



YASKAWA

ENVIRONMENTAL ENERGY

VILLE PARPALA
Director, Product Marketing, Marine Solutions

HISTORIIKKI

TUOTTEET TÄNÄÄN

THE SWITCH NYKYTILANNE

MITEN MENI OMASTA MIELESTÄ

COMPANY HISTORY

- **1988 University Research since**
- **1996 Company Established by Jarmo Alamäki Rotatek Finland Oy**
- **2001 Majority of the shares to Vacon Oyj (1 employee)**
- **2004 VNT-management and other investors take the hold of the company (4 employees)**
- **2006 Joins in consortium later named The Switch (~10 employees) TO: 10MEUR**
- **2014 Yaskawa Electric Corporation purchases all company shares**
- **2016 The Switch acquires Marine Drives division from Wärtsilä**
- **2018 The Switch nominated to Environmental Energy Division**
- **2020 Yaskawa & City of Lappeenranta invests for factory extension 6 MEUR in LPR**

THREE INNOVATIVE COMPANIES 2006

- The Switch Electrical Machines Ltd
- The Switch High Power Converters Ltd
- The Switch Controls and Converters Ltd



TUOTTEET TÄNÄÄN

YASKAWA PRODUCT PORTFOLIO

Drives

Inverter
Low & medium voltage



Motion

Servo / Controller



Best-in-class
products

Control

PLC / HMI / I/O

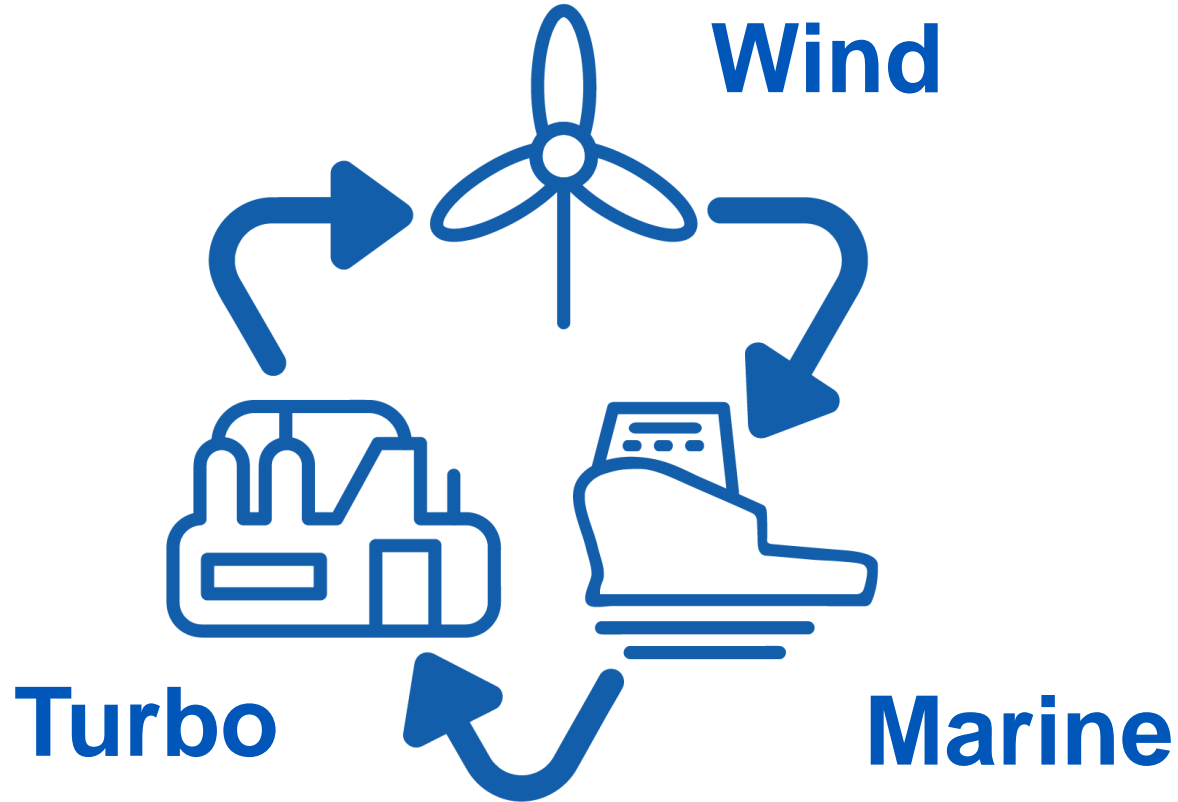


Robotics

Robots / Systems / TCS



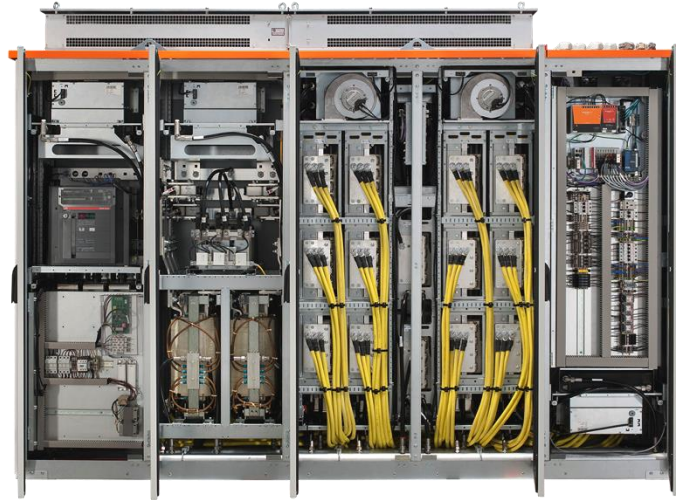
THE SWITCH BUSINESS FOCUS



CONVERTER SCOPE



Yaskawa drive
200 kW – 2 MW



Full-power converter
500 kW – 8 MW



Marine drives
800 kW – 11 MW

PERMANENT MAGNET MACHINE SCOPE

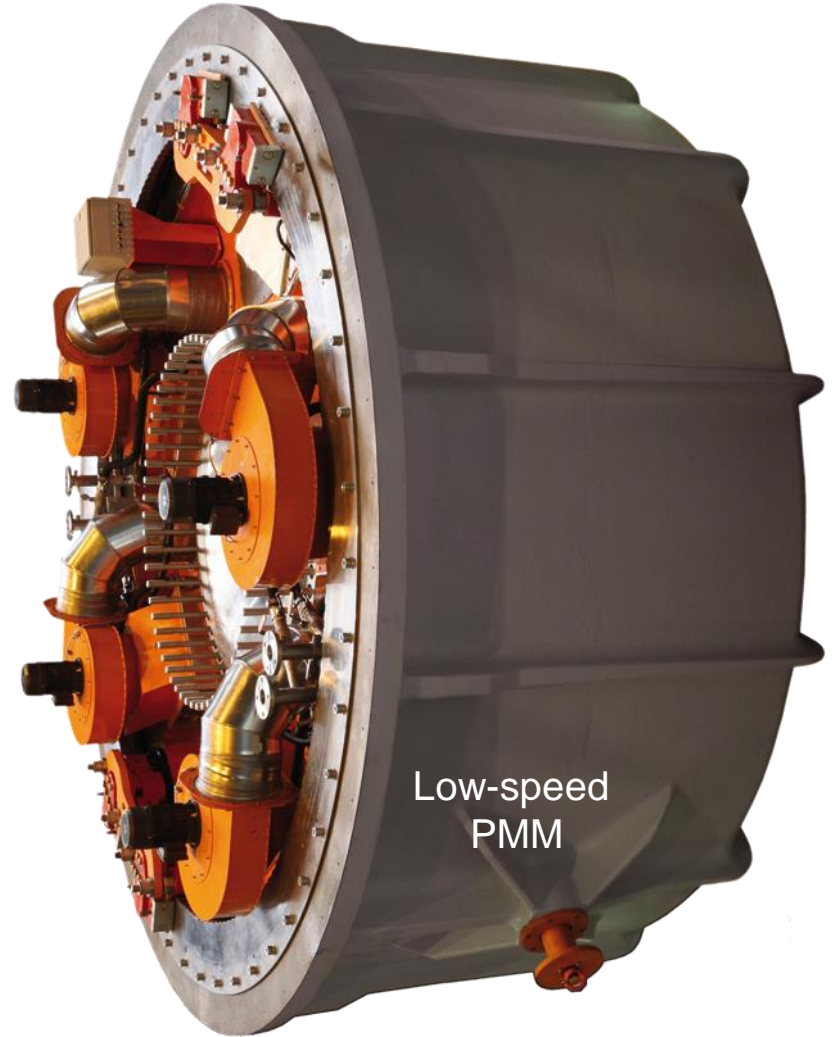
1–10+ MW



High-speed
PMM



Medium-speed
PMM



Low-speed
PMM

SHIFT IN TECHNOLOGY OFFSHORE WIND

10 biggest wind turbines in 2001 *

Turbine model	Power [kW]	Technology
Enercon E-112	4500	Conventional
GE Wind 3.2s	3200	Conventional
Vestas V-90	3000	Conventional
Nordex N-80	2500	Conventional
NEG Micon NM2000	2000	Conventional
Vestas V-80	2000	Conventional
Dewind D8	2000	Conventional
Enercon E-66	1800	Conventional
Vestas V-100	1800	Conventional
Vestas V-82	1650	Conventional

