Role of digital technology in energy transition

Discussion with Case Study

1ST OCTOBER 2020
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THREE STRATEGIC PLAYS PROVIDE NEW VALUE DRIVERS FOR THE ENERGY COMPANY OF TOMORROW

**CURRENT**

- Conventional generator
  - Large-scale renewables
  - Seasonal storage
  - Hydrogen
  - Biofuels

- Grid operator (TSO/DSO)
  - Smart DSO – Manage congestion
  - Accommodate DER in the grid
  - Flex markets
  - Data hub for market facilitation
  - Biogas, Hydrogen distribution

- Commodity-centric supplier
  - Retail Energy Management Services (REMS)
  - Decentralized Energy Resources (DER)
  - Electric vehicles
  - Flexibility services

**NEW**

**RENEWABLE GENERATION**

**NETWORK OF THE FUTURE**

**CONNECTED ENERGY SERVICES**
THE ENERGY TRANSITION IS TRANSFORMING ALL SEGMENTS

21 Priority ETS Topics

- Generation - Renewables and Nuclear
  - Hydro Power
  - Nuclear
  - Onshore Wind
  - Offshore Wind
  - Hybrid Plants
  - CCUS
  - Renewables Gas
  - Renewables Integration
  - T-D Interface

- Transmission & Distribution - Network of the Future (NotF)

- Retail - Connected Energy Services (CES)
  - Utility Scale Solar
  - Distributed Solar
  - PPAs
  - Retail Energy Management
  - Batteries/Storage
  - Flexibility
  - EV Infras.
  - Hydrogen
  - P2P/Microgrids
  - VPP
  - DERMs
  - eMobility Services

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UK OFFSHORE WIND IN NUMBERS

7.9GW/ 38 farms
Offshore Wind Installed Capacity (largest in the world, 43% of Europe)

>8% generation
Offshore wind supplied 8% of the UK’s total estimated electricity generation in 2018. It was higher in 2019 and increasing

£39/MWh
UK 3rd round cfd auction £39.65 ($50.05)

30GW
Target capacity by 2030 with 5.8GW financing secured or under construction

40%
Average offshore wind capacity factor

40%
LCOE in the Operations phase (and 70% of the time)

12MW
Size of the largest fixed offshore wind turbines, to be installed at SSE’s and Equinor’s Dogger Bank development (largest is 8.8 GW)

659MW
World’s largest offshore wind farm-Walney Extension completed in 2018

>30 years
Some new projects estimate potential asset life

**HISTORY OF OFFSHORE WIND IN THE UK**

**FORECAST in 2011**

- **Forecast new capacity build (MW)**
- **Investment cost (m£ / MW)**

**It actually happened. How?**

- LCOE change, from >£150/MWh to est. 3rd round auction of <£40
- Turbine size, from <2MW to 8.25MW to 12MW
- Offshore visits cut in ½ over the last 4 years
- From 30% capacity factor in 2005 to 40% in 2018. Some newer sites can achieve 50%
- Turbine supply chain and development of other local supply chains
- Purpose built vessels

*Source: 2011 Accenture offshore wind report*
**OFFSHORE WIND COST STRUCTURE**

40% OF COSTS, AND 70% OF TIME SPENT NOW IN OPERATIONAL PHASE

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<th>EPC</th>
<th>O&amp;M</th>
<th>Decom</th>
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<td>2 Years</td>
<td>25 Years</td>
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<table>
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<tr>
<th>Development</th>
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<td>Installation</td>
<td>12%</td>
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Source: Offshore Wind Catapult

**KEY CHANGE FROM 2011 TO 2020**

- In-house EPC capability enabling decisions that will reduce LCOE (e.g. *invest in CBM to save on O&M*)
- More O&M control post warranty, and renegotiating/ restructuring full-service O&M contracts
- **Investing in digital and automation given largely manual processes** where problems repeated over 100x
- Increased focus on the basics: logistics, maintenance, materials supply chain, workforce processes
COMMERCIAL ENERGY IOT PLATFORM IS ALREADY AVAILABLE AND STRONGLY SUPPORT “CARBON ZERO WORLD”.

- Envision Digital provides comprehensive Energy IoT platform, EnOS™. Big data and advanced analytics

90+ gw

16+ gw
Thank you all for listening.