Offshore Wind Power HVDC Stations & Its Impacts on Marine Biodiversity

2023-06-01

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Who we are

Hitachi Energy

The world in 2050

Climate change extremely urgent and important to limit global warming to

1.5°C

World population reaches

~10bn

(up from 7.8bn people in 2021)

Global demand for steel is projected to

increase

by more than a third through to 2050

Internet of Things expands to

24bn

interconnected devices vs. 10bn connected devices today

Rapid growth in EV sales rises to

62M

units p.a. globally – up from 6.4M in 2021

Global electrification will be more than

50%

of total energy demand – up from around 20% today

Urbanization increases with

68%

of world population living in cities – up from 55% in 2018

Markets we serve

Utilities

Partnering with utilities for ~130 years from generation, to transmission and distribution

Renewables

Accelerating renewable integration with strong installed base

Industries

Supporting industrial customers to electrify the entire energy value chain

Transportation

Enabling society to meet sustainable mobility demands in air, land, water and rail

Data centers

Providing the data center industry with reliable power connection and eco-efficient solutions

Smart Life

Advancing sustainable energy for industry and society with solutions that reduce waste and CO_2 footprint

Our Purpose and Our Heritage

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"Electricity will be the backbone of the entire energy system

Advancing a sustainable energy future for all

We are advancing the world's energy system to be more sustainable, flexible and secure.

As the pioneering technology leader, we collaborate with customers and partners to enable a sustainable energy future – for today's generations and those to come.

Sustainable (Green)

Enabling a carbon-neutral energy system through renewable integration, highly efficient end-to-end electrification including industry and transport, and our eco-efficient portfolio.

Flexible (Smart)

Enabling energy systems to actively minimize consequences of unexpected failures.

Secure (Strong)

Ensuring safe & secure mission-critical infrastructure with expert services and a flexible cyber and physical security offering.

Scalable. Reliable. Resilient. Digitized.

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Sustainability 2030

Our Targets

Planet

Carbon-neutral in our own operations

↓ 50% CO_2 emissions along the value chain
↓ 50% waste disposed
↓ 25% freshwater use
↓ 25% hazardous substances and chemicals

Decarbonized society
Climate Change Mitigation/Adaptation

Resource Efficient Society
Saving and Recycling Resources

Harmonized Society with Nature
Preservation of Ecosystems

People

Zero harm
Top quartile health absence rates
Life-long learning culture
Increase female diversity from 19% to 25% by 2025

Peace

Zero incidents of corruption and bribery

Partnerships

Increase involvement in multi-stakeholder partnerships

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Drivers behind the study

- ❑ Increasing requirements from customers and stakeholders in biodiversity impact
- ❑ Greater expansion of offshore wind power generation
- ❑ Upcoming legislative trends on biodiversity

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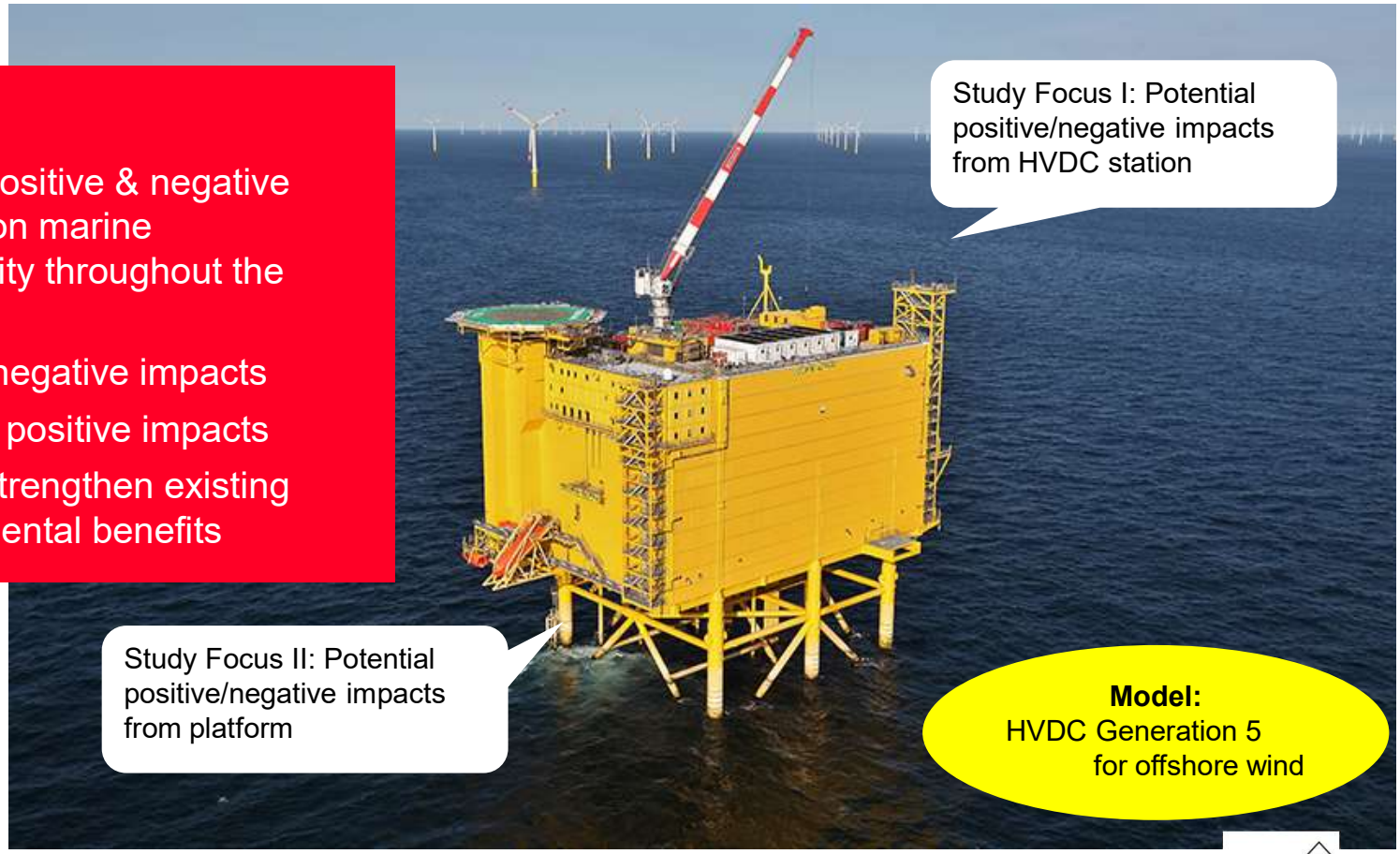
Objectives:

