

Growing our Leadership in Submarine Market

Unique Selling Proposition in Offshore
Market

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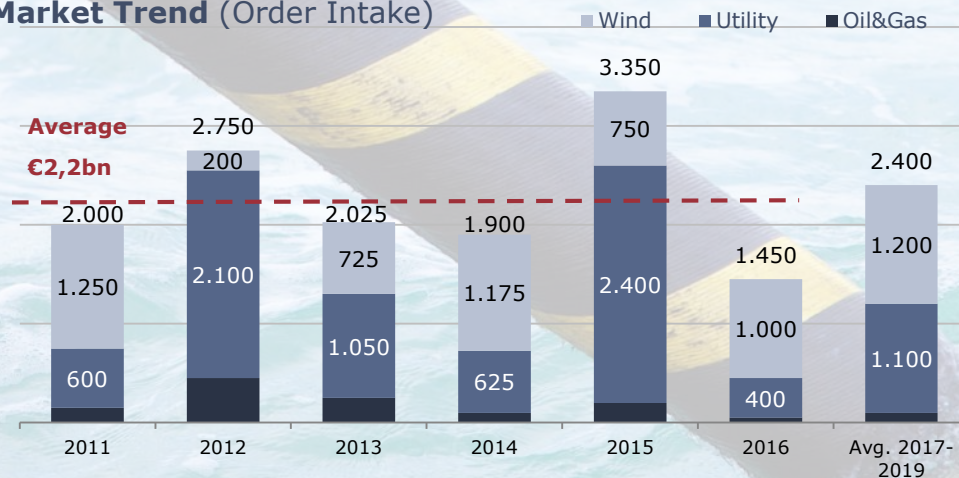


SUBMARINE CABLES MARKET

Features & trends

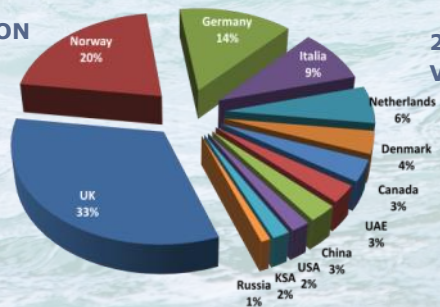


Market Trend (Order Intake)

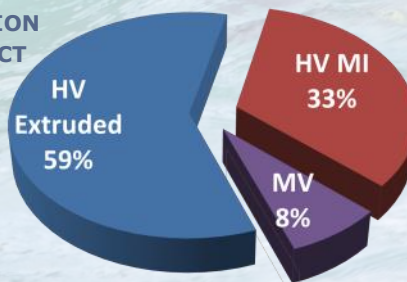


- Submarine market continues to be mainly Europe centric,
- Large interconnectors:
 - Dominated in 2015 (NordLink, NSL, NEMO: €2bn)
 - Only COBRA in 2016: € 0,25bn
 - 2017 and 2018 show a positive outlook with IFA2, FAB and Viking
- Offshore Wind activity buoyant in Europe with steady growth into the next decade with other regions initiating, particularly US and Far East. Timing of OI remains volatile.
- Total Volumes show a trend of moderate growth (in average) for the next three-five years period.

