	SOUTHERN	1968-9	1974-11	1975-12	93.6	93.6	-
	US-366	HATCH-2	BWR	BWR-4 (Mark 1)	2804	921	883	SOUTHERN	1972-2	1978-9	1979-9	96.3	96.3	-
	US-354	HOPE CREEK-1	BWR	BWR-4 (Mark 1)	3840	1240	1172	PSEG	1976-3	1986-8	1986-12	94.6	94.6	-
	US-247	INDIAN POINT-2	PWR	WH 4LP (DRYAMB)	3216	1067	998	ENERGY	1966-10	1973-6	1974-8	89.8	89.8	-
	US-286	INDIAN POINT-3	PWR	WH 4LP (DRYAMB)	3216	1085	1030	ENERGY	1968-11	1976-4	1976-8	90.8	90.8	-
	US-373	LASALLE-1	BWR	BWR-5 (Mark 2)	3546	1207	1137	EXELON	1973-9	1982-9	1984-1	94.8	94.8	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applies	
	Code	Name			Thermal	Gross									Net
USA	US-374	LASALLE-2	BWR	BWR-5 (Mark 2)	3546	1207	1140	EXELON	GE	1973-9	1984-4	1984-10	94.8	94.8	-
	US-352	LIMERICK-1	BWR	BWR-4 (Mark 2)	3515	1194	1099	EXELON	GE	1974-6	1985-4	1986-2	95.2	95.2	-
	US-353	LIMERICK-2	BWR	BWR-4 (Mark 2)	3515	1194	1134	EXELON	GE	1974-6	1985-4	1990-1	95.0	95.0	-
	US-369	MCGUIRE-1	PWR	WH 4LP (ICECND)	3411	1215	1158	DUKEENER	WH	1971-4	1981-9	1981-12	93.1	93.1	-
	US-370	MCGUIRE-2	PWR	WH 4LP (ICECND)	3411	1215	1158	DUKEENER	WH	1971-4	1983-5	1984-3	93.0	93.0	-
	US-336	MILLSTONE-2	PWR	CE 2LP (DRYAMB)	2700	918	869	DOMINION	CE	1969-11	1975-11	1975-12	89.9	89.9	-
	US-423	MILLSTONE-3	PWR	WH 4LP (DRYSUB)	3650	1280	1210	DOMINION	WH	1974-8	1986-2	1986-4	93.3	93.3	-
	US-263	MONTICELLO	BWR	BWR-3 (Mark 1)	2004	691	628	NSP	GE	1967-6	1971-3	1971-6	94.1	94.1	-
	US-220	NINE MILE POINT-1	BWR	BWR-2 (Mark 1)	1850	642	613	EXELON	GE	1965-4	1969-11	1969-12	97.0	97.0	-
	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	94.2	94.2	-
	US-339	NORTH ANNA-2	PWR	WH 3LP (DRYSUB)	2940	1011	944	DOMINION	WH	1971-2	1980-8	1980-12	94.0	94.0	-
	US-269	OCONEE-1	PWR	B&W LLP (DRYAM)	2568	891	847	DUKEENER	B&W	1967-11	1973-5	1973-7	93.1	93.1	-
	US-270	OCONEE-2	PWR	B&W LLP (DRYAM)	2568	891	848	DUKEENER	B&W	1967-11	1973-12	1974-9	96.7	96.7	-
	US-287	OCONEE-3	PWR	B&W LLP (DRYAM)	2568	900	859	DUKEENER	B&W	1967-11	1974-9	1974-12	95.3	95.3	-
	US-255	PALISADES	PWR	CE 2LP (DRYAMB)	2565	850	805	ENTERGY	CE	1967-3	1971-12	1971-12	88.8	88.8	-
	US-528	PALO VERDE-1	PWR	CE80 2LP (DRYA)	3990	1414	1311	APS	CE	1976-5	1985-6	1986-1	93.9	93.9	-
	US-529	PALO VERDE-2	PWR	CE80 2LP (DRYA)	3990	1414	1314	APS	CE	1976-6	1986-5	1986-9	90.8	90.8	-
	US-530	PALO VERDE-3	PWR	CE80 2LP (DRYA)	3990	1414	1312	APS	CE	1976-6	1987-11	1988-1	94.5	94.5	-
	US-277	PEACH BOTTOM-2	BWR	BWR-4 (Mark 1)	3951	1412	1232	EXELON	GE	1968-1	1974-2	1974-7	95.7	95.7	-
	US-278	PEACH BOTTOM-3	BWR	BWR-4 (Mark 1)	3951	1412	1251	EXELON	GE	1968-1	1974-9	1974-12	96.6	96.6	-
	US-440	PERRY-1	BWR	BWR-6 (Mark 3)	3758	1303	1240	FENOC	GE	1974-10	1986-12	1987-11	94.4	94.4	-
	US-293	PILGRIM-1	BWR	BWR-3 (Mark 1)	2028	711	677	ENTERGY	GE	1968-8	1972-7	1972-12	89.6	90.7	-
	US-266	POINT BEACH-1	PWR	WH 2LP (DRYAMB)	1800	640	591	NEXTERA	WH	1967-7	1970-11	1970-12	95.1	95.1	-
	US-301	POINT BEACH-2	PWR	WH 2LP (DRYAMB)	1800	640	591	NEXTERA	WH	1968-7	1972-8	1972-10	94.1	94.1	-
	US-282	PRAIRIE ISLAND-1	PWR	WH 2LP (DRYAMB)	1677	566	522	NSP	WH	1968-6	1973-12	1973-12	89.7	89.7	-
	US-306	PRAIRIE ISLAND-2	PWR	WH 2LP (DRYAMB)	1677	560	519	NSP	WH	1968-6	1974-12	1974-12	89.3	89.3	-
	US-254	QUAD CITIES-1	BWR	BWR-3 (Mark 1)	2957	940	908	EXELON	GE	1967-2	1972-4	1972-4	97.6	97.6	-
	US-265	QUAD CITIES-2	BWR	BWR-3 (Mark 1)	2957	940	911	EXELON	GE	1967-2	1972-5	1973-3	95.6	95.6	-
	US-458	RIVER BEND-1	BWR	BWR-6 (Mark 3)	3091	1016	967	ENTERGY	GE	1977-3	1985-12	1986-6	88.6	88.6	-

TABLE 14. OPERATIONAL REACTORS, 31 DEC. 2018 — continued

Country	Reactor		Type	Model	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	EAF % 2014-2018	UCF % 2014-2018	Non-electrical applics	
	Code	Name			Thermal	Gross									Net
USA	US-261	ROBINSON-2	PWR	WH 3LP (DRYAMB)	2339	780	741	PROGRESS	WH	1967-4	1970-9	1971-3	88.0	88.2	-
	US-272	SALEM-1	PWR	WH 4LP (DRYAMB)	3459	1254	1169	PSEG	WH	1968-9	1976-12	1977-6	89.4	89.4	-
	US-311	SALEM-2	PWR	WH 4LP (DRYAMB)	3459	1200	1158	PSEG	WH	1968-9	1981-6	1981-10	85.2	85.2	-
	US-443	SEABROOK-1	PWR	WH 4LP (DRYAMB)	1296	1246	1246	NEXTERA	WH	1976-7	1990-5	1990-8	92.8	92.8	-
	US-327	SEQUOYAH-1	PWR	WH 4LP (ICECND)	3455	1221	1152	TVA	WH	1970-5	1980-7	1981-7	89.0	89.3	-
	US-328	SEQUOYAH-2	PWR	WH 4LP (ICECND)	3455	1200	1139	TVA	WH	1970-5	1981-12	1982-6	91.2	91.2	-
	US-498	SOUTH TEXAS-1	PWR	WH 4LP (DRYAMB)	3853	1354	1280	STP	WH	1975-12	1988-3	1988-8	87.3	87.3	-
	US-499	SOUTH TEXAS-2	PWR	WH 4LP (DRYAMB)	3853	1354	1280	STP	WH	1975-12	1989-4	1989-6	94.2	94.2	-
	US-335	ST. LUCIE-1	PWR	CE 2LP (DRYAMB)	3020	1045	981	FPL	CE	1970-7	1976-5	1976-12	91.9	92.0	-
	US-389	ST. LUCIE-2	PWR	CE 2LP (DRYAMB)	3020	1050	987	FPL	CE	1977-6	1983-6	1983-8	88.1	88.5	-
	US-395	SUMMER-1	PWR	WH 3LP (DRYAMB)	2900	1006	973	SCE&G	WH	1973-3	1982-11	1984-1	86.2	86.2	-
	US-280	SURRY-1	PWR	WH 3LP (DRYAMB)	2587	890	838	DOMINION	WH	1968-6	1972-7	1972-12	91.6	91.6	-
	US-281	SURRY-2	PWR	WH 3LP (DRYAMB)	2587	890	838	DOMINION	WH	1968-6	1973-3	1973-5	90.5	90.5	-
	US-387	SUSQUEHANNA-1	BWR	BWR-4 (Mark 2)	3952	1330	1257	PPL SUSQ	GE	1973-11	1982-11	1983-6	90.0	90.0	-
	US-388	SUSQUEHANNA-2	BWR	BWR-4 (Mark 2)	3952	1330	1257	PPL SUSQ	GE	1973-11	1984-7	1985-2	92.6	92.6	-
	US-289	THREE MILE ISLAND-1	PWR	B&W LLP (DRYAMB)	2568	880	819	EXELON	B&W	1968-5	1974-6	1974-9	96.5	96.5	-
	US-250	TURKEY POINT-3	PWR	WH 3LP (DRYAMB)	2644	829	837	FPL	WH	1967-4	1972-11	1972-12	89.8	89.9	-
	US-251	TURKEY POINT-4	PWR	WH 3LP (DRYAMB)	2644	829	821	FPL	WH	1967-4	1973-6	1973-9	94.0	94.0	-
	US-424	VOGTLE-1	PWR	WH 4LP (DRYAMB)	3626	1229	1150	SOUTHERN	WH	1976-8	1987-3	1987-6	93.1	93.1	-
	US-425	VOGTLE-2	PWR	WH 4LP (DRYAMB)	3626	1229	1152	SOUTHERN	WH	1976-8	1989-4	1989-5	95.8	95.8	-
US-382	WATERFORD-3	PWR	CE 2LP (DRYAMB)	3716	1250	1168	ENTERGY	CE	1974-11	1985-3	1985-9	91.1	91.1	-	
US-390	WATTS BAR-1	PWR	WH 4LP (ICECND)	3459	1210	1123	TVA	WH	1973-7	1986-2	1986-5	89.6	89.6	-	
US-391	WATTS BAR-2	PWR	WH 4LP (ICECND)	3411	1218	1135	TVA	WH	1973-9	2016-6	2016-10	75.0	75.0	-	
US-482	WOLF CREEK	PWR	WH 4LP (DRYAMB)	3565	1285	1200	WCNOC	WH	1977-5	1985-6	1985-9	85.8	85.8	-	
TAIWAN, CHINA	TW -2	CHINSHAN-2	BWR	BWR-4 (Mark 1)	1840	636	604	TPC	GE	1973-12	1978-12	1979-7	62.8	63.0	-
TAIWAN, CHINA	TW -3	KUOSHENG-1	BWR	BWR-6	2894	985	985	TPC	GE	1975-11	1981-5	1981-12	82.4	83.4	-
TAIWAN, CHINA	TW -4	KUOSHENG-2	BWR	BWR-6	2894	985	985	TPC	GE	1976-3	1982-6	1983-3	79.7	80.0	-
TAIWAN, CHINA	TW -5	MAANSHAN-1	PWR	WH 3LP (WE 312)	2822	951	936	TPC	WH	1978-8	1984-5	1984-7	92.3	92.6	-
TAIWAN, CHINA	TW -6	MAANSHAN-2	PWR	WH 3LP (WE 312)	2822	951	938	TPC	WH	1979-2	1985-2	1985-5	85.8	86.0	-

