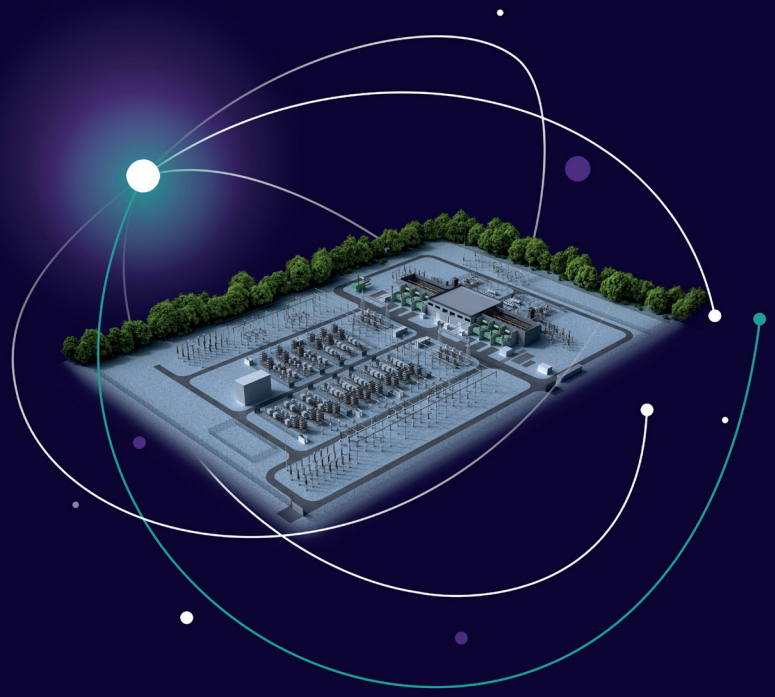
SIEMENS energy

High-voltage direct current (HVDC) transmission solutions

Over 50 years of practical experience



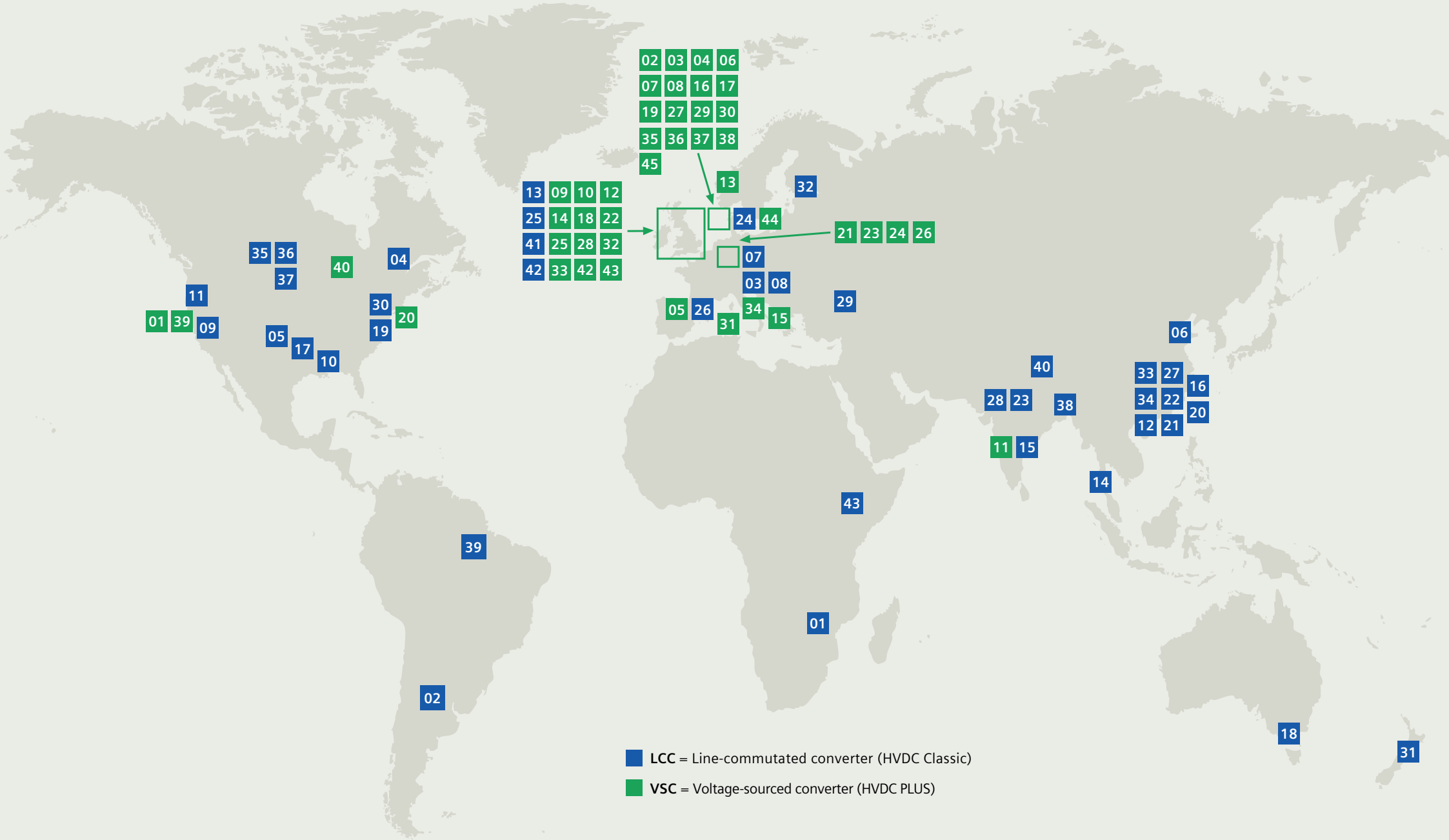


An overview of global HVDC references

With over 50 years of practical experience, Siemens Energy is a globally renowned technology partner for HVDC solutions:
Currently, the company is counting 88 projects among its references, in over 25 countries around the globe.

43 HVDC Classic projects are designed to operate with line-commutated converters (LCC) and have already been commissioned or are close to completion.

On top of that 45 more *HVDC PLUS* projects are based on voltage-sourced converters (VSC) with multi-level modular converters technology (MMC).


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LCC = Line-commutated converter (HVDC Classic)
VSC = Voltage-sourced converter (HVDC PLUS)

HVDC Classic (LCC) references

No.	Commissioning	Project name	Country	Power rating
01	1975	Cahora Bassa (1975/1998)	South Africa - Mozambique	1,920 MW
02	1981	Acaray	Paraguay	55 MW
03	1983	Dürnrohr	Austria	550 MW
04	1984	Poste Châteauguay	Canada	2 x 500 MW
05	1987	Virginia Smith	USA	200 MW
06	1989	Gezhouba - Nanqiao	China	1,200 MW
07	1993	Etzenricht	Germany	600 MW
08	1993	Wien - Suedost	Austria	600 MW
09	1995	Sylmar East Valve Reconstruction	USA	550 (825) MW
10	1995	Welsh 1995/2017	USA	600 MW
11	1997	Celilo 1997/2004	USA	3,100 MW