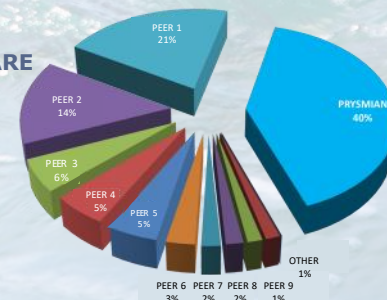
2017 PRODUCTION VALUE – GEOGRAPHICAL



2017 PRODUCTION VALUE - PRODUCT



2011-2016 MARKET SHARE



Traditional Market

Island connection
to Mainland

Interconnections enabling
arbitrage between different
energy price areas

Power from shore

New Market

Offshore Wind Energy rise

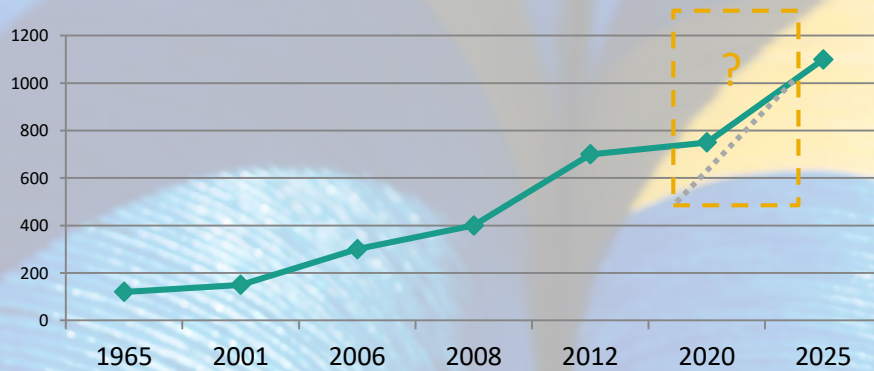
Grid access & Interarray challenges
(avoid curtailing RES development)

Interconnection targets for EU (10%)

Different regional generation and
consumption patterns (day/season)

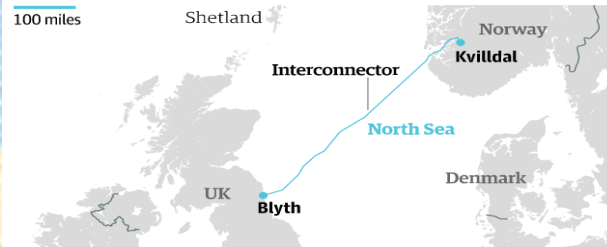
Underground & submarine lines
preferred vs. overhead by public

Project Length Evolution 1965-2025 (Fcst)



NSN interconnector

100 miles



GUARDIAN GRAPHIC

SOURCE: NATIONAL GRID

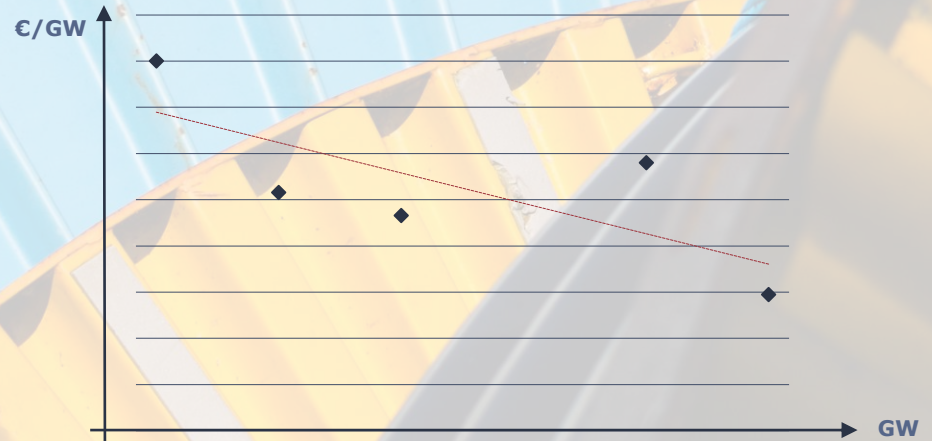
Project Length Evolution

- Since 1960's the record project length has increased almost tenfold.
- HVDC links low losses have enabled the planning of projects above the 1000km length. Implementation is still a challenge due to business reasons but it is technically feasible
- Higher voltages mean lower losses, decreasing total cost of ownership for longer links and pushing the non economic threshold to higher values
- Manufacturing technologies and Vessel Capabilities are no longer a limiting factor.

