

P2X asset management

Experiences from an established topic in a new industry

At the Capital Markets Day in June 2021, we set a new 2030 aspiration to become the world's leading green energy major

Become the world's leading green energy major



One of the world's largest **green electricity** producers

Global no. 1
in offshore wind

Significant player
in onshore renewables

A global leader
in P2X



One of the world's largest and **we are creating deployers of**

1

Execute and expand **current pipeline of 2-4 GW** in close collaboration with key offtake partners

2

Pursue global opportunities across our growth platform in Europe and USA

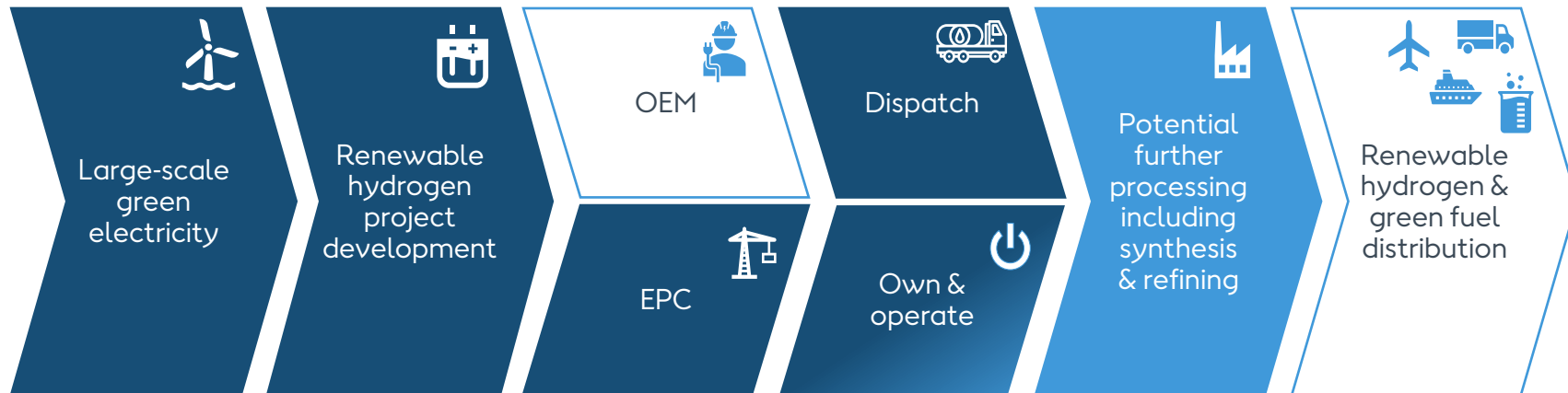
3

Lean forward into selected value chains to drive deep decarbonization together with key offtake partners

VALUE CHAIN | Within P2X, Ørsted will lean forward into selected value chains to drive deep decarbonisation

Ørsted value chain focus for renewable hydrogen and green fuels

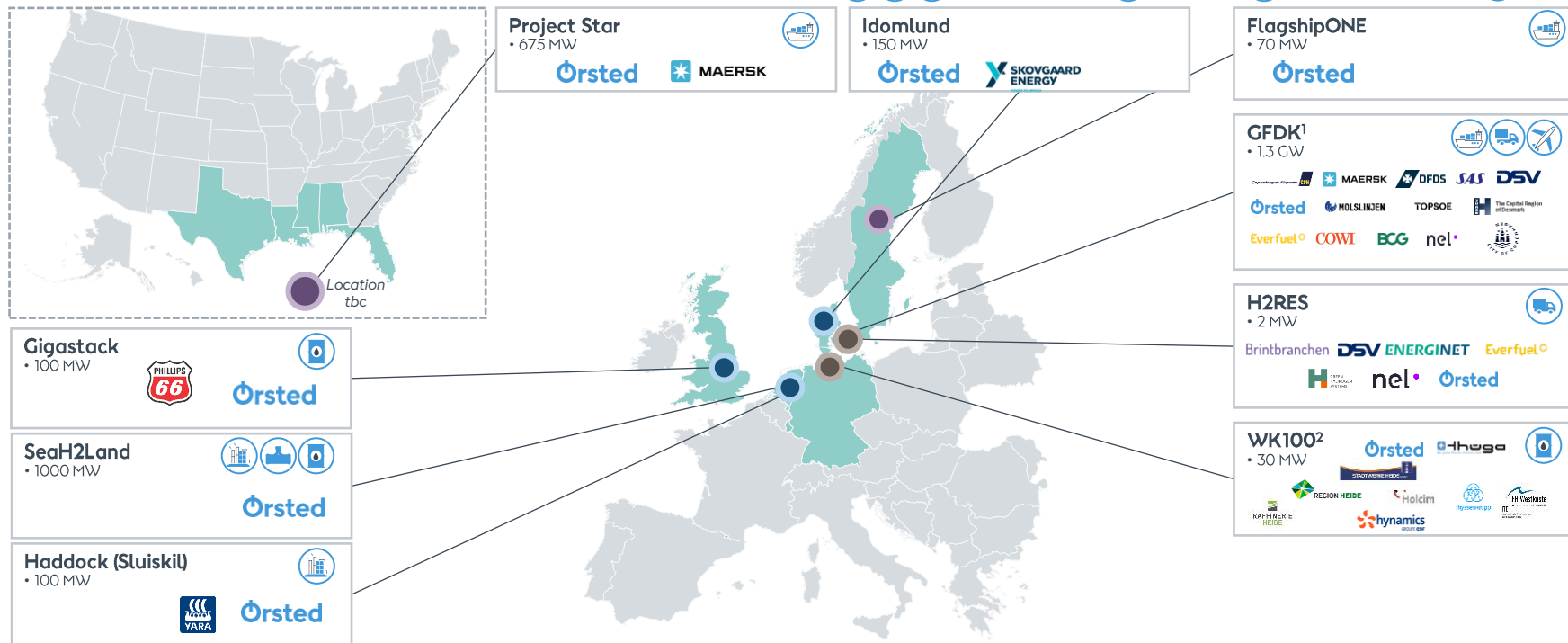
■ Ørsted current focus ■ Ørsted will lean into selected renewable H₂ and green fuel value chains



