

Demand and Capacity for HVAC and HVDC underground and submarine cables

EUROPACABLE communication in the context of the ENTSO-E TYNDP 2018

Executive Summary

In order to meet its ambitious energy and climate objectives, the European Union requires a well-integrated trans-European energy market, the pre-requisite of which will be a fully interconnected high (HV) and extra high voltage (EHV) electricity grid network.

With this Paper, EUROPACABLE:

1. Highlights the importance of realizing the projects included in the ENTSO-E Ten Year Network Development Plan 2018 (“TYNDP18”) in a timely and sustainable manner; and
2. Recognises the overall coherence between the forecasted demand for HVDC land and submarine cables as identified for the TYNDP18 projects in the coming decade and the annual production capacity of European cable manufacturers.

Europe needs more transmission grids

According to the TYNDP18 some 37,000 km *route length* of extra high voltage (EHV) power lines on land as well as subsea will need to be built/refurbished by 2030. Current estimates foresee 52% of the total distance will have to be built using EHV underground cables, the majority using HVDC submarine cables.

TYNDP18	Km route length	%km	Projects	% projects
Overhead Line	17,857	48	169	69
Submarine cabling (incl. some land parts)	16,059	44	53 submarine or mix submarine & land cable	22
Land Cabling	3,100	8	21 full or partial underground	9
TOTAL	37,016	100	243	100

ENTSO-E / EUROPACABLE Joint Paper regarding the “Feasibility and Technical Aspects of Partial Undergrounding of Extra High Voltage Power Transmission Lines” published in December 2010, clearly demonstrated the benefit of TSOs and industry offering a joint position on key challenges to respond to meeting Europe’s electricity grid needs.

Further to a successful collaboration with ENTSO-E on the TYNDP16, EUROPACABLE now issues this updated paper reconfirming the availability of appropriate production capacity of high quality high voltage alternating (HVAC) and direct current (HVDC) land and submarine cables by European manufacturers to meet the expected demand in a timely manner.¹ Ensuring that demand and capacity for EHV cables are aligned is a prerequisite for a timely completion of Europe’s future electricity grids according to TYNDP18.

¹ For the purpose of this document high voltage HVAC cables are defined at a voltage of >220 kV and HVDC cables are defined at a voltage level >320 kV.

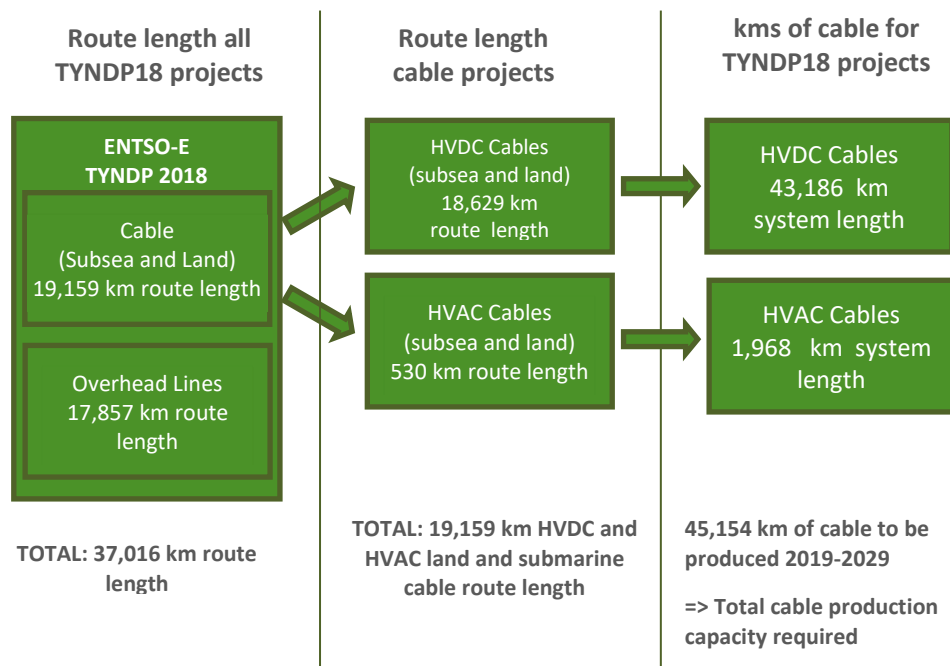
Demand for HVAC and HVDC land and submarine cables

The TYNDP18 identified a total of approximately 37,000 km *route length*, i.e. km of distance, to be covered by new projects in the period to 2030. Excluding overhead lines, and focussing on cables only, this foresees 19,159 km route length to be covered through cables, i.e. km of distance for:

- 18,629 km of HVDC land and submarine cables; and
- 530 km of HVAC land and submarine cables

To cover this, EUROPACABLE estimates that in total, Europe will need some 45,154 cable km² of HVAC and HVDC land and submarine cables in the period to 2030, i.e. a total amount of km of cables as follows:

- 43,186 km of HVDC land and submarine cables; and
- 1,968 km of HVAC land and submarine cables.