Trends in high power links

- HVDC interconnectors have been usually operated below limits but increasing energy prices and interconnection needs lead to HVDC links operating at 100% nominal load
- Offshore windfarms are pushing limits of VSC technology beyond 1000MW, whereas LCC has not reached its limits in the submarine market
- Interconnectors will require even higher power rating, thus optimizing cost benefit ratio and delivering more energy
- Cost elements: Cable, Converters, Installation, Losses, Operation, Planning & Permitting

Cost (€/GW) vs System Capacity



Technological Leadership



A higher power rating lowers the unit cost of energy

Deep Water Applications

- **High pulling forces**, long suspended weights of cable
- **Bending under tension**, on the installation vessel sheave
- **External water pressure**

Cable design parameters

- **Elongation**
- **Rotation**
- **Weight**
- **Breaking strength**
- **Joining**

Fluid filled cables
to 1000 m water depth

Mass Impregnated cables
beyond 2000 m

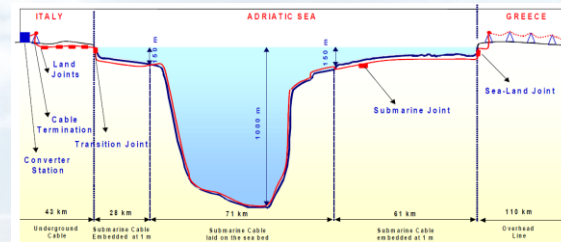
Extruded cables
up to 3000m feasible

Laying Vessel Capabilities

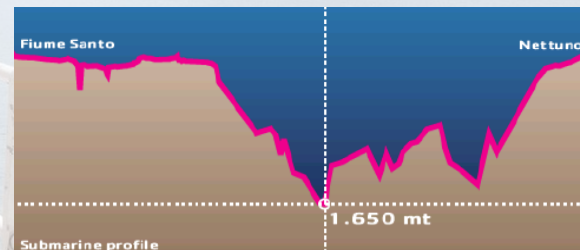


- Withstand high pulling force
- Dynamic positioning navigation system
- Rotating platform
- Loading Capability

Italy-Greece 1000m



SAPEI 1650m

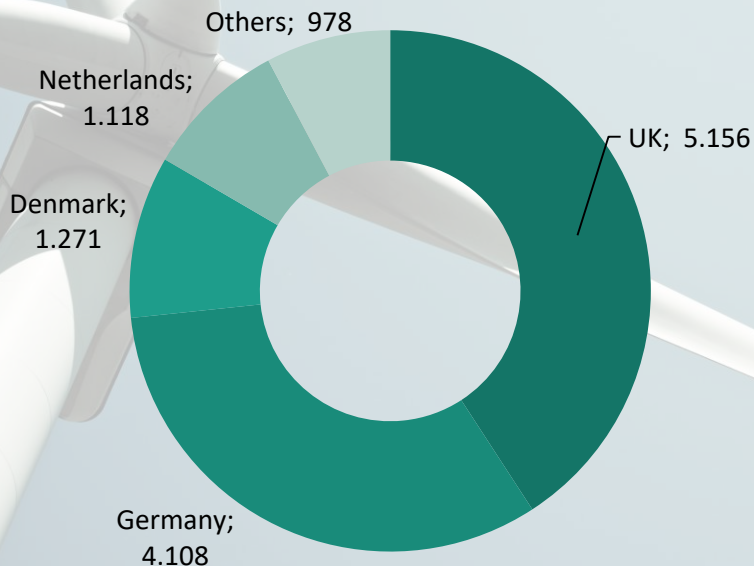


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Offshore Wind Market Scenario

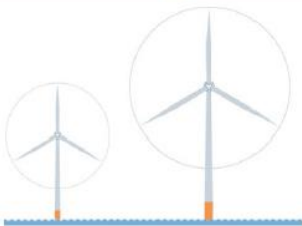


Installed Capacity (MW)



- Total installed capacity at the end of 2016 amounted on 12.6GW.
- UK and Germany representing more than 70% of total installed capacity.
- Total capacity addition in 2016 reached 1.558GW
- North Sea area represents more than 70% of total capacity installed.