Note: Status as of 31 December 2018. 451 reactors (396911 MW) were connected to the grid, including 5 units (4448 MW) in Taiwan, China.

TABLE 15. REACTORS IN LONG TERM SHUTDOWN, 31 DEC. 2018

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 2018, no reactor was in long term shutdown.

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2018

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shutdown
	Code	Name		Thermal	Gross						
ARMENIA	AM-18	ARMENIAN-1	PWR	1375	408	ANPPC/JSC	FAEA	1969-7	1976-12	1977-10	1989-2
BELGIUM	BE-1	BR-3	PWR	41	12	CEN/SCK	WH	1957-11	1962-10	1962-10	1987-6
BULGARIA	BG-1	KOZLODUY-1	PWR	1375	440	KOZNPP	AEI	1970-4	1974-7	1974-10	2002-12
	BG-2	KOZLODUY-2	PWR	1375	440	KOZNPP	AEI	1970-4	1975-8	1975-11	2002-12
	BG-3	KOZLODUY-3	PWR	1375	440	KOZNPP	AEI	1973-10	1980-12	1981-1	2006-12
	BG-4	KOZLODUY-4	PWR	1375	440	KOZNPP	AEI	1973-10	1982-5	1982-6	2006-12
CANADA	CA-2	DOUGLAS POINT	PHWR	704	218	OH	AECL	1960-2	1967-1	1968-9	1984-5
	CA-3	GENTILLY-1	H2LWR	792	266	HQ	AECL	1965-9	1971-4	1972-5	1977-6
	CA-12	GENTILLY-2	PHWR	2156	675	HQ	AECL	1974-4	1982-12	1983-10	2012-12
	CA-5	PICKERING-2	PHWR	1744	542	OPG	OH/AECL	1966-9	1971-10	1971-12	2007-5
	CA-6	PICKERING-3	PHWR	1744	542	OPG	OH/AECL	1967-12	1972-5	1972-6	2008-10
	CA-1	ROLPHTON NPD	PHWR	92	25	OPG	CGE	1958-1	1962-6	1962-10	1987-8
FRANCE	FR-9	BUGEY-1	GCR	1954	555	EDF	FRAM	1965-12	1972-4	1972-7	1994-5
	FR-2	CHINON A-1	GCR	300	80	EDF	LEVIVIER	1957-2	1963-6	1964-2	1973-4
	FR-3	CHINON A-2	GCR	800	230	EDF	LEVIVIER	1959-8	1965-2	1965-2	1985-6
	FR-4	CHINON A-3	GCR	1170	480	EDF	GTM	1961-3	1966-8	1966-8	1990-6
	FR-5	CHOOZ-A (ARDENNES)	PWR	1040	320	SENA	AJFW	1962-1	1967-4	1967-4	1991-10
	FR-6	EL4 (MONTS D'ARREE)	H2/GCR	250	75	EDF	GAAA	1962-7	1967-7	1968-6	1985-7
	FR-1B	G-2 (MARCOULE)	GCR	260	43	COGEMA	SACM	1955-3	1959-4	1959-4	1980-2
	FR-1	G-3 (MARCOULE)	GCR	260	43	COGEMA	SACM	1956-3	1960-4	1960-4	1984-6
	FR-10	PHENIX	FBR	345	142	CEA/EDF	CNCLNEY	1968-11	1973-12	1974-7	2010-2
	FR-7	ST. LAURENT A-1	GCR	1650	500	EDF	FRAM	1963-10	1969-3	1969-6	1990-4
	FR-8	ST. LAURENT A-2	GCR	1475	530	EDF	FRAM	1966-1	1971-8	1971-11	1992-5
	FR-24	SUPER-PHENIX	FBR	3000	1242	EDF	ASPALDO	1976-12	1986-1	1986-12	1998-12
GERMANY	DE-4	AVR JUELICH	HTGR	46	15	AVR	BBK	1961-8	1967-12	1969-5	1988-12
	DE-12	BIBLIS-A	PWR	3517	1225	RWE	KWU	1970-1	1974-9	1975-2	2011-8

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2018 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shutdown
	Code	Name		Thermal	Gross						
GERMANY	DE-18	BIBLIS-B	PWR	3733	1300	1240	RWE	1972-2	1976-4	1977-1	2011-8
	DE-13	BRUNSBUEITEL	BWR	2292	806	771	KKK	1970-4	1976-7	1977-2	2011-8
	DE-23	GRAFENRHEINFELD	PWR	3765	1345	1275	E.ON	1975-1	1981-12	1982-6	2015-6
	DE-502	GREIFSWALD-1	PWR	1375	440	408	EWN	1970-3	1973-12	1974-7	1990-2
	DE-503	GREIFSWALD-2	PWR	1375	440	408	EWN	1970-3	1974-12	1975-4	1990-2
	DE-504	GREIFSWALD-3	PWR	1375	440	408	EWN	1972-4	1977-10	1978-5	1990-2
	DE-505	GREIFSWALD-4	PWR	1375	440	408	EWN	1972-4	1979-9	1979-11	1990-2
	DE-506	GREIFSWALD-5	PWR	1375	440	408	EWN	1976-12	1989-4	1989-11	1989-11
	DE-3	GUNDREMMINGEN-A	BWR	801	250	237	KEG,GE	1962-12	1966-12	1967-4	1977-1
	DE-26	GUNDREMMINGEN-B	BWR	3840	1344	1284	KWU	1976-7	1984-3	1984-7	2017-12
	DE-7	HDR GROSSWELZHEIM	BWR	100	27	25	HDR	1965-1	1969-10	1970-8	1971-4
	DE-16	ISAR-1	BWR	2575	912	878	E.ON	1972-5	1977-12	1979-3	2011-8
	DE-8	KNK II	FBR	58	21	17	KEG	1974-9	1978-4	1979-3	1991-8
	DE-20	KRUEMMEL	BWR	3690	1402	1346	KKK	1974-4	1983-9	1984-3	2011-8
	DE-6	LINGEN	BWR	520	268	183	KWL	1968-10	1969-7	1968-10	1977-1
	DE-22	MUELHEIM-KAERLICH	PWR	3760	1302	1219	KEG	1975-1	1986-3	1987-8	1988-9
	DE-2	MZFR	PHWR	200	57	52	KEG	1961-12	1966-3	1966-12	1984-5
	DE-15	NECKARWESTHEIM-1	PWR	2497	840	785	ErKK	1972-2	1976-6	1976-12	2011-8
	DE-11	NIEDERAICHBACH	PWR	321	106	100	KKN	1966-6	1973-1	1973-1	1974-7
	DE-5	OBIRGHEIM	PWR	1050	357	340	ErBW	1965-3	1968-10	1969-3	2005-5
	DE-14	PHILIPPSBURG-1	BWR	2575	926	890	ErKK	1970-10	1979-5	1980-3	2011-8
	DE-501	RHEINBERG	PWR	265	70	62	EWN	1960-1	1966-5	1966-10	1990-6
	DE-10	STADE	PWR	1900	672	640	E.ON	1967-12	1972-1	1972-5	2003-11
	DE-19	THTR-300	HTGR	760	308	296	HKG	1971-5	1985-11	1987-6	1988-9
	DE-17	UNTERWESER	PWR	3900	1410	1345	E.ON	1972-7	1978-9	1979-9	2011-8
	DE-1	VAK KAHL	BWR	60	16	15	VAK	1958-7	1961-6	1962-2	1985-11
DE-9	WUERGASSEN	BWR	1912	670	640	PE	1968-1	1971-12	1975-11	1994-8	
ITALY	IT-4	CAORSO	BWR	2651	882	860	SOGIN	1970-1	1978-5	1981-12	1990-7
	IT-3	ENRICO FERMI	PWR	870	270	260	SOGIN	1961-7	1964-10	1965-1	1990-7
	IT-2	GARIGLIANO	BWR	506	160	150	SOGIN	1959-11	1964-1	1964-6	1982-3
	IT-1	LATINA	BWR	660	160	153	SOGIN	1958-11	1963-5	1964-1	1987-12
			GCR								