In view of the fact that the vast majority of these projects (> 43,000km) are planned to be using HVDC submarine and land cables, this paper focuses on HVDC demand and production capacity.

² For the purpose of this paper “cable km” is defined as the route length multiplied by the number of cables required per phase or circuit”.

Recognizing that on average cables will be produced two to three years prior to the expected project completion, EUROPACABLE expects the following demand for HVDC land and submarine cables per year in the coming decade³:

Year	DC LAND System km			DC Submarine System km			Grand TOTAL
	320kV	>320kV	Total	320kV	>320kV	Total	
2019	100	-	100	1,057	1,618	2,675	2,775
2020	103	-	103	1,747	2,660	4,407	4,510
2021	103	1,870	1,973	2,340	1,750	4,090	6,063
2022	-	2,403	2,403	2,110	1,273	3,383	5,786
2023	330	2,483	2,813	2,855	1,265	4,120	6,933
2024	330	2,484	2,814	2,870	1,345	4,215	7,029
2025	150	-	150	1,325	1,105	2,430	2,580
2026	510	-	510	1,200	690	1,890	2,400
2027	360	30	390	570	430	1,000	1,390
2028	-	30	30	1,710	270	1,980	2,010
2029	-	-	-	1,640	70	1,710	1,710
Total	1,986	9,300	11,286	19,424	12,476	31,900	43,186

A few proposed offshore wind projects of “regional significance” with HVDC submarine cables in the North Sea were not included in the TYNDP18. We have identified five potential projects (2 in Germany and 3 UK) that promoters have indicated should be completed by 2029 with an approximate length of 2,000 km (land section 780 km and submarine 1,220 km). If these projects are included in the demand forecasts, total demand would increase by 4.6%. The main annual increases are in 2021 and 2028.

This demand forecast is based on the following assumptions:

1. Project data (e.g. capacity, current, voltage, route length, status, estimated date of completion) taken principally from ENTSO-E TYNDP18
2. Route length converted to cable km length to estimate potential cable demand as follows:

	Capacity MVA/MW(DC)	Cables per phase
DC land >320 kV one system	1000	2
DC land >320 kV two systems	2000	4
DC subsea >320kV	500	2
DC subsea 500kV	>1000 and < 2000	2

3. Tender date assumed to be an average of 3 years before project completion date (exceptions small HVAC subsea 2 years, large HVDC 4 years)

³ For the SuedLink and SuedOst Link HVDC land projects in Germany, we assume 80% to be underground cables using five 525 kV XLPE cables, i.e. four to carry the load and one backup cable.

Production and Installation capacity of HVAC and HVDC land and submarine cables

In 2018, EUROPACABLE member companies had a total of some 11,000 km of annual production capacity of HVDC and HVAC cables:

	Annual production capacity (km)
Extruded HV /EHV Land cables	6,550
Extruded and MI HV / EHV Submarine cables	4,730
TOTAL	11,280

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To further specify the HVDC capacity in the context of this paper, EUROPACABLE members aggregated their dedicated annual production capacity of HVDC land and submarine cables in 2018 as follows:

Annual production capacity (km)	Land Only	Land & Submarine
320 kV HVDC	6,090	6,980
320 kV and 525 kV HVDC	5,550	6,440

This annual HVDC production capacity of European manufacturers clearly matches the demand forecasted per year for the ENTSO-E TYNDP18 projects in the coming decade.

EUROPACABLE Commitment

1. In view of the above-mentioned importance of a timely completion of the projects singled out in the TYNDP18, EUROPACABLE herewith highlights the importance of realizing the projects in a timely and sustainable manner; and
2. Recognises the overall coherence between the forecasted demand for HVDC land and submarine cables as identified for the TYNDP18 projects in the coming decade and the annual production capacity of European cable manufacturers.

EUROPACABLE underlines that only high-quality products and installations will offer the required high level of security of supply for Europe's society.

Brussels, 24 September 2019

About Europacable

Europacable is the voice of all leading European wire and cable producers. Europacable members include the largest cable makers in the world providing global technology leadership, as well as highly specialized small- and medium sized businesses from across Europe. Globally our members employ over 80.000 people of which more than 50% in Europe, generating a turnover over € 70 billion in 2018. The product scope of our members covers the full range of energy, communication, industrial and special application cables.

Europacable is listed in the European Commission's transparency register under [453103789-92](#). We are a partner of CENELEC.