10 biggest wind turbines in 2018 * *

Turbine model	Power [kW]	Technology
GE Haliade-X***	12000	PM DD
MHI Vestas / V164	9500	PM MS
Siemens SWT 8.0	8000	PM DD
Enercon E-126 (onshore)	7500	EESG DD
Goldwind GW154	6700	PM DD
Senvion 6.2 M152	6150	DFIG
Sinovel SL6000	6000	DFIG
GE Haliade 150	6000	PM DD
Ming Yang SCD 6.0	6000	PM MS
Dong Fang / Hyundai 5.5MW	5500	PM HS

PM = permanent magnet generator, **DFIG** = double fed induction generator, **EESG** = electrically excited synchronous generator
DD = direct drive, **MS** = medium speed, **HS** = high speed

* Source: Wind turbine market 2001, special report, Germany 2001

** Source: Wind Power Monthly magazine and The Switch

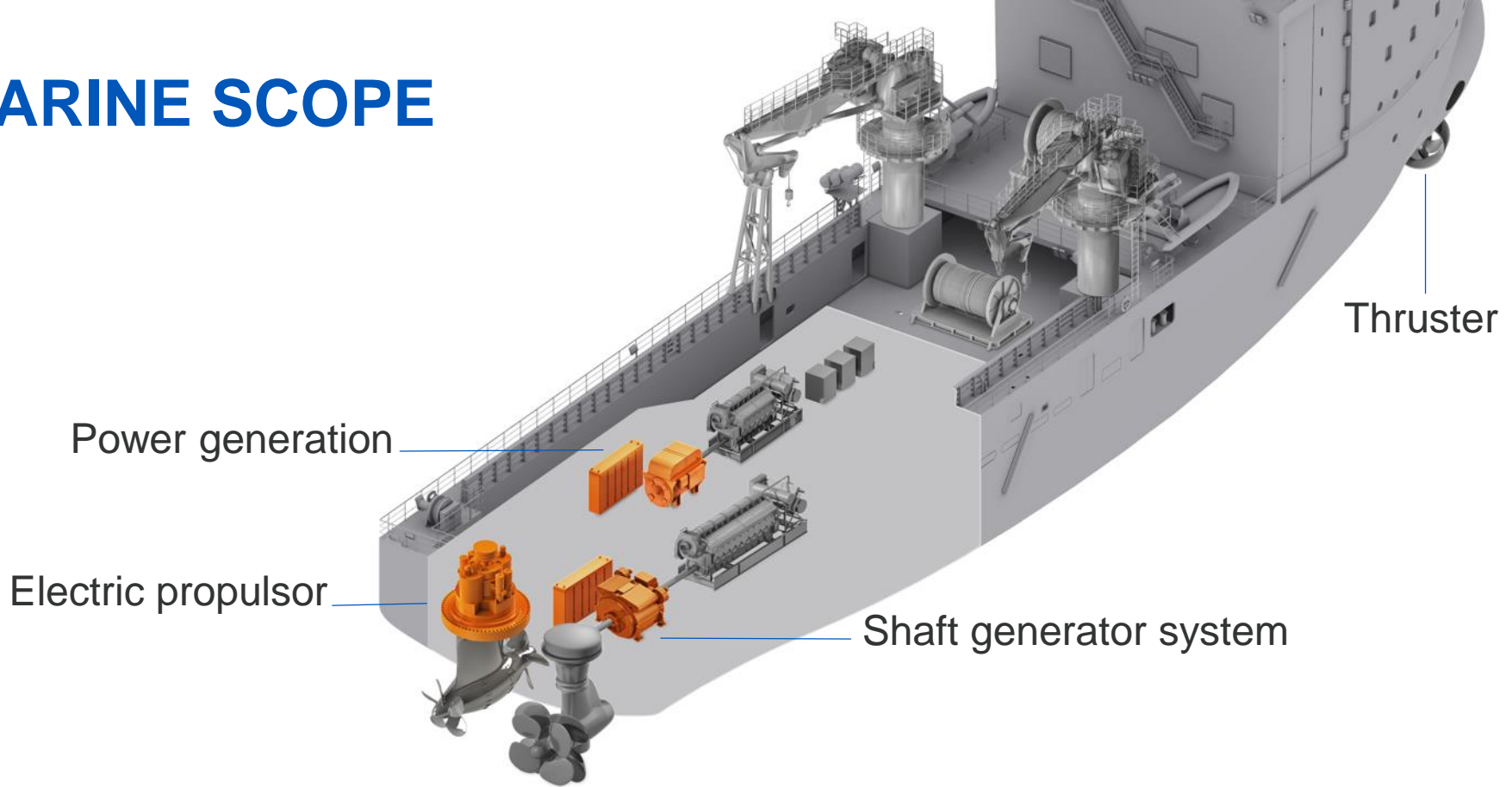
*** Not in market yet

MIND FOR MARINE



Now we're on course to change the game for marine drive trains – and bring the benefits of our technology there.