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2018 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shutdown	
	Code	Name		Thermal	Gross							Net
JAPAN	JP-20	FUGEN-ATR	HMLWR	557	165	JAEA	HITACHI	1972-5	1978-7	1979-3	2003-3	
	JP-5	FUKUSHIMA-DAIICHI-1	BWR	1380	460	TEPCO	GE/GETSC	1967-7	1970-11	1971-3	2011-5	
	JP-9	FUKUSHIMA-DAIICHI-2	BWR	2381	784	TEPCO	GE/T	1969-6	1973-12	1974-7	2011-5	
	JP-10	FUKUSHIMA-DAIICHI-3	BWR	2381	784	TEPCO	TOSHIBA	1970-12	1974-10	1976-3	2011-5	
	JP-16	FUKUSHIMA-DAIICHI-4	BWR	2381	784	TEPCO	HITACHI	1973-2	1978-2	1978-10	2011-5	
	JP-17	FUKUSHIMA-DAIICHI-5	BWR	2381	784	TEPCO	TOSHIBA	1972-5	1977-9	1978-4	2013-12	
	JP-18	FUKUSHIMA-DAIICHI-6	BWR	3293	1100	TEPCO	GE/T	1973-10	1979-5	1979-10	2013-12	
	JP-12	GENKAI-1	PWR	1650	559	KYUSHU	MHI	1971-9	1975-2	1976-3	2015-4	
	JP-11	HAMAOKA-1	BWR	1593	540	CHUBU	TOSHIBA	1971-6	1974-8	1975-10	2009-1	
	JP-24	HAMAOKA-2	BWR	2436	840	CHUBU	TOSHIBA	1974-6	1978-5	1978-11	2009-1	
	JP-23	IKATA-1	PWR	1650	566	SHIKOKU	MHI	1973-9	1977-2	1977-9	2016-5	
	JP-32	IKATA-2	PWR	1650	538	SHIKOKU	MHI	1978-8	1981-8	1982-3	2018-5	
	JP-1	JPDR	BWR	90	13	JAEA	GE	1960-12	1963-10	1965-3	1976-3	
	JP-4	MIHAMA-1	PWR	1031	340	KEPCO	WH	1967-2	1970-8	1970-11	2015-4	
	JP-6	MIHAMA-2	PWR	1456	500	KEPCO	MHI	1968-5	1972-4	1972-7	2015-4	
	JP-31	MONJU	FBR	714	280	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-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	1000	90	52	MAEC-KAZ	MAEC-KAZ	1964-10	1973-7	1973-7	1999-4	
KOREA, REP. OF	KR-1	KORI-1	1729	607	576	KHNP	WH	1972-8	1977-6	1978-4	2017-6	
LITHUANIA	LT-46	IGNALINA-1	4800	1300	1185	INPP	MAEP	1977-5	1983-12	1985-5	2004-12	
	LT-47	IGNALINA-2	4800	1300	1185	INPP	MAEP	1978-1	1987-8	1987-12	2009-12	
NETHERLANDS	NL-1	DODEWAARD	183	60	55	BV GKN	RDM	1965-5	1968-10	1969-3	1997-3	
RUSSIA	RU-1	APS-1 OBNINSK	30	6	5	MSM	MSM	1951-1	1954-6	1954-12	2002-4	

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2018 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shutdown	
	Code	Name		Thermal	Gross							Net
RUSSIA	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-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	1977-2
		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	NUCLENOR	1966-9	1971-3	1971-5	2017-8	
	ES-3	VANDELLOS-1	GCR	1670	500	480	HIFRENSA	1968-6	1972-5	1972-8	1990-7	
SWEDEN	SE-1	AGESTA	PHWR	80	12	10	SVAF0	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	1973-1	1977-3	1977-7	2005-5	
SWITZERLAND	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	
	CH-8	LUCENS	HWGCR	28	7	6	EOS	1962-4	1968-1	NA	1969-1	
UK	GB-3A	BERKELEY-1	GCR	620	166	138	ML	1957-1	1962-6	1962-6	1989-3	
	GB-3B	BERKELEY-2	GCR	620	166	138	ML	1957-1	1962-6	1962-10	1988-10	
	GB-4A	BRADWELL-1	GCR	481	146	123	ML	1957-1	1962-7	1962-7	2002-3	
	GB-4B	BRADWELL-2	GCR	481	146	123	ML	1957-1	1962-7	1962-11	2002-3	
	GB-1A	CALDER HALL-1	GCR	268	60	49	SL	1953-8	1956-8	1956-10	2003-3	
	GB-1B	CALDER HALL-2	GCR	268	60	49	SL	1953-8	1957-2	1957-2	2003-3	
	GB-1C	CALDER HALL-3	GCR	268	60	49	SL	1955-8	1958-3	1958-5	2003-3	
	GB-1D	CALDER HALL-4	GCR	268	60	49	SL	1955-8	1959-4	1959-4	2003-3	
	GB-2A	CHAPEL CROSS-1	GCR	260	60	48	ML	1955-10	1959-2	1959-3	2004-6	

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2018 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shutdown	
	Code	Name		Thermal	Gross							Net
UK	GB-2B	CHAPELCROSS-2	GCR	260	60	48	UKAEA	1959-10	1959-7	1959-8	2004-6	
	GB-2C	CHAPELCROSS-3	GCR	260	60	48	UKAEA	1955-10	1959-11	1959-12	2004-6	
	GB-2D	CHAPELCROSS-4	GCR	260	60	48	UKAEA	1955-10	1960-1	1960-3	2004-6	
	GB-14	DOUNREAY DFR	FBR	60	15	11	UKAEA	1955-3	1962-10	1962-10	1977-3	
	GB-15	DOUNREAY PFR	FBR	600	250	234	TNPG	1966-1	1975-1	1976-7	1994-3	
	GB-9A	DUNGENESS A-1	GCR	840	230	225	ML	1960-7	1965-9	1965-10	2006-12	
	GB-9B	DUNGENESS A-2	GCR	840	230	225	TNPG	1960-7	1965-11	1965-12	2006-12	
	GB-7A	HINKLEY POINT A-1	GCR	900	267	235	ML	1957-11	1965-2	1965-3	2000-5	
	GB-7B	HINKLEY POINT A-2	GCR	900	267	235	ML	1957-11	1965-3	1965-5	2000-5	
	GB-6A	HUNTERSTON A-1	GCR	595	173	150	ML	GEC	1964-2	1964-2	1990-3	
	GB-6B	HUNTERSTON A-2	GCR	595	173	150	ML	GEC	1964-6	1964-7	1989-12	
	GB-11A	OLDBURY A-1	GCR	730	230	217	ML	TNPG	1962-5	1967-11	2012-2	
	GB-11B	OLDBURY A-2	GCR	660	230	217	ML	TNPG	1962-5	1968-4	2011-6	
	GB-10A	SIZEWELL A-1	GCR	1010	245	210	ML	EE/B&W/T	1961-4	1966-1	2006-12	
	GB-10B	SIZEWELL A-2	GCR	1010	245	210	ML	EE/B&W/T	1961-4	1966-4	2006-12	
	GB-8A	TRAFALGAR A-1	GCR	850	235	195	ML	APC	1959-7	1965-3	1991-2	
	GB-8B	TRAFALGAR A-2	GCR	850	235	195	ML	APC	1959-7	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
	GB-13A	WYLFA-1	GCR	1650	530	490	ML	EE/B&W/T	1963-9	1971-1	1971-11	2015-12
	GB-13B	WYLFA-2	GCR	1920	540	490	ML	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	1981-2	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 B&W	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