12	2000	Tianshengqiao - Guangzhou	China	1,800 MW
13	2001	Moyle Interconnector	United Kingdom	2 x 250 MW
14	2001	Thailand-Malaysia	Thailand - Malaysia	300 MW
15	2003	East-South Interconnector II and Upgrade	India	2,000 / 2,500 MW
16	2004	Guizhou - Guangdong	China	3,000 MW
17	2005	Lamar	USA	210 MW
18	2006	Basslink	Australia	500 MW
19	2007	Neptune RTS	USA	660 MW
20	2008	Guizhou - Guangdong II	China	3,000 MW
21	2009	Yunnan - Guangdong	China	5,000 MW
22	2010	Xiangjiaba - Shanghai	China	6,400 MW
23	2010	Ballia - Bhiwadi	India	2,500 MW
24	2010	Storebælt	Denmark	600 MW
25	2011	BritNed	United Kingdom	1,000 MW
26	2012	COMETA	Spain	2 x 200 MW
27	2012	Jinping - Sunan	China	7,200 MW
28	2012	Mundra - Mohindergarh	India	2,500 MW
29	2013	Black Sea Transmission Network	Georgia	2 x 350 MW
30	2013	Hudson	USA	660 MW
31	2014	Inter-Island link Pole 3	New Zealand	700 MW
32	2014	EstLink 2	Finland - Estonia	670 MW
33	2014	Xiluodu - Guangdong	China	2 x 3,200 MW
34	2015	Nuozhadu - Guangdong	China	5,000 MW
35	2016	EATL	Canada	1,000 MW
36	2016	WATL	Canada	1,000 MW
37	2018	Nelson River, Bipole 1 / 2 / 3 (2004 / 1977 / 2018)	Canada	1,000 / 2,000 / 2,000 MW
38	2018	Bheramara BtB Block 1/2 (2013/2018)	Bangladesh	2 x 500 MW
39	2018	HVDC Brazil	Brazil	4,000 MW
40	2021	Vindhyachal BtB Block - 1 & 2 refurbishment	India	2 x 250 MW
41	2022	Western HVDC Link	United Kingdom	2,200 MW
42	2022	Moyle C&P Refurbishment	United Kingdom	2 x 250 MW
43	2023	Ethiopia - Kenya HVDC Interconnector	Ethiopia - Kenya	2,000 MW