MARINE SCOPE

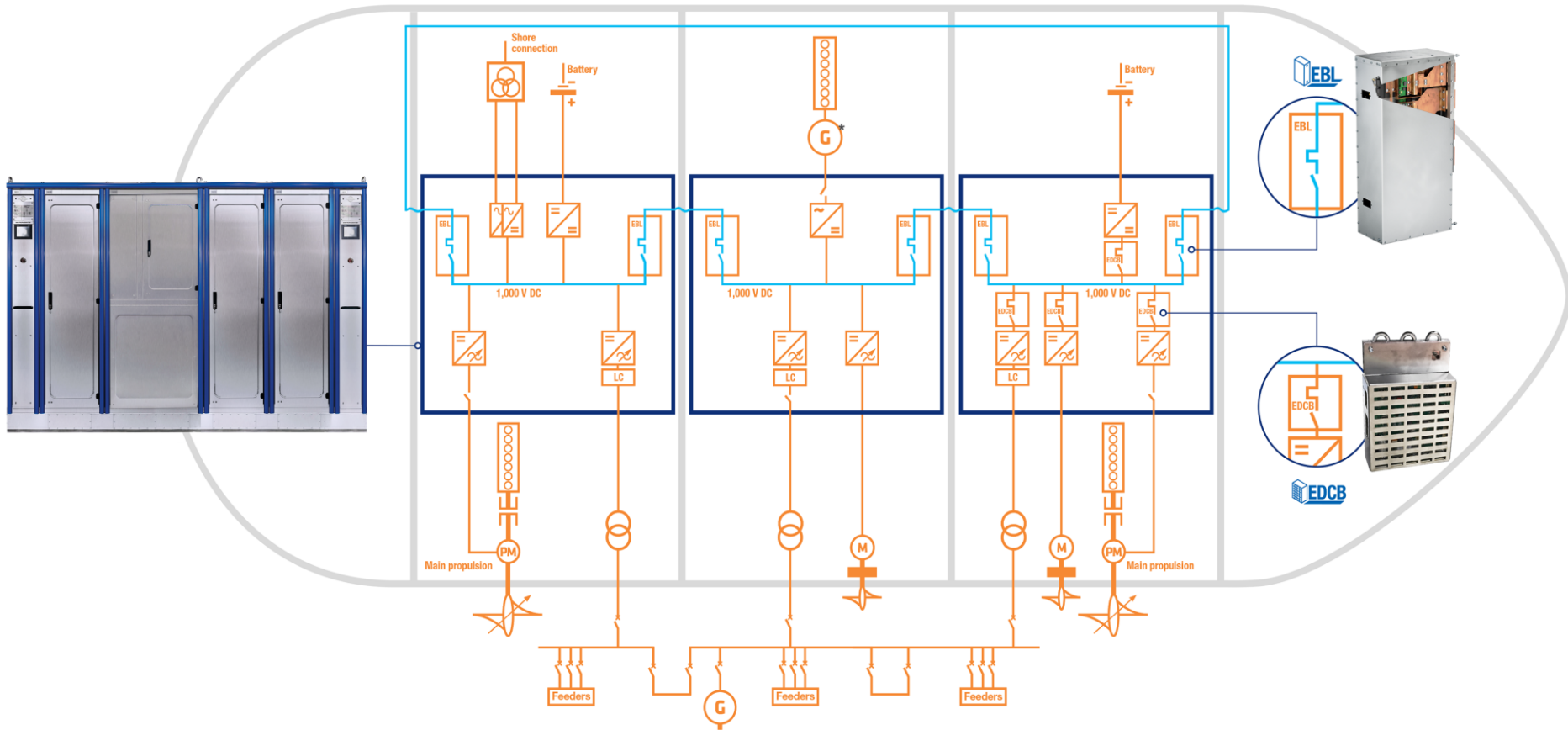


CONVERTER SCOPE

400 V–690 V, 800 KW–11 MW



DC-HUB

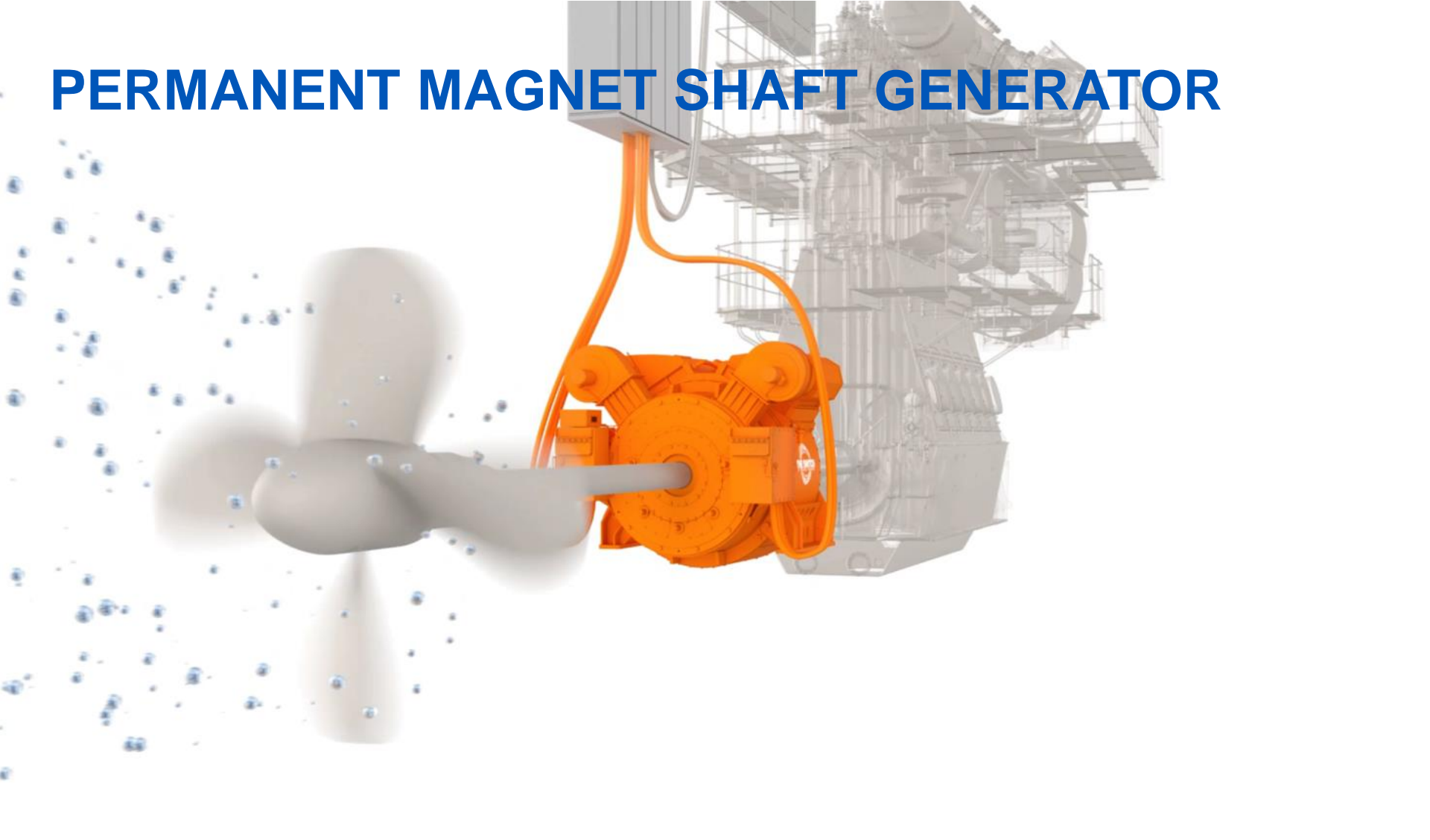


MARINE REFERENCE

North Sea Giant is first to install our innovative Electronic Bus Link (EBL), allowing the vessel to run just one diesel engine rather than the three used at all times earlier. This saves fuel, emissions and maintenance



PERMANENT MAGNET SHAFT GENERATOR



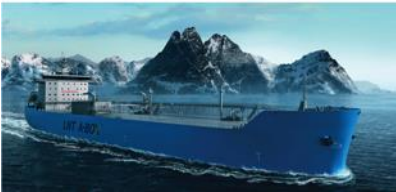
EXISTING PM SHAFT GENERATOR REFERENCES



Owner	Toll Shipping
Type of vessel	12,000 dwt RORO vessels
WE Tech Solution	Efficient power distribution with direct-drive PM shaft generator



Owner	Wallenius Shipping
Type of vessel	Post-Panamax-sized pure car and truck carrier (PCTC)
WE Tech Solution	Direct-drive PM generator



Owner	Saga LNG Shipping Pte. Ltd.
Type of vessel	45,000 m ³ LNG carrier
WE Tech Solution	Efficient power distribution with PM shaft generator



Owner	Termtank Rederi A/S
Type of vessel	15,000 dwt product tankers
WE Tech Solution	Direct-drive PM shaft generator

Orders received from WE Tech Solutions

EXISTING PM SHAFT GENERATOR REFERENCES



Owner	ESL Shipping
Type of vessel	25,600 dwt dual-fueled handysize bulk carriers
WE Tech Solution	Direct-drive PM shaft generator



Owner	Stena Line
Type of vessel	ROPAX ferries
WE Tech Solution	Efficient power distribution with PM shaft generator



Owner	Rederiet Stenersen
Type of vessel	17,500 dwt chemical tankers
WE Tech Solution	Efficient power distribution with direct-drive PM shaft generator



Owner	Ektank AB
Type of vessel	18,600 dwt chemical tankers
WE Tech Solution	Direct-drive PM shaft generator