TABLE 16. REACTORS PERMANENTLY SHUT DOWN, 31 DEC. 2018 — continued

Country	Reactor		Type	Capacity (MW)		Operator	NSSS supplier	Construction start	Grid connection	Commercial operation	Shutdown	
	Code	Name		Thermal	Gross							Net
USA	US-011	ELK RIVER	BWR	58	24	22	RCPA	AC	1959-1	1963-8	1964-7	1968-2
	US-16	FERMI-1	FBR	200	65	61	DTEDISON	UEC	1966-8	1966-8	1966-8	1972-11
	US-285	FORT CALHOUN-1	PWR	1500	512	482	EXELON	CE	1968-6	1973-8	1973-8	2016-10
	US-267	FORT ST. VRAIN	HTGR	842	342	330	PSCC	GA	1968-9	1979-7	1979-7	1989-8
	US-018	GE VALLECITOS	BWR	50	24	24	GE	GE	1956-1	1957-10	1957-10	1963-12
	US-213	HADDAM NECK	PWR	1825	603	560	CYAPC	WH	1964-5	1967-8	1968-1	1996-12
	US-077	HALLAM	X	256	84	75	AEC/NPPD	GE	1959-1	1963-9	1963-11	1964-9
	US-133	HUMBOLDT BAY	BWR	220	65	63	PG&E	GE	1960-11	1963-4	1963-8	1976-7
	US-013	INDIAN POINT-1	PWR	615	277	257	ENERGY	B&W	1966-5	1962-9	1962-10	1974-10
	US-305	KEWAUNEE	PWR	1772	595	566	DOMINION	WH	1968-8	1974-4	1974-6	2013-5
	US-409	LACROSSE	BWR	165	55	48	DPC	AC	1963-3	1968-4	1969-11	1987-4
	US-309	MAINE YANKEE	PWR	2630	900	860	MYAPC	CE	1968-10	1972-11	1972-12	1997-8
	US-245	MILLSTONE-1	BWR	2011	684	641	DOMINION	GE	1966-5	1970-11	1971-3	1998-7
	US-219	OYSTER CREEK	BWR	1930	652	619	EXELON	GE	1964-12	1969-9	1969-12	2018-9
	US-130	PATHFINDER	BWR	220	63	59	NMC	AC	1959-1	1966-7	1966-8	1967-10
	US-171	PEACH BOTTOM-1	HTGR	115	42	40	EXELON	GA	1962-2	1967-8	1967-8	1974-11
	US-012	PIQUA	X	46	12	12	CofPiqua	GE	1960-1	1963-7	1963-11	1966-1
	US-312	RANCHO SECO-1	PWR	2772	917	873	SMUD	B&W	1969-4	1974-10	1975-4	1989-6
	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-320	THREE MILE ISLAND-2	PWR	3471	959	880	GPU	B&W	1969-11	1978-3	1978-3	1989-5
	US-344	TROJAN	PWR	2711	1155	1095	PORTGE	WH	1970-2	1975-12	1976-5	1992-11
	US-271	VERMONT YANKEE	BWR	1912	635	605	ENERGY	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	1973-6	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 2018. 172 reactors (71389 MW) have been permanently shut down, including 1 unit (604 MW) in Taiwan, China.

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2018

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	License terminated
	Code	Name							
ARMENIA	AM -18	ARMENIAN-1	1989-2	Others	Other			ANPPCJSC	
BELGIUM	BE -1	BR-3	1987-6	2,5	ID	4,9	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		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			OPG	
	CA -6	PICKERING-3	2008-10	2	ISD			OPG	
		FR -10	PHENIX	2010-2	Others	ID			-
FRANCE	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			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	1982-5	1,2	ID			EDF	2025
	FR -9	BUGEY-1	1994-5	1,2	ID		9	EDF	2020
	FR -1	VAK KAHL	1985-11	Others	Other			VAK	2010
	FR -10	STADE	2003-11	2	ID		3,4,6	E.ON	2023
	FR -11	NIEDERAICHBACH	1974-7	6	Other			KIT	1995
	FR -12	BIBLIS-A	2011-8	7	ID			RWE	
FR -13	BRUNSBUEITEL	2011-8	7	ID		1	3,7	KKB	
							3		
GERMANY	DE -1	VAK KAHL	1985-11	Others	Other			VAK	2010
DE -10	STADE	2003-11	2	ID		3,4,6		E.ON	2023
DE -11	NIEDERAICHBACH	1974-7	6	Other				KIT	1995
DE -12	BIBLIS-A	2011-8	7	ID			3,7	RWE	
DE -13	BRUNSBUEITEL	2011-8	7	ID		1		KKB	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2018 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	License terminated	
	Code	Name								
GERMANY	DE-14	PHILIPPSBURG-1	2011-8	7	ID	1	3	EnKK		
	DE-15	NECKARWESTHEIM-1	2011-8	7	ID	1	3	EnKK	2038	
	DE-16	ISAR-1	2011-8	7	ID	2	3	E.ON	2035	
	DE-17	UNTERWESER	2011-8	7	ID	2		E.ON		
	DE-18	BIBLIS-B	2011-8	7	ID	2		RWE		
	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	1	3	PElectra	2035	
	DE-3	GUNDEMMINGEN-A	1977-1	6,8	ID			KGG		
	DE-4	AVR JUELICH	1988-12	7	ID	3,4				
	DE-5	OBIRGHEIM	2005-5	7	ID					
	DE-501	RHEINBERG	1990-6	1,3,6,7	ID	9	4,7	EnKK		
	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	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	ID	3,6		SOGIN	2040
		IT-2	GARIGLIANO	1982-3	3,4,Others	ID	3,6,9		SOGIN	2033
		IT-3	ENRICO FERMI	1990-7	7,Others	ID	3,6,9,10		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		

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2018 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	License terminated
	Code	Name							
JAPAN	JP -11	HAMAOKA-1	2009-1	6	Dd+SE	3,4,6,7		CHUBU DL	2037
	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 -2	TOKAI-1	1998-3	2	Dd+PD+SE	3,4,6,7,9	5	JAPCO	2025
	JP -20	FUGEN ATR	2003-3	2	Dd+SE	1,6		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 -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	
	JP -9	FUKUSHIMA-DAIICHI-2	2011-5	Others	Other			TEPCO DL	
KAZAKHSTAN	KZ -10	AKTAU	1999-4	2.5	Dd+PD+SE	1,6	4,7	MAEC-KAZ	
KOREA, REP. OF	KR -1	KORI-1	2017-6	7, Others	ID	1		KHNP	
LITHUANIA	LT -46	IGNALINA-1	2004-12	7, Others	ID	3	2,3,7	INPP	2038
	LT -47	IGNALINA-2	2009-12	7, Others	ID	2,3	1,2,3,7	INPP	2038
NETHERLANDS	NL -1	DODEWAARD	1997-3	2, Others	Dd+SE	7		BV GKN	2055
RUSSIA	RU -3	BELOYARSK-1	1983-1	Others	Other			EA	
	RU -4	NOVOVORONEZH-1	1986-2	Others	Other			EA	
	RU -6	BELOYARSK-2	1990-1	Others	Other			EA	
	RU -8	NOVOVORONEZH-2	1990-8	Others	Other			EA	
SLOVAKIA	SK -1	BOHUNICE A1	1977-2	4	Dd+PD+SE	3,6		JAVVYS	
	SK -2	BOHUNICE-1	2006-12	7	ID	3,4,9		JAVVYS	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2018 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	License terminated
	Code	Name							
SLOVAKIA	SK-3	BOHUNICE-2	2008-12	7	ID	3,4,9		JAVYS	
SPAIN	ES-1	JOSE CABRERA-1	2006-4	Others	ID	8	7	UFG	2015
	ES-3	VANDELLOS-1	1990-7	4	Dd+PD+SE			ENRESA	2032
	SE-1	AGESTA	1974-6	2	Dd+SE	1,7	4	VAB	
SWEDEN	SE-2	OSKARSHAMN-1	2017-6	2	ID	1,2	2	OKG	
	SE-3	OSKARSHAMN-2	2016-12	2	ID	6	2,3,4	OKG	
	SE-6	BARSEBACK-1	1999-11	Others	Other	1	4	BKAB	2030
	SE-8	BARSEBACK-2	2005-5	Others	Other	1	4	BKAB	2030
	CH-8	LUCENS	1969-1	4	Dd+SE	1		EOS	2004
	UK	GB-10A	SIZEWELL A-1	2006-12	2,8	Dd+SE	8		Magnox S
GB-10B		SIZEWELL A-2	2006-12	2,8	Dd+SE	8		Magnox S	2110
GB-12		WINFRITH SGHWR	1990-9	Others	ID	10		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	3,5,6,8		Magnox N	2128
GB-2B		CHAPELCROSS-2	2004-6	2,8	Dd+PD+SE	3,5,6,8		Magnox N	2128
GB-2C		CHAPELCROSS-3	2004-6	2,8	Dd+PD+SE	3,5,6,8		Magnox N	2128
GB-2D		CHAPELCROSS-4	2004-6	2,8	Dd+PD+SE	3,5,6,8		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	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2018 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	License terminated
	Code	Name							
UK	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	TRAWSFYNYDD-1	1991-2	2,8	Dd+PD+SE	8		Magnox S	2098
	GB-8B	TRAWSFYNYDD-2	1991-2	2,8	Dd+PD+SE	8		Magnox S	2098
	GB-9A	DUNGENESS A-1	2006-12	2,8	Dd+PD+SE	8		Magnox S	2111
	GB-9B	DUNGENESS A-2	2006-12	2,8	Dd+PD+SE	8		Magnox S	2111
	USA	US-001	SHIPPINGPORT	1982-10	3	ID			DOE DUQU
US-011		ELK RIVER	1968-2	1,Others	ID			RCPA	1974
US-012		PIQUA	1966-1	4,5	ISD	11		CofPiqua	
US-013		INDIAN POINT-1	1974-10	5	Dd+PD+SE			ENERGY	
US-014		BONUS	1968-6	5,6	ISD			DOE/PRWR	1970
US-018		GE VALLECITOS	1963-12	1	Dd+SE			GE&PGEC	
US-077		HALLAM	1964-9	5	Dd+SE			AEC&NPPD	1971
US-10		DRESDEN-1	1978-10	6	Dd+SE		7	EXELON	
US-130		PATHFINDER	1967-10	5	Dd+SE	9,11		NMC	
US-133		HUMBOLDT BAY	1976-7	5	Dd+PD+SE	11		PG&E	2013
US-144		CVTR	1967-1	7,Others	Dd+SE	3,4,6		CVPA	2009
US-146		SAXTON	1972-5	Others	ID			GPJNC	2005
US-155		BIG ROCK POINT	1957-8	2,Others	ID		7	CPC	2007
US-16		FERMI-1	1972-11	4,5	Dd+SE	9,11		DTEDISON	2025
US-171		PEACH BOTTOM-1	1974-11	1	Dd+SE	1,9		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	2008
US-245		MILLSTONE-1	1998-7	6	Dd+PD+SE			DOMINRES	2007
US-267		FORT ST. VRAIN	1998-8	1,Others	ID			PSCC	1996
US-289		YANKEE NPS	1991-10	5,7	ID	4,6		YAE	2005
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	