Main technology drivers



Larger turbines, fewer foundations and handlings



Larger and more efficient vessels



More cost efficient O&M

Subsidies Evolution – The Danish Case

€/MWh

140

149

-32%

-50%

100

50

Anholt (2010)

Anholt (2015 prices)

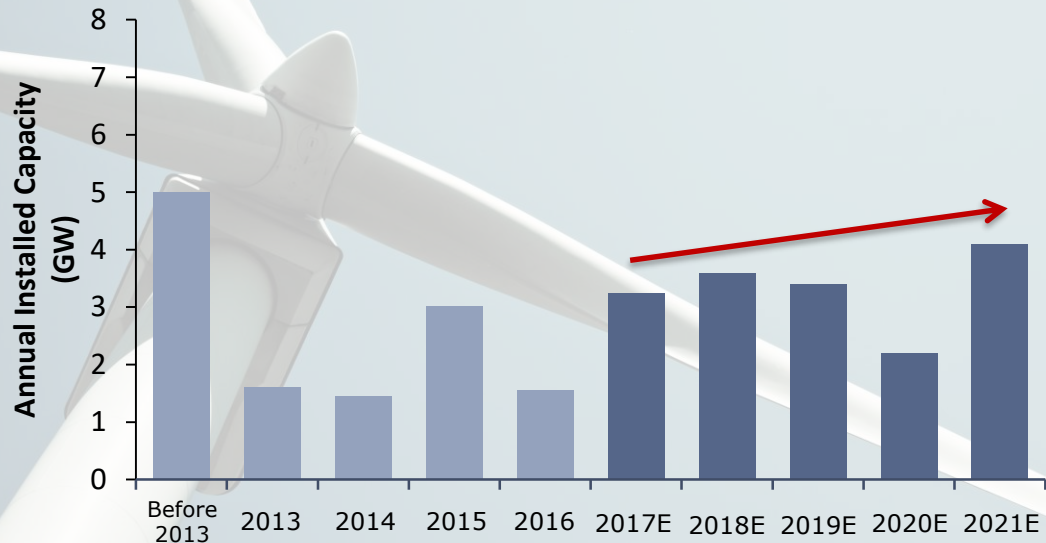
Horns Rev3 (2015)

Kriegers Flak (2016)

Main facts

- Vattenfall won the subsidy scheme at a price of €103/MWh, with **four developers** participated to the tender: Statoil, EON, Dong Energy and Vattenfall.
- Kriegers Flak was again won by Vattenfall at €49,9€/MWh among **six competitors**: Statoil/EON, DONG, SPR, WPD, EEE, EnBW

Project pipeline five year outlook



Source: WindEurope

Capacity Installation Trend

- Robust project pipeline. Market is demonstrating a stable outlook at the moment.
- Market will be driven by cost effectiveness
- 24GW of projects already obtained consent to construct
- North Sea will remain the main region for Offshore Wind deployment, followed by Baltic sea.

General Overview – Developers' OWF Business

- Developers are predominantly utilities
 - Most have mature generation businesses based on conventional (coal, gas) and onshore wind power generation
 - Many have retail businesses selling energy and/or electricity
 - Most have a dedicated renewables unit focused on development of onshore and offshore generation projects and technologies
- The cost of an offshore wind farm is significant, leading even the biggest utilities to seek investment partners and/or finance to fund the construction

DONG
energy

e-on

edp renewables
powered by nature

EDF
energies nouvelles

VATTENFALL

IBERDROLA
RENEWABLES

GDF SUEZ is now
ENGIE

RWE
The energy to lead

Early Concept
/ Licensing

Financial
Closure

O&M

Bid for States'
subsidies

Construction

- CAPEX Value of ~ 2bn€
- Current size of 0,8 to 1,2 GW

PRYSMIAN GROUP

The worldwide leader in the
cable industry





Prysmian PowerLink

- Responsible for global submarine cable system solutions
- Undisputed market leader



Product Portfolio

- Medium Voltage, HVAC and HVDC solutions
- Extruded and paper insulation technologies
- Voltage levels up to 700kV