Orders received from WE Tech Solutions



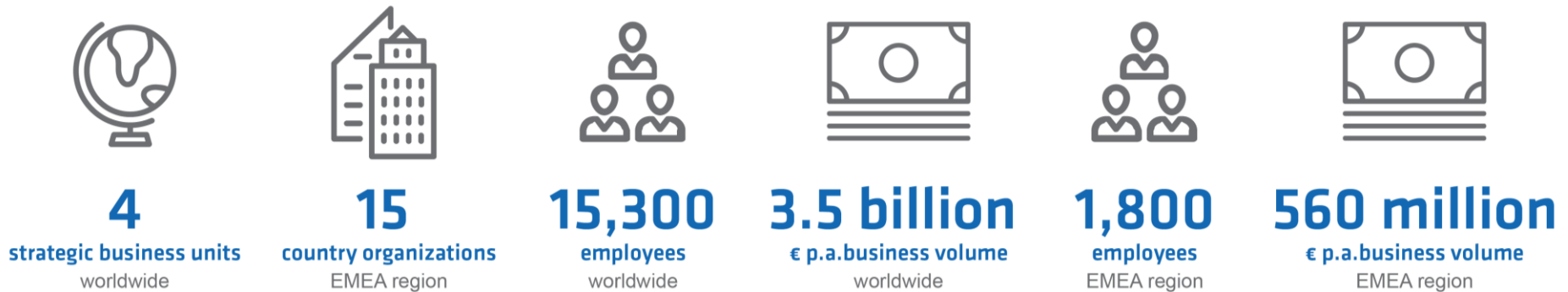
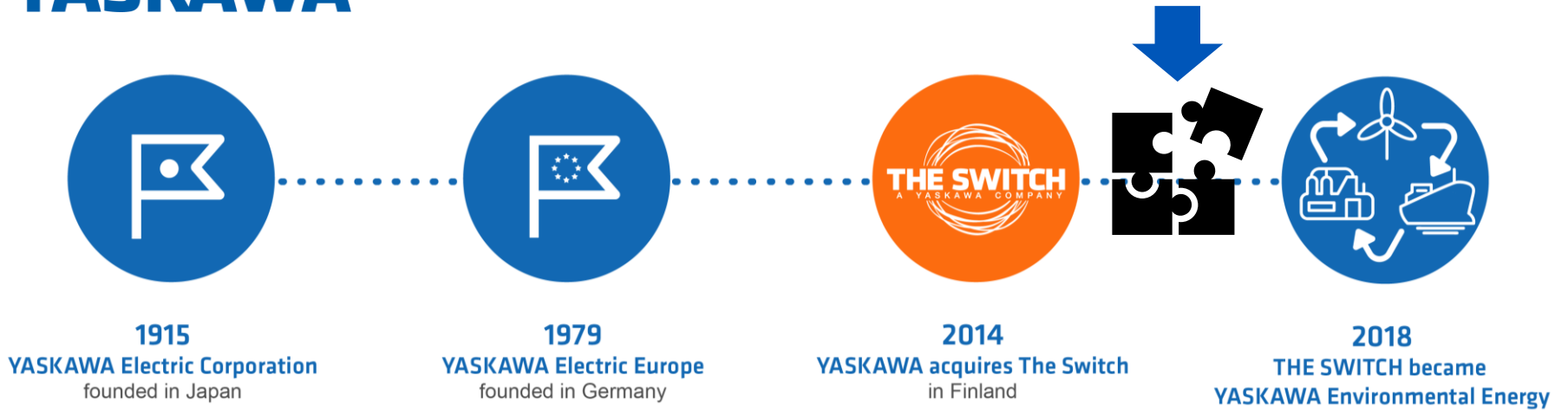
REFERENCES IN MARINE