TABLE 17. REACTORS IN DECOMMISSIONING PROCESS OR DECOMMISSIONED, 31 DEC. 2018 — continued

Country	Reactor		Shut down	Shutdown reason	Decom. strategy	Current decom. phase	Current fuel management	Decom. licensee	License terminated	
	Code	Name								
USA	US-305	KEWAUNEE	2013-5	2,6	Dd+SE	4	7	DOMINRES	2005	
	US-309	MAINE YANKEE	1997-8	6	ID			MYAPC	2009	
	US-312	RANCHO SECO-1	1989-6	5,6	Dd+PD+SE			SMUD		
	US-320	THREE MILE ISLAND-2	1979-3	4,5	Other	9,11	4	GPU	1995	
	US-322	SHOREHAM	1989-5	7,Others	ID			LIPA	2005	
	US-344	TROJAN	1992-11	6	Dd+PD+SE	9		PORTGE		
	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
	ID	Other		
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 requirements		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		Other	None of the above
6	Other economical reasons			
7	Public acceptance or political reasons			
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

TABLE 18. PERFORMANCE FACTORS BY REACTOR CATEGORY, 2016 to 2018

Reactor category	Reactors reporting to IAEA PRIS (see note)							
	Number of units	Availability factor (%)	Planned cap. loss factor (%)	Capability factor (%)	Forced loss rate (%)	Operating factor (%)	Load factor (%)	
PWR	303	78.1	15.9	79.3	2.4	78.3	76.8	
PWR < 600 Mw(e)	45	73.6	22.7	74.3	1.6	75.4	72.6	
PWR >= 600 Mw(e)	258	78.4	15.4	79.7	2.5	78.8	77.1	
BWR	79	61.7	35.5	62.1	2.4	61.3	60.0	
BWR < 600 Mw(e)	7	37.8	60.8	38.5	1.9	49.1	37.9	
BWR >= 600 Mw(e)	72	62.3	34.8	62.7	2.4	62.3	60.6	
PHWR	49	76.3	18.2	77.7	3.7	76.0	76.1	
PHWR < 600 Mw(e)	26	75.8	16.8	77.0	6.2	75.0	75.6	
PHWR >= 600 Mw(e)	23	76.6	18.8	78.1	2.6	77.0	76.3	
LWGR	15	76.9	19.6	77.2	3.4	78.5	78.0	
LWGR < 600 Mw(e)	4	77.7	22.1	77.7	0.2	76.5	45.8	
LWGR >= 600 Mw(e)	11	76.9	19.6	77.2	3.4	79.2	78.2	
GCR	14	79.1	12.0	79.5	5.0	83.6	79.4	
FBR	2	74.6	21.6	75.1	3.1	78.6	75.9	
TOTAL	462	74.8	19.8	75.9	2.6	75.3	73.6	

Note: Operating reactors shut down during 2016 to 2018 (13 units) are considered.

TABLE 19. FULL OUTAGE STATISTICS DURING 2018

Reactor type	Number of operating reactors	Full outage hours per operating reactor	Planned outages (%)	Unplanned outages (%)	External outages (%)
PWR	299	1773	78.3	16.7	5.0
PWR < 600 Mw(e)	41	2243	91.5	7.8	0.7
PWR >= 600 Mw(e)	258	1699	75.5	18.5	6.0
BWR	75	3357	93.6	2.9	3.5
BWR < 600 Mw(e)	5	4983	99.2	0.8	0.0
BWR >= 600 Mw(e)	70	3241	93.0	3.1	3.9
PHWR	49	2239	89.6	9.7	0.7
PHWR < 600 Mw(e)	26	2319	90.1	8.9	1.0
PHWR >= 600 Mw(e)	23	2148	88.9	10.7	0.4
LWGR	15	2493	93.4	6.3	0.3
LWGR < 600 Mw(e)	4	2923	100.0	0.0	0.0
LWGR >= 600 Mw(e)	11	2336	90.4	9.1	0.5
GCR	14	2031	52.1	47.7	0.2
FBR	2	2465	96.5	3.5	0.0
ALL REACTORS	454	2120	83.5	12.7	3.8

Notes:

1. Only reactors in commercial operation are considered .
2. Reactors shut down during 2018 (6 units) are considered.

TABLE 20. DIRECT CAUSES OF FULL OUTAGES DURING 2018

Direct cause	Planned full outages						Unplanned full outages					
	Energy lost			Time lost			Energy lost			Time lost		
	GW-h	%	Hours	Hours	%	GW-h	%	Hours	Hours	%	Time lost	
Plant equipment problem/failure	37357	5.00	34438	3.88		49345	94.92	54591			95.09	
Refuelling without maintenance	367568	49.20	426639	48.12								
Inspection, maintenance or repair combined with refuelling	37253	4.99	65795	7.42								
Inspection, maintenance or repair without refuelling	2086	0.28	3632	0.41		139	0.27	140			0.24	
Testing of plant systems or components	20799	2.78	27028	3.05								
Major backfitting, refurbishment or upgrading activities with refuelling	280941	37.61	312674	35.27								
Major backfitting, refurbishment or upgrading activities without refuelling	157	0.02	787	0.09		135	0.26	148			0.26	
Nuclear regulatory requirements						2321	4.46	2312			4.03	
Human factor related	862	0.12	15569	1.76		44	0.08	219			0.38	
Other												
TOTAL	747023	100.00	886562	100.00		51984	100.00	57410			100.00	

Note: Only reactors which have achieved full commercial operation in or before 2018 are counted.

TABLE 21. DIRECT CAUSES OF FULL OUTAGES, 2014 TO 2018

Direct outage cause	Planned full outages						Unplanned full outages					
	Energy lost			Time lost			Energy lost			Time lost		
	GW-h	%	Hours	Hours	%	GW-h	%	Hours	Hours	%	Time lost	
Plant equipment problem/failure	146549	3.98	143196		3.39	270573	93.48	329121		93.03		
Refuelling without maintenance	1583875	43.07	1789845		42.39	487	0.17	483		0.14		
Inspection, maintenance or repair combined with refuelling	142614	3.88	236958		5.61							
Inspection, maintenance or repair without refuelling	11812	0.32	11419		0.27	206	0.07	403		0.11		
Testing of plant systems or components	149458	4.06	172044		4.07							
Major backfitting, refurbishment or upgrading activities with refuelling	1635458	44.47	1812323		42.92							
Major backfitting, refurbishment or upgrading activities without refuelling	1710	0.05	3844		0.09	7254	2.51	7934		2.24		
Nuclear regulatory requirements						9657	3.34	13238		3.74		
Human factor related						955	0.33	1130		0.32		
Fire	2200	0.06	1795		0.04	10		8				
Fuel management limitation	4052	0.11	50742		1.20	300	0.10	1474		0.42		
Other												
TOTAL	3677728	100.00	4222166		100.00	289442	100.00	353791		100.00		

Note: Only reactors which have achieved full commercial operation in or before 2018 are counted.

TABLE 22. COUNTRIES: ABBREVIATIONS AND SUMMARY

Country code	Full name	Number of reactors, as of 31 Dec. 2018				
		Operational	Construction	LT shut down	Shut down	Planned
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			6	
CN	CHINA	46	11		31	
CZ	CZECH REPUBLIC	6				
FI	FINLAND	4	1		12	
FR	FRANCE	58	1		29	
DE	GERMANY	7			2	
HU	HUNGARY	4			2	
IN	INDIA	22	7		3	
IR	IRAN, ISLAMIC REPUBLIC OF	1			4	
IT	ITALY				21	
JP	JAPAN	39	2		1	
KZ	KAZAKHSTAN				1	
KR	KOREA, REPUBLIC OF		5		1	
LT	LITHUANIA	24			2	
MX	MEXICO	2				
NL	NETHERLANDS	1			1	
PK	PAKISTAN	5	2			
RO	ROMANIA	2				
RU	RUSSIA	36	6		7	
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. 2018				
		Operational	Construction	LT shut down	Shut down	Planned
SE	SWEDEN	8				5
CH	SWITZERLAND	5				1
TR	TURKEY		1			
UA	UKRAINE	15	2			4
AE	UNITED ARAB EMIRATES		4			
GB	UNITED KINGDOM	15	1			30
US	UNITED STATES OF AMERICA	98	2			35
TOTAL		451	55		172	81

Note: The total includes the following data from Taiwan, China:
 — 5 units in operation; 2 units under construction; 1 unit in shutdown.