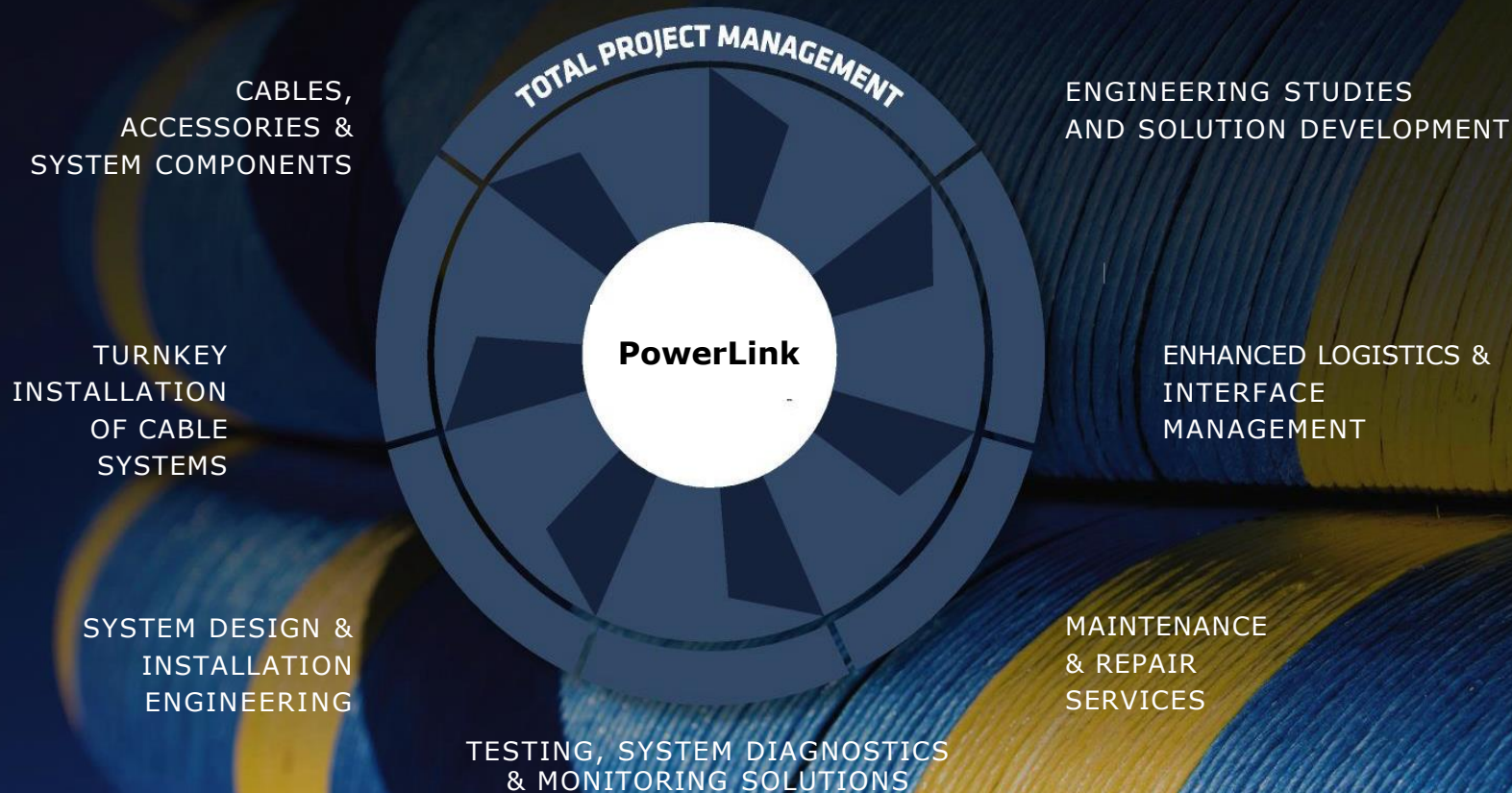
Organization

- Integrated worldwide organization
- HQ located in Milan, Italy
- Regional offices worldwide.