- Identify positive & negative impacts on marine biodiversity throughout the lifecycle
- Mitigate negative impacts
- Enhance positive impacts
- Further strengthen existing environmental benefits



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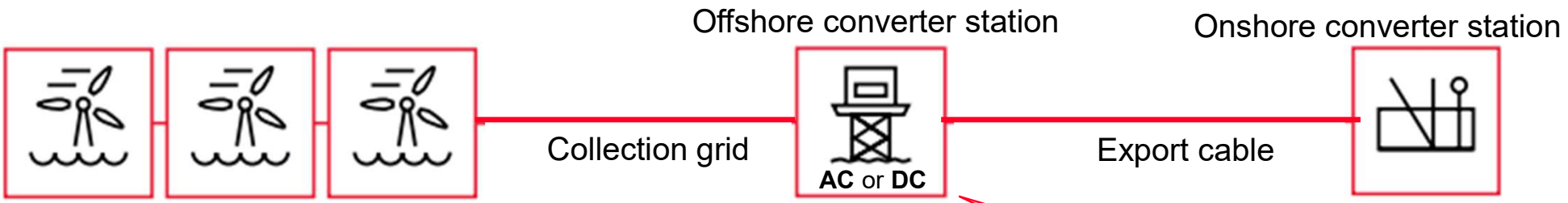
What is offshore wind convertor station?



- Renewable energy is transformed to high voltage at an offshore substation for transmission to shore to reduce power losses
- A converter station is used for High- Voltage DC (HVDC) connection to shore

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Model:
HVDC Generation 5
for offshore wind

Power/ Voltage Rating	**1400 MW/320kV 2000 MW/525kV**
Life Time	• **40 y for HVDC system** • **25-30 y for platform**
Offshore Platform Size	• **~70 m x 40 m x 40 m (for 320 kV)** • **~100 m x 80 m x 50 m (for 525 kV)**
Maintenance Interval	**2-3 years**

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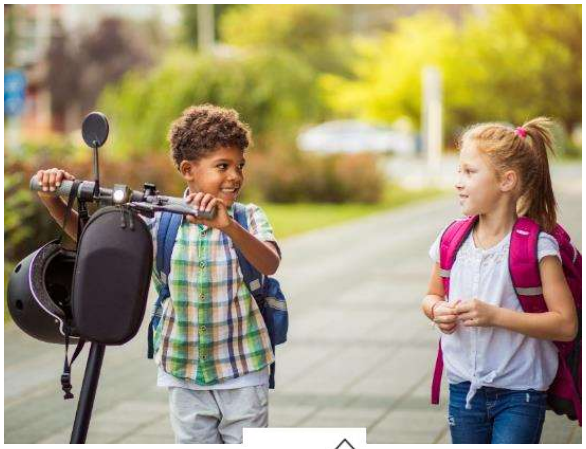
Challenges

- Lack of previous studies on impact of substation and platform
- Knowledge buildup needed quickly to facilitate fast expansion of wind power

Opportunities

- Support customer expectations around forthcoming marine legislations
- Biodiversity net gain



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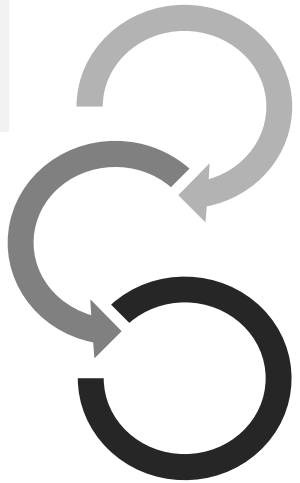
Current Understanding (as of September 2023)

01 Negative impacts	Countermeasures, such as silt curtains, against acoustic disruption and sediment dispersal could be considered during platform construction and decommissioning phases
02 Positive impacts	Operation phase could enhance biodiversity by the emergence of new habitats such as artificial reefs. However, it can also become a concern if such habitats introduce non-indigenous species and creates an imbalance in the ecosystem
03 Processes	Baseline of the ecosystem status should be well understood for each location of the installation. Monitoring measures need to be deployed to ensure no-harm to the marine biodiversity



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