P2X PORTFOLIO | Ørsted has a diverse range of global projects and a pipeline of 2-4 GW involving many partners and key stakeholders

Product: ● Hydrogen ● eMethanol ● Multiple

Offtake segment(s): Heavy transport Refineries Chemicals & fertilizers Steel



What is asset management and what does it mean for P2X?

Formal (ISO¹) definition

“Coordinated activity of an organisation to realise value from assets”

An interpretation of what asset management entails in the context of P2X

“Active ownership of assets to ensure FID business case value is achieved, lifetime economic profit is maximised and assets are operated in a safe, compliant and reputable manner””

Fundamentally, value is created differently in P2X and renewables

Archetypical attributes



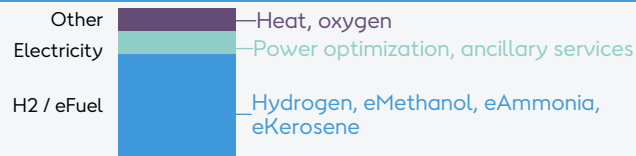
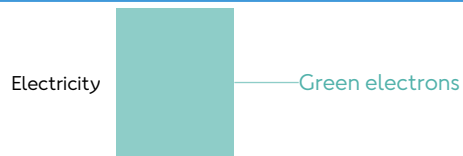
Renewables



P2X

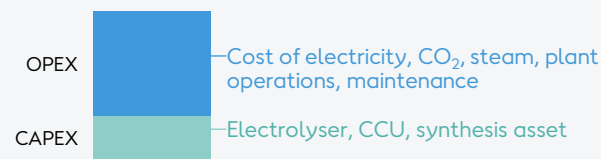
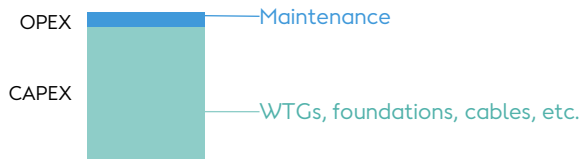
Revenue split

ILLUSTRATIVE



Lifetime CAPEX/ OPEX split

ILLUSTRATIVE



Cost and revenue dynamic

- Cost of production: **Low to moderate ability to influence post COD**
- Production volume: **Low ability to influence** beyond COD given sun/wind yield

- Cost of production: **Moderate-to-high ability to influence** due to dispatching trade-offs and process optimisation to increase yield
- Production volume: **Moderate ability influence**; active operations determines production volume and yield

Risk type

- Safety risk: Occupational health during construction and maintenance
- High impact risk events: Installation accident, turbine failure, cable destruction

- Safety risk type: Process safety during operations and occupational health during construction, operations and maintenance
- High impact risk events: Leaks or operations outside safety window leading to chemical release or explosion, accidents during construction and O&M

Current state of the P2X industry creates both opportunities and challenges for asset management

Not exhaustive

Opportunities



Complexity of operations with renewable feedstock:

- To keep the cost of production low and ensure the P2X products produced are green¹, P2X facilities generally need to operate in accordance with availability of intermittent green electricity
- In contrast, conventional process energy facilities operate based on more stable feedstock



Production process optimisation:

- Achieving high yield and efficiency of process chemistry facilities are dependent on skilled operators
- The 'skill' of optimizing the core process and the interplay with renewables is likely to create advantages for those who master it

Challenges



Immature OEM space:

- Project developers and regulators are putting significant demand pressure on (inexperienced) electrolyser and synthesis suppliers to develop new equipment and scale-up and accelerate deliveries
- There is significant risk of putting non-fit-for-purpose equipment on the market and risk of long lead times resulting in project delays



Capabilities required to run an asset:

- Production of hydrogen-derived P2X products² require complex facilities, which historically have been one-off and required asset-by-asset operations knowledge
- Many players venturing into P2X do not come from backgrounds with large operations organisations and experience in running large non-standardized assets

1. Among others by complying to delegated acts 26 and 27 of REDII 2. eMethanol, eAmmonia, eAviation fuel, etc.

A photograph of an industrial facility, likely a water treatment plant, featuring large blue storage tanks and metal railings. The word "Questions" is overlaid in the center in a large, white, sans-serif font. The scene is set outdoors under a clear sky, with various pipes and structural elements visible.

Questions