Business Model

- EPC contractor capability
- Realization of full turn-key projects
- Unique manufacturing and installation asset base



Strengthening production ...



Wrexham (UK)



Pikkala (Finland)



Arco Felice (Italy)



Drammen (Norway)



Total Production Capacity:

- XLPE/P-Laser: 750 km/y (+ 400 km/y land cables)
- Paper/PPL: 550 km/y

Cable lay and installation vessels

Best of class vessels and equipment providing extended project versatility

Wide ranging **track record and global experience**

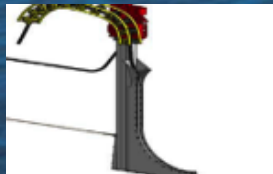
Deep water installation capability **up to 3,000 m**

Shallow water and near shore installation solutions

In-house cable protection



Heavy duty plough



Vertical injector



Jetting machines



Hydroplow



Giulio Verne



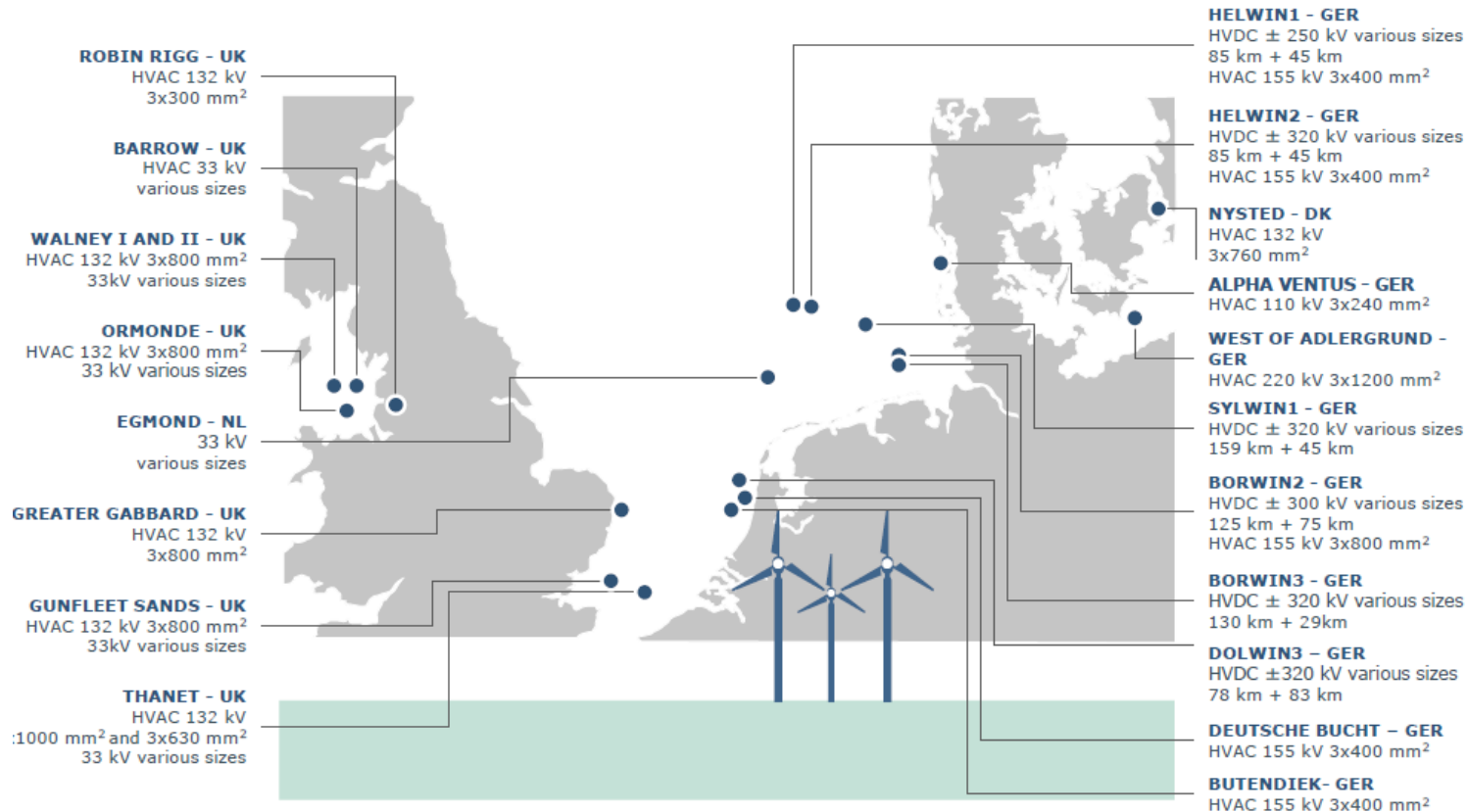
Cable Enterprise



Ulisse

Hydroplow
movie

Consolidated track record in offshore wind farm



One-stop solutions provider

Total System Provider for the Offshore Wind market with the largest in-house cable production and installation capability

- Complete control over the **entire supply** chain from solution development to cable design and production, installation and burial, project management, jointing and testing, maintenance and repair services, and monitoring and system diagnostics solutions.
- High degree of **flexibility**, able to guarantee a tailor-made proposal for each customer (both bundled and unbundled offers)

Technology leadership

Superior submarine cable systems technology, undisputed leader by market and capabilities & unique track record of submarine cable projects

- Superior **cable system technology** (whether it is AC or DC, MV or HV cables)
- With the largest cable manufacturing capacity in the world, our presence and industrial footprint ensure that we can serve our **customer everywhere** in the world together with knowledge and flexibility to adapt the solutions to local market requirements.

Installation capabilities

Best of class vessels and equipment providing extended project versatility

- Widest and complete **fleet** of cable laying vessels in the market able to provide solutions for all segments (export cables, inter-array and interconnectors), from shallow up to the deepest water.
- Advanced **burial tools**, able to guarantee the adequate level of protection in all type of soils and depths.

Integrated worldwide organization

Proven financial solidity, ethics & integrity and heritage of installing and manufacturing submarine cables for more than 130 years.

- A sustainable **business partner** with solid financials, ethics, corporate governance, and people value practice at the highest level in the industry.
- **Heritage** of installing and manufacturing of submarine cables for more than **130 years**.