HVDC PLUS (VSC) references

No.	Commissioning	Project name	Country	Power rating	Voltage level
01	2010	Trans Bay Cable	USA	400 MW	200 kV DC
02	2015	BorWin2	Germany	800 MW	300 kV DC
03	2015	HelWin1	Germany	576 MW	250 kV DC
04	2015	HelWin2	Germany	690 MW	320 kV DC
05	2015	Interconnection Baixas – Santa Llogaia for INELFE	France - Spain	2 x 1,000 MW	320 kV DC
06	2015	SylWin1	Germany	864 MW	320 kV DC
07	2019	BorWin3	Germany	900 MW	320 kV DC
08	2019	Cobra Cable	Denmark - Netherlands	700 MW	320 kV DC
09	2019	Nemo Link	UK - Belgium	1,000 MW	400 kV DC
10	2020	ALEGrO	Belgium - Germany	1,000 MW	500 kV DC
11	2021	Pugalur – North Thrissur (PK2000)	India	2 x 1,000 MW	320 kV DC
12	2022	ElecLink	UK - France	1,000 MW	320 kV DC
13	2022	Johan Sverdrup Phase 2	Norway	200 MW	80 kV DC
14	2023	Viking Link	UK - Denmark	1,400 MW	525 kV DC
15	2023	Crete-Attica Interconnector	Greece	1,000 MW	500 kV DC
16	2023	DolWin6	Germany	900 MW	320 kV DC
17	2024	ULTRANET	Germany	2,000 MW	380 kV DC
18	2024	Greenlink	UK - Ireland	500 MW	320 kV DC
19	2025	BorWin5	Germany	900 MW	320 kV DC
20	2025	Sunrise Wind	USA	1,086 MW	320 kV DC
21	2026	SuedOstLink	Germany	2,000 MW	525 kV DC
22	2027	East Anglia 3	UK	1,320 MW	320 kV DC
23	2028	ULTRANET A-Nord	Germany	2,000 MW	380 kV DC

No.	Commissioning	Project name	Country	Power rating	Voltage level
24	2028	SuedLink DC3	Germany	2,000 MW	525 kV DC
25	2028	NeuConnect	Germany - UK	1,400 MW	525 kV DC
26	2028	DolWin4	Germany	900 MW	320 kV DC
27	2028	BorWin4	Germany	900 MW	320 kV DC
28	2026	Celtic Interconnector	Ireland - France	700 MW	320 kV DC
29	2030	BalWin1	Germany	2,000 MW	525 kV DC
30	2031	BalWin2	Germany	2,000 MW	525 kV DC
31	2028	Tyrrhenian Link	Italy	2,000 MV	500 kV DC
32	2028	Norfolk Vanguard East	United Kingdom	1,086 MV	320 kV DC
33	2029	Norfolk Vanguard West	United Kingdom	1,086 MV	320 kV DC
34	2029	Adriatic	Italy	1,000 MV	500 kV DC
35	2030	BalWin3	Germany	2,000 MV	525 kV DC
36	2031	LanWin2	Germany	2,000 MV	525 kV DC
37	2031	LanWin4	Germany	2,000 MV	525 kV DC
38	2032	North Sea Connector 1 / LanWin3	Germany	2,000 MV	525 kV DC
39	2028	LS Power	USA	1,000 MV	320 kV DC
40	2029	HVDC Modernization Project for Minnesota Power	USA	1,500 MV	250 kV DC
41		awarded		400 MV	250 kV DC
42	2031	SeaLink	United Kingdom	2,000 MV	525 kV DC
43	2033	Eastern Green Link 4	United Kingdom	2,000 MV	525 kV DC
44	2033/2034	Bornholm Energy Island (BEI)	Denmark - Germany	3,200 MV	525 kV DC
45	2034	North Sea Connector 2 / LanWin6	Germany	2,000 MV	525 kV DC

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