TABLE 23. REACTOR TYPES: ABBREVIATIONS AND SUMMARY

Type code	Full name	Number of reactors, as of 31 Dec. 2018			
		Operational	Construction	L.T shut down	Shut down
BWR	Boiling Light-Water Cooled and Moderated Reactor	73	4		42
FBR	Fast Breeder Reactor	3	1		8
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	14			10
PHWR	Pressurized Heavy-Water Moderated and Cooled Reactor	49	4		8
PWR	Pressurized Light-Water Moderated and Cooled Reactor	298	45		53
SGHWR	Steam Generating Heavy-Water Reactor				1
X	Other				2
TOTAL		451	55		172
					81

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY

Operator code	Full name	Number of reactors, as of 31 Dec. 2018		
		Operational	Construction	Shut down / Planned
AEC/NPPD	ATOMIC ENERGY COMMISSION AND NEBRASKA PUBLIC POWER DISTRICT			
AEP	AMERICAN ELECTRIC POWER COMPANY, INC.	2		1
Ameren/UE	AMEREN UE, UNION ELECTRIC COMPANY	1		
ANAV	ASOCIACION NUCLEAR ASCO-VANDELLOS A.I.E. (ENDES/ID)	3		
ANC	AKUYU NUCLEAR JOINT STOCK COMPANY	1	1	3
ANPPC/JSC	CLOSED JOINT STOCK COMPANY, ARMENIAN NPP	1		
APS	ARIZONA PUBLIC SERVICE CO.	3		
AVR	ARBEITSGEMEINSCHAFT VERSUCHSREAKTOR GMBH	2		1
Axpo AG	KERNKRAFTWERK BEZNAUCH-5312 DÖTTINGEN		2	
BelNPP	REPUBLICAN UNITARY ENTERPRISE BELARUSIAN NUCLEAR POWER PLANT		1	
BHAVINI	BHARATIYA NABHIKIYA VIDYUT NIGAM LIMITED		1	
BKAB	BARSEBÄCK KRAFT AB			2
BKW	BKW ENERGIE AG	1		
BRUCE/POW	BRUCE POWER	8		
BY GKN	BV GEMEENSCHAPPELIJKE KERNENERGIECENTRALE NEDERLAND (BV GKN)			1
CEA/EDF	COMMISSARIAT À 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		
CHUGOKU	THE CHUGOKU ELECTRIC POWER CO., INC.	1	1	1
CIAE	CHINA INSTITUTE OF ATOMIC ENERGY	1		2
CNAT	CENTRALES NUCLEARES 'ALMARAZ-TRILLO (ID)UFGIENDES/HCNUCLEONOR)	3		
CNEA	COMISION NACIONAL DE ENERGIA ATOMICA		1	
CNNO	CNOC NUCLEAR OPERATION MANAGEMENT COMPANY LIMITED.	1		
CoP/iqua	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. 2018			
		Operational	Construction	LT shut down	Shut down
CYAPC	CONNECTICUT YANKEE ATOMIC POWER CO.				
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			
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		1		1
ELETRONU	ELETRONAS ELETRONUCLEAR, S.A.	2	1		
ENBW	ENBW KRAFTWERKE AG				1
ENERGYNW	ENERGY NORTHWEST	1			
ENKK	ENBW KERNKRAFT GMBH	2			2
ENERGY	ENERGY NUCLEAR OPERATIONS, INC.	10			2
EOS	ENERGIE DE L'OUEST SUISSE				1
EPDC	ELECTRIC POWER DEVELOPMENT CO., LTD.		1		
EPZ	N.V. ELEKTRICITEITS-PRODUKTIEMAATSCHAPPIJ ZUID-NEDERLAND	1			
ESKOM	ESKOM	2			
EWN	ENERGIEWERKE NORD GMBH				6
EXELON	EXELON GENERATION CO., LLC	22			6
FENOC	FIRST ENERGY NUCLEAR OPERATING CO.	4			
FKA	FORSMARK KRAFTGRUPP AB	3			
FORTUMPH	FORTUM POWER AND HEAT OY (FORMER IVO)	2			
FPL	FLORIDA POWER & LIGHT CO.	4			
FQNP	CNNC FUJIAN FUJING NUCLEAR POWER CO., LTD		2		
FSNPC	FUJIAN SANMING NUCLEAR POWER CO., LTD.	4			2

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2018			
		Operational	Construction	LT shut down	Shut down
FV	FENNOVOIMA OY				1
GE	GENERAL ELECTRIC				
GFNC	GUANGXI FANGCHENGANG NUCLEAR POWER COMPANY, LTD.	2	2		1
GPU	GENERAL PUBLIC UTILITIES(OWNED BY FIRSTENERGY CORP.)				1
HDR	HEISSAMPFREAKTOR-BETRIEBSGESELLSCHAFT MBH.				1
HEPCO	HOKKAIDO 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				1
HSNPC	HUANENG SHANDONG SHIDAO BAY NUCLEAR POWER COMPANY, 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./				
JNPC	JIANGSU NUCLEAR POWER CORPORATION	4	2		3
KBG	KERNKRAFTWERK-BETRIEBSGESELLSCHAFT MBH				2
KEPCO	KANSAI ELECTRIC POWER CO.	7			4
KGB	KERNKRAFTWERKE GUNDEMMINGEN BETRIEBSGESELLSCHAFT MBH				1
KGK	KERNKRAFTWERKE GUNDEMMINGEN GMBH	1			2
KNHP	KOREA HYDRO AND NUCLEAR POWER CO.	24	5		1
KKB	KERNKRAFTWERK BRUNSBÜTTEL GMBH & CO. OHG				1
KKG	KERNKRAFTWERK GOESGEN-DAENIKEN AG	1			
KKK	KERNKRAFTWERK KRÜMMEL GMBH & CO. OHG				1
KKL	KERNKRAFTWERK LEIBSTADT	1			
KKN	KERNKRAFTWERK NIEDERAICHBACH GMBH	1			1
KLE	KERNKRAFTWERKE LIPPE-EMIS GMBH	1			
KOZNP	KOZLODUY NPP, PLC.	2			4

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2018			
		Operational	Construction	LT shut down	Shut down
KWL	KERNKRAFTWERK LINGEN GMBH				
KYUSHU	KYUSHU ELECTRIC POWER CO., INC.	5		1	1
LFNPC	CGN LUFENG NUCLEAR POWER CO., LTD			1	2
LHNPC	LIAONING HONGYANHE NUCLEAR POWER CO. LTD. (LHNPC)	4	2		
LIPA	LONG ISLAND POWER AUTHORITY			1	
LNPC	LIAONIN NUCLEAR POWER COMPANY, LMT.				2
LUMINANT	LUMINANT GENERATION COMPANY, LLC	2			
MAEC-KAZ	MANGISHLAK ATOMIC ENERGY COMPLEX-KAZATOMPROM, LIMITED LIABILITY COMPANY			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			
NMIC	NUCLEAR MANAGEMENT CO.			1	
NNEG	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
NPPDCO	NUCLEAR POWER PRODUCTION & DEVELOPMENT CO. OF IRAN	1			3
NPQJVC	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		
PAKS II	MVM PAKS II, LTD.				2

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2018				
		Operational	Construction	LT shut down	Shut down	Planned
PAKS ZIT	PAKS NUCLEAR POWER PLANT, LTD.	4				
PE	PREUSSELEKTRA KERNKRAFT GMBH&CO KG				1	
PElectra	PREUSSELEKTRA GMBH	3				
PG&E	PACIFIC GAS AND ELECTRIC COMPANY	2			1	
PORTGE	PORTLAND GENERAL ELECTRIC CO.	2			1	
PPL SUSQ	PPL SUSQUEHANNA, LLC	2				
PROGRESS	PROGRESS ENERGY	4			1	
PSCC	PUBLIC SERVICE CO. OF COLORADO	4			1	
PSEG	PSEG NUCLEAR, LLC	3				
QNPC	QINSHAN NUCLEAR POWER COMPANY	2				
RAB	RINGHALS AB	4				
RCPA	RURAL COOPERATIVE POWER ASSOC.				1	
REA	JOINT STOCK COMPANY 'CONCERN ROSENERGOATOM'	36	6		6	21
RWE	RWE POWER AG				2	
SCE	SOUTHERN CALIFORNIA EDISON CO.				3	
SCE&G	SOUTH CAROLINA ELECTRIC & GAS CO.	1				
SDNPC	SHANDONG NUCLEAR POWER COMPANY, LTD.	2				2
SE	SLOVENSKE ELEKTARANE, AS.	4	2			
SENA	SOCIETE D'ENERGIE NUCLEAIRE FRANCO-BELGE DES ARDENNES				1	
SHIKOKU	SHIKOKU ELECTRIC POWER CO., INC	1			2	
SL	SELLAFIELD LIMITED				4	
SNMPC	SANMEN NUCLEAR POWER CO., LTD.	2				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.				4	
SOUTHERN	SOUTHERN NUCLEAR OPERATING COMPANY, INC.	6	2			
STP	STP NUCLEAR OPERATING CO.	2				
SWAFO	AB SWAFO				1	
TEPCO	TOKYO ELECTRIC POWER COMPANY HOLDINGS, INC.	11			6	2

TABLE 24. OPERATORS: ABBREVIATIONS AND SUMMARY — continued

Operator code	Full name	Number of reactors, as of 31 Dec. 2018				
		Operational	Construction	L.T. shut down	Shut down	Planned
TNPC	GUANGDONG TAISHAN NUCLEAR POWER JOINT VENTURE COMPANY LIMITED (TNPC)	1	1			
TOHOKU	TOHOKU ELECTRIC POWER CO., INC.	4				1
TPC	TAIWAN POWER CO.	5	2		1	
TONGPC	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.					
YJNPC	YANGJIANG NUCLEAR POWER COMPANY	5	1		1	
not specified						26
TOTAL		451	55		172	81