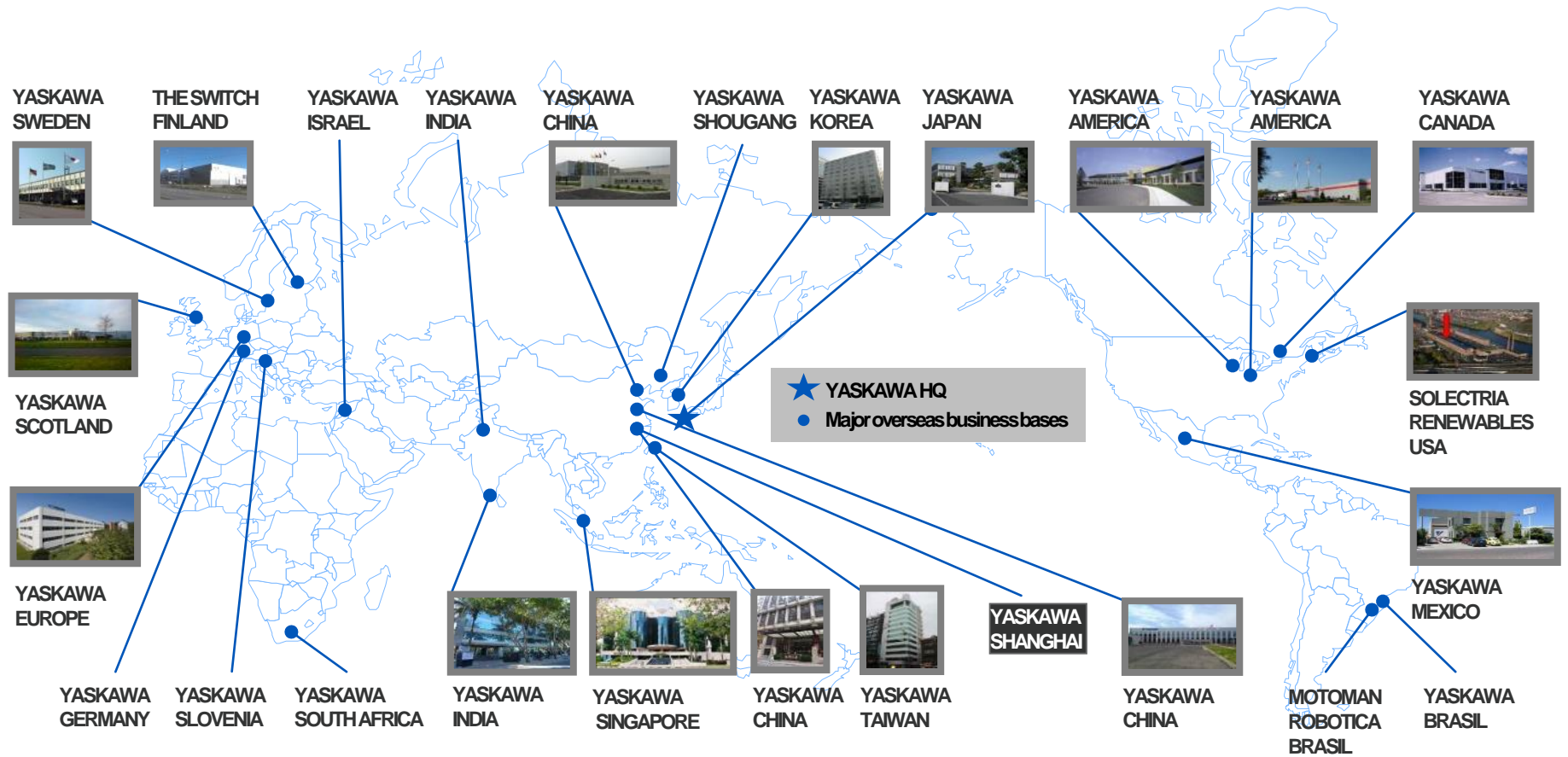
NYKYTILANNE

YASKAWA

The Switch acquired Wärtsilä Marine Drives in Stord 2016



YASKAWA – GLOBAL NETWORK



ABOUT YASKAWA ENVIRONMENTAL ENERGY

Founded in 2006 as The Switch



Main focus on wind, marine and turbo applications



~220 employees

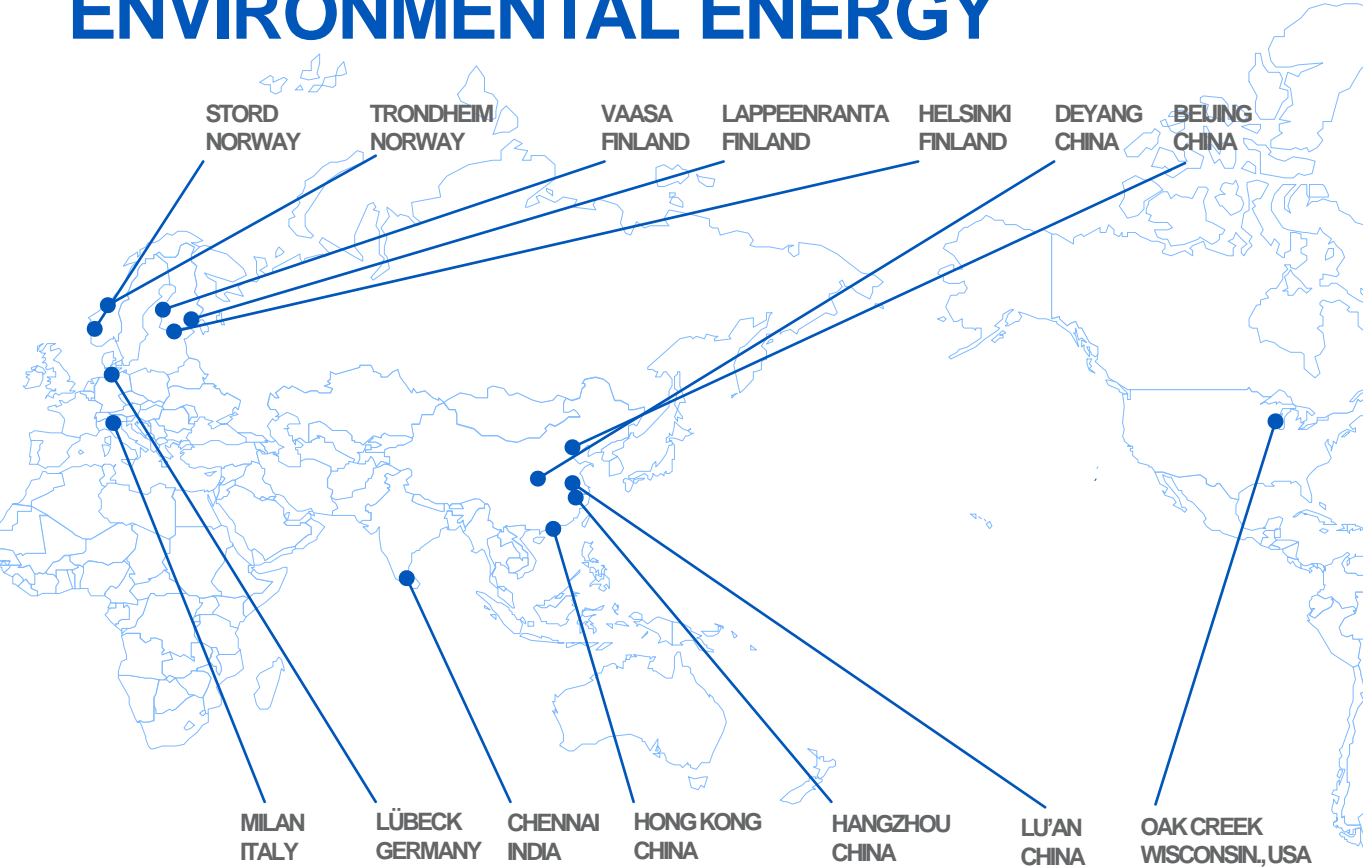


~15,000 MW installed power capacity



Over €70 million net sales 2017

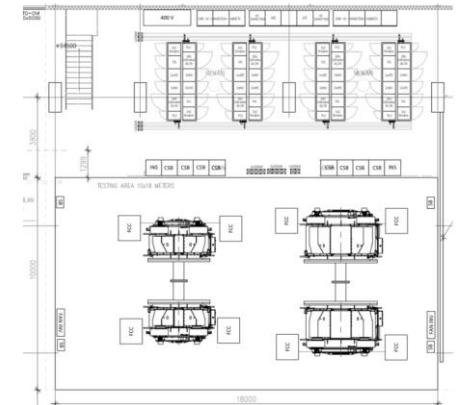
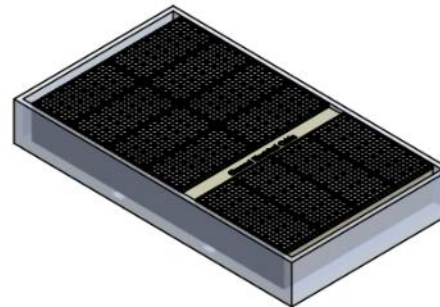
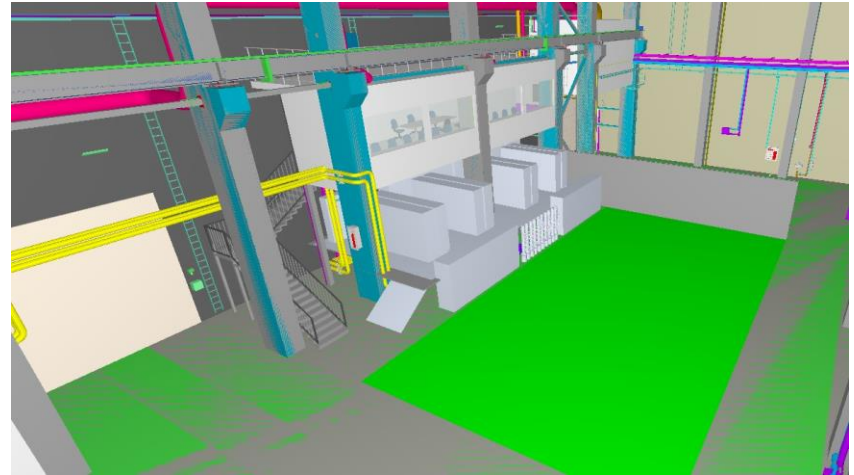
YASKAWA ENVIRONMENTAL ENERGY



LPR FACTORY ENLARGEMENT

Large Drive Test Centre

- Machine testing up to 12 MW
- Two independent testing fields
- Will be upgraded to 18 MW later
- Test field area 10m x 18m
- New testing transformer 2500 kVA, upgradable to 3000 kVA
- Lifting capacity 80t
- Reserved capacity for 50t
- 3.2 million€ investment on LDTC testing systems



LAPPEENRANTA FACTORY



MITEN MENI OMASTA MIELESTÄ?

PIRUN HYVIN! 😊

YASKAWA

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