66kV EPR Interarray Cable System



Light and cost effective

Monitoring & Maintenance Solutions



Efficient operation and diagnostics

HVDC Technologies & Higher Voltages



XLPE
P-Laser
MI
PPL

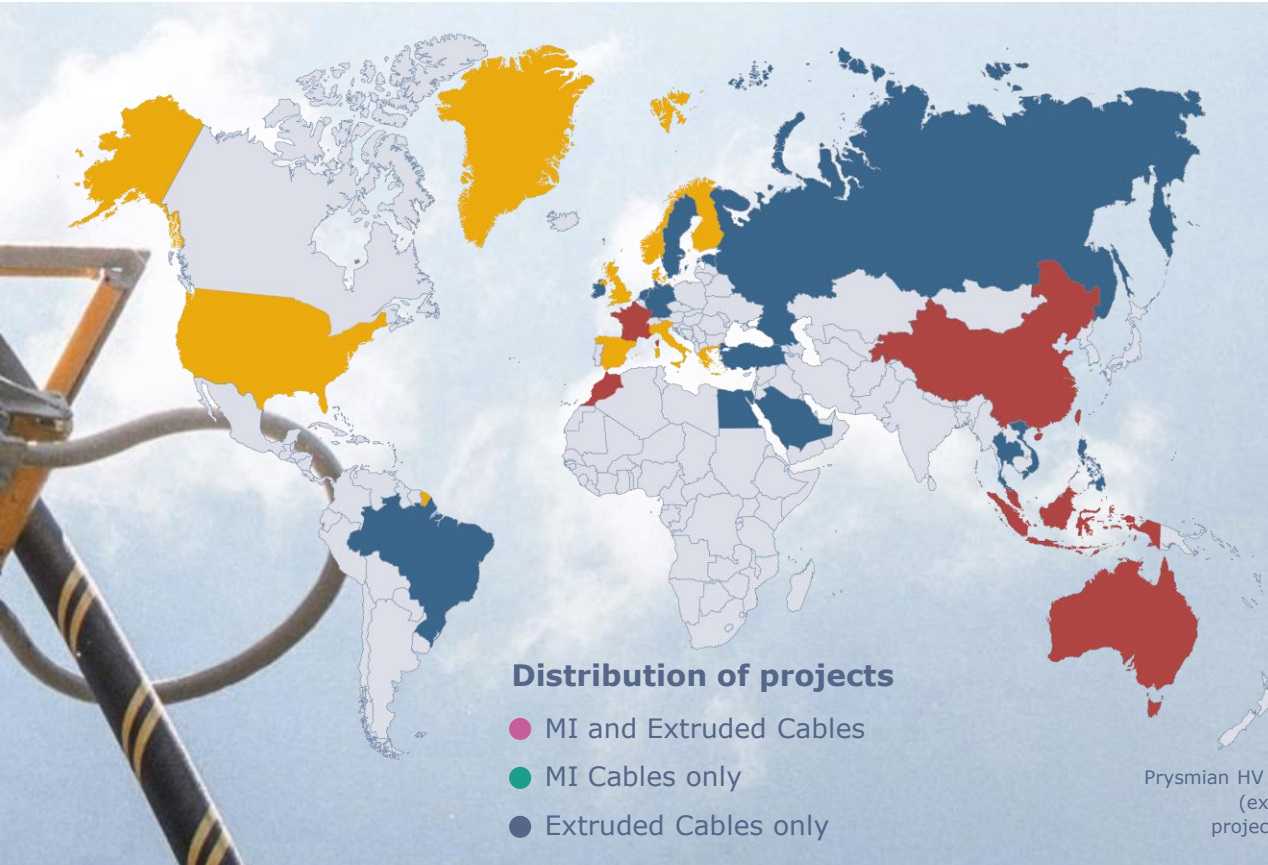
High power cost savings

Solutions for future applications



Innovative HVDC concepts

Interconnections: Focus on HVDC Submarine Cable Systems



COUNTRY	EXTRUDED	MI
GERMANY	2,750	0
ITALY	73	964
UNITED KINGDOM	526	1,419
USA	185	106
DENMARK	406	107
NETHERLANDS	390	0
SPAIN	136	245
NORWAY	48	470
GREECE	109	84
AUSTRALIA	0	295
SOUTH KOREA	0	192
PHILIPPINES	66	0
FRANCE	0	176
FINLAND	67	10
TOTAL	5,031	4,266

Prysmian HV submarine power cables (extruded/MI) in operation/projects in progress worldwide



XLPE

- ± 600 kV
- 3,000 MW @ 70 degC
- VSC (LCC up to 250 kV)
- Need degassing to reduce chemical by-products (cause of space charges)

P-Laser

- ± 525 kV
- 2,700 MW @ 90 degC
- Both LCC and VSC
- No post-insulation treatment, fully recyclable insulation

MI paper

- ± 525 kV
- 2,400 MW @ 55 degC
- Both LCC and VSC
- Need impregnation

MI-PPL

- ± 700 kV
- 3,400 MW @ 80 degC
- Both LCC and VSC
- Need impregnation

- **Solid market fundamentals: The off-shore wind market will be a sound contributor to the submarine cable industry during the next decade**
- **Prysmian is committed to achieve the leadership in all the segments of the global submarine market: the Off-shore Wind market is a challenge and an opportunity to grow.**
- **One-stop shop with full vertical integration: Prysmian unique strategy in the Off-shore Wind cable industry.**
- **Prysmian offers technically leading products both for the interconnector and off-shore wind markets**

Prysmian
Group

 **ffshore**
WIND ENERGY 2017
LONDON 6-8 JUNE

Thank you