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. 2018		
		Operational	Construction	L.T. shut down / Shut down / Planned
A/FW	ASSOCIATION ACEC-FRAMATOME AND WESTINGHOUSE.			
ABBATOM	ABBATOM (FORMERLY ASEA-ATOM)	5		1
AC	ALLIS CHALMERS	4		4
ACECOWEN	ACECOWEN (ACEC-COCKERILL-WESTINGHOUSE)	1		3
ACLF	(ACECOWEN -CREUSOT LOIRE -FRAMATOME)	8		
AECL	ATOMIC ENERGY OF CANADA, LTD.	3		3
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	USC ATOMENERGOMASH	36	9	2
AMIN/GETS	ANSALDO MECCANICO NUCLEARE SPA / GENERAL ELECTRIC TECHNICAL SERVICES CO.	2		1
APC	ATOMIC POWER CONSTRUCTION, LTD.	1	4	2
AREVA	AREVA. 27-29, RUE LE PELETIER, 75433 PARIS CEDEX 09URL: WWW.AREVA.COM	2		1
ASEASTAL	ASEA-ATOM / STAL-LAVAL	2		1
ASPALDO	ASPALDO			1
B&W	BABCOCK & WILCOX CO.	6		1
BBK	BROWN BOVERI-KRUPP REAKTORBAU GMBH			4
BBR	BROWN BOVERI REAKTOR GMBH			1
CE	COMBUSTION ENGINEERING CO.	11		1
CEA	COMMISSARIAT A L'ENERGIE ATOMIQUE			4
CFHI	CHINA FIRST HEAVY INDUSTRIES	7	4	1
CGE	CANADIAN GENERAL ELECTRIC	1		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 CORPORATIONDEC-NPIC-FANP	11	2	3

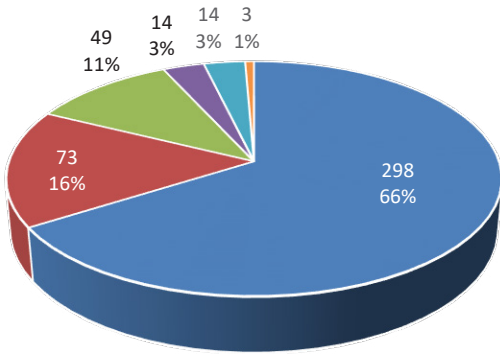
TABLE 25. NSSS SUPPLIERS: ABBREVIATIONS AND SUMMARY — continued

NSSS supplier code	Full name of nuclear steam supply system supplier	Number of reactors, as of 31 Dec. 2018			
		Operational	Construction	LT shut down	Shut down
DHICKAEC	DOOSAN HEAVY INDUSTRIES & CONSTRUCTION CO.LTD./KOREA ATOMICENERGY RESEARCH I	2			
EEB&W/T	DOOSAN HEAVY INDUSTRIES & CONSTRUCTION CO.LTD./KOREA POWER ENGINEERING COMPA	11	5		6
EL/WEST	THE ENGLISH ELECTRIC CO., LTD./BABCOCK & WILCOX CO./TAYLOR WOODROW CONSTR				1
FAEA	ELETTRONUCLEARE ITALIANA / WESTINGHOUSE ELECTRIC CORP.	1			5
FRAM	FEDERAL ATOMIC ENERGY AGENCY	66			3
FRAMACEC	FRAMATOME	2			2
GA	FRAMACECO (FRAMATOME-ACEC-COCKERILL)				1
GAAGA	GENERAL ATOMIC CORP.				2
GE	GROUPEMENT ATOMIQUE ALSACIENNE ATLANTIQUE				1
GE/AEG	GENERAL ELECTRIC CO.	42	2		16
GE/GETSC	GENERAL ELECTRIC COMPANY (US), ALLGEMEINE ELEKTRICITAETS- GESELLSCHAFT				1
GE/T	GENERAL ELECTRIC CO. / GENERAL ELECTRIC TECHNICAL SERVICES CO.				1
GEC	GENERAL ELECTRIC CO. / TOSHIBA CORPORATION				2
GETSCO	GENERAL ELECTRIC COMPANY (UK)	2			3
GNEPRWRA	GENERAL ELECTRIC TECHNICAL SERVICES CO.				1
GTM	GENERAL NUCLEAR ENGINEERING & PUERTO RICO WATER RESOURCES AUTHORITY (US)				1
H/G	GRANDS TRAVAUX DE MARSEILLE				1
HITACHI	HITACHI GE NUCLEAR ENERGY, LTD.	8	1		3
HRB	HITACHI,LTD.				1
IA	HOCHTEMPERATUR-REAKTORBAU GMBH				1
ICL/FE	INTERNATIONAL INTERNAZIONALE ATOMREAKTORBAU GMBH				1
IZ	INTERNATIONAL COMBUSTION LTD. / FAIREY ENGINEERING LTD.				1
JSC ASE	IZHORSKIYE ZAVODY	5			
KEPCO	JSC ATOMSTROYEXPORT	1	6		2
KWU	KOREA ELECTRIC POWER CORPORATION		4		
LEVIVIER	SIEMENS KRAFTWERK UNION, AG	10	1		11
MAEC-KAZ	MAEC-KAZATOMPROMMANGISHLAK ATOMIC ENERGY COMPLEX-KAZATOMPROM,LIMITED LIABILI				2
MAEP	MINATOMENERGOPROM. MINISTRY OF NUCLEAR POWER AND INDUSTRY	2			1
MHI	MINISTRY OF NUCLEAR POWER AND INDUSTRY				2
MSM	MINISTRY OF MEDIUM MACHINE BUILDING OF THE USSR (MINSREDMASH)	16			4
					5

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. 2018			
		Operational	Construction	LT shut down	Shut down / Planned
NSA	NATIONALE GESELLSCHAFT ZUR FÖRDERUNG DER INDUSTRIELLEN ATOMTECHNIK				
NNC	NATIONAL NUCLEAR CORPORATION	2			1
NPC	NUCLEAR POWER CO., LTD.	6			
NP/CIL	NUCLEAR POWER CORPORATION OF INDIA, LTD./VIKRAM SARABHAI BHAVAN, ANUSHAKTI NA	16	4		
NPIC	NUCLEAR POWER INSTITUTE OF CHINA	6			
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 DROEGDOK MAATSCHAPPIJ (RDM) IN ROTTERDAM (NL)	1			1
S/KWU	SIEMENS/KRAFTWERK UNION, AG	1			
SACM	SOCIETE ALSACIENNE DE CONSTRUCTIONS MECANIQUES	1			2
SHE	SHANGHAI ELECTRIC	1	1		
SIEM.KWU	SIEMENS AG, KRAFTWERK UNION AG				2
SIEMENS	SIEMENS AG, POWER GENERATION	2			1
SKODA	SKODA CONCERN NUCLEAR POWER PLANT WORKS	10	2		1
T/H/F/M	TOSHIBA / HITACHI / FUJIELECTRIC HOLDINGS / MITSUBISHI HEAVY INDUSTRIES	1			1
TNPG	THE NUCLEAR POWER GROUP, LTD.	4			10
TOSHIBA	TOSHIBA CORPORATION	13			4
TSINGHUA	TSINGHUA UNIVERSITY		1		
UEC	UNITED ENGINEERS AND CONTRACTORS				1
UKAEA	UNITED KINGDOM ATOMIC ENERGY AUTHORITY				10
WH	WESTINGHOUSE ELECTRIC CORPORATION	69	2		15
WH/MIHI	WESTINGHOUSE ELECTRIC CORPORATION / MITSUBISHI HEAVY INDUSTRIES, LTD.	3			2
not specified			1		41
TOTAL		451	55		172
					81

Number of reactors



Net electrical power [GW]

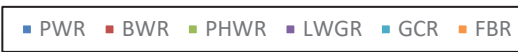
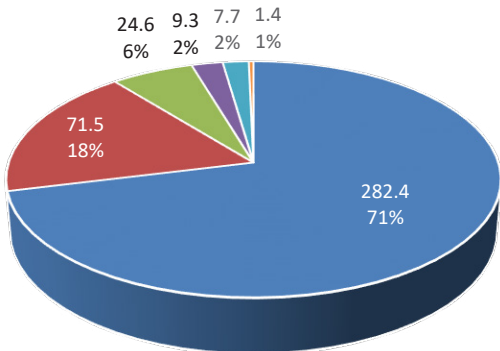


Figure 1. Number of operational reactors by type and net electrical power (as of 31 Dec. 2018).

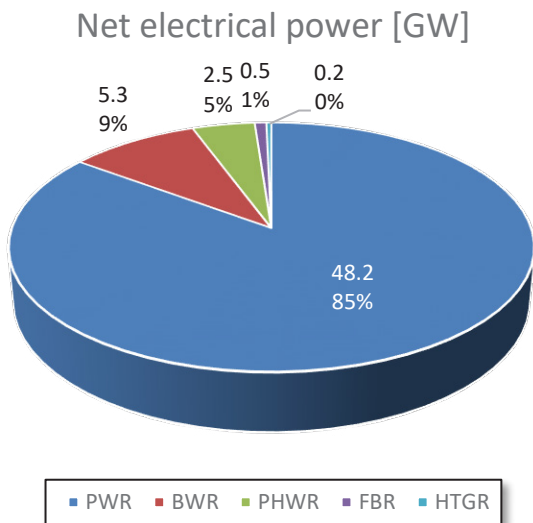
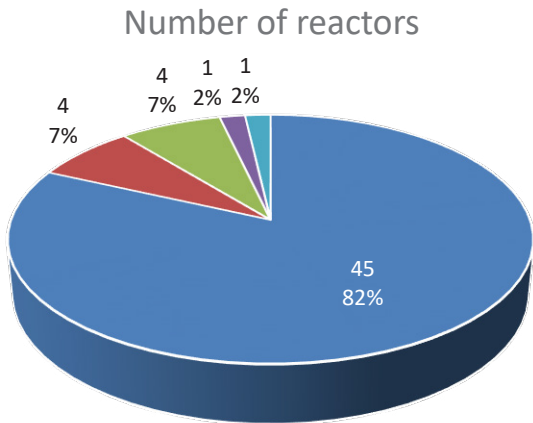


Figure 2. Reactors under construction by type and net electrical power (as of 31 Dec. 2018).

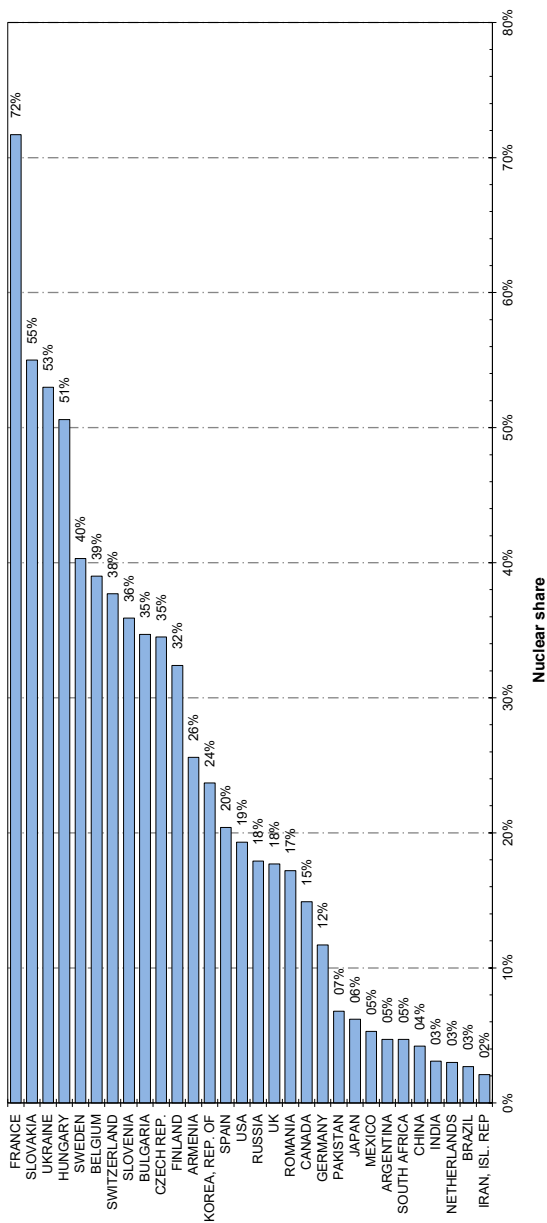


Figure 3. Nuclear share of electricity generation (as of 31 Dec. 2018).

Note: The nuclear share of electricity supplied in Taiwan, China was 11.4 % of the total.

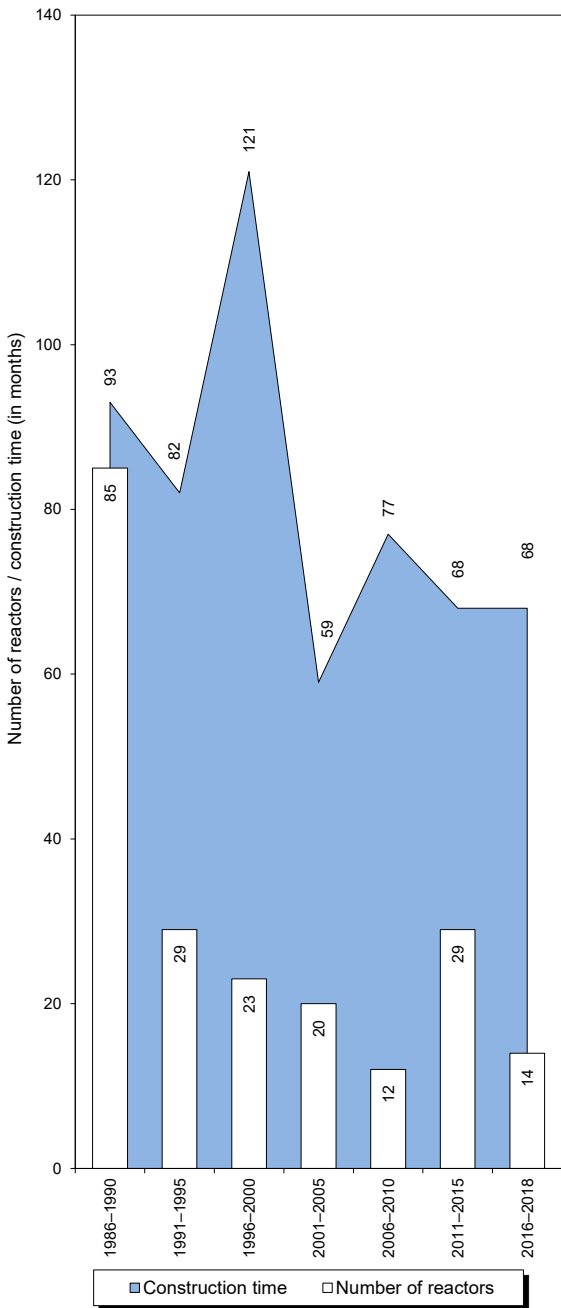


Figure 4. Worldwide median construction time in months (as of 31 Dec. 2018).

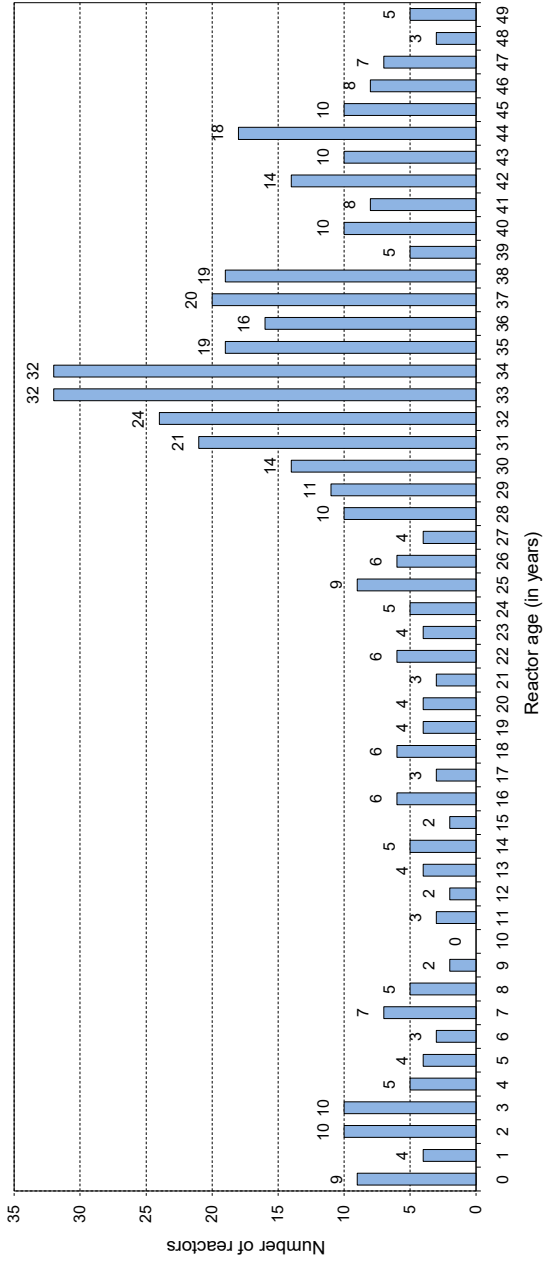


Figure 5. Number of operational reactors by age (as of 31 Dec. 2018).

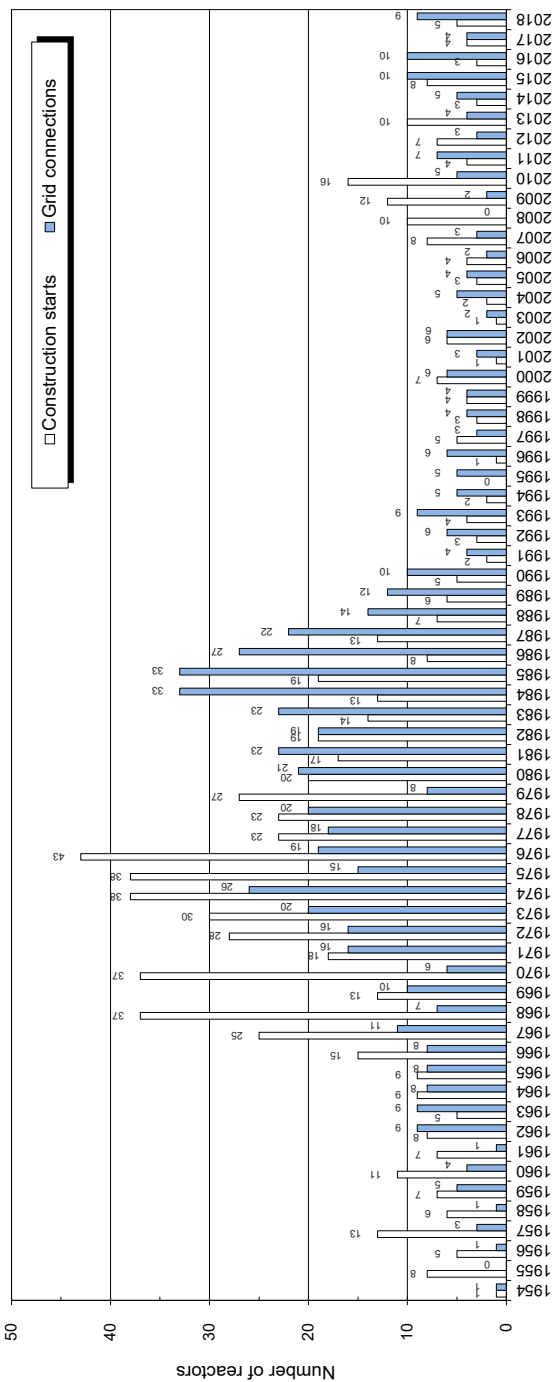


Figure 6. Annual construction starts and connections to the grid (1954 to 2018).



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