

AFRY

ÅF PÖYRY

Offshore Wind Capability Statement



1. AFRY's Wind Power services
2. Offshore Wind Power projects
3. Why AFRY?





AFRY's Wind Power services

WIND POWER SERVICES

AFRY is dedicated to the Wind Power industry

AFRY is at the forefront of wind power development. **For more than 25 years, AFRY has been actively involved in numerous wind power projects around the world.** AFRY'S dedicated team of wind experts have cutting-edge engineering and technology expertise to serve clients **throughout the entire value chain and project lifecycle.**

AFRY's wind power numbers:

- Involved in **30+ GW** offshore wind projects worldwide as Technical Advisor / Owner's Engineer (with over 100 offshore wind project assignments) and **65+ GW** offshore wind as Commercial / Market Advisor
- **250+** Wind projects delivered overall
- **25+** years of experience in Wind Power, **20+** years in offshore wind
- **150+** Wind Power Experts of which 50+ with dedicated offshore wind expertise.



MARKET ADVISORY

- Market reports and price projections
- Policy and regulation studies
- Wind and renewable energy strategies
- Market entry strategies
- PPA advisory

DEVELOPMENT

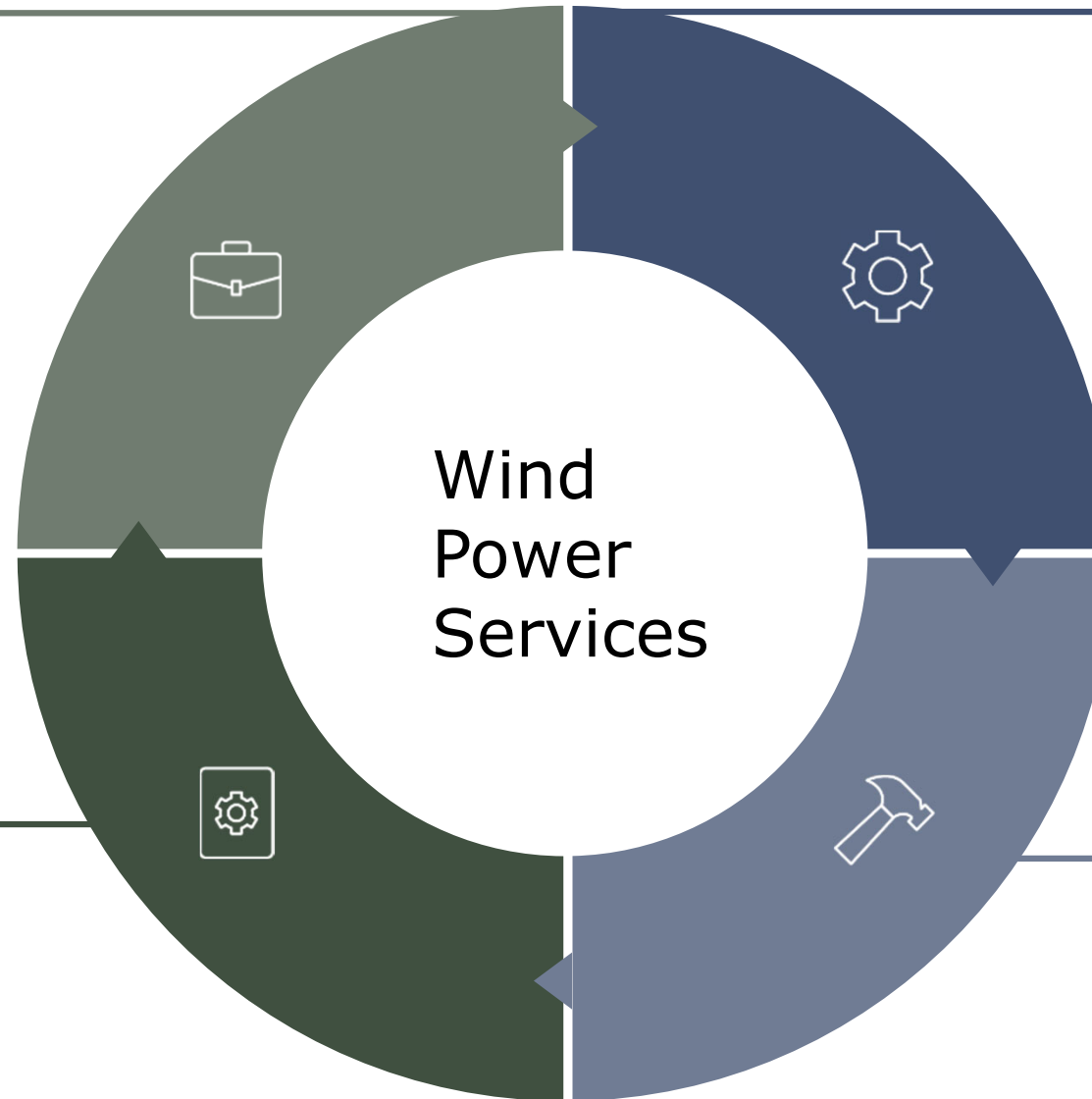
- Development support
- M&A support
- Project management
- Wind measurements and energy yield Assessment
- CFD simulations
- Feasibility
- Basic design
- Permitting
- Environmental studies
- Grid Studies and Power system integration
- Sound & Vibration measurements
- Technical specifications
- Tendering
- Contracting
- Financing support

O&M

- Asset management
- Operational excellence
- Production analysis
- Maintenance
- HSE plans
- Energy sales

CONSTRUCTION

- Design review
- Site supervision
- Testing
- Commissioning
- Connection to transmission network
- Contracts and loan management



We understand the global and local trends and regulations

The AFRY Wind Power Market service supports companies seeking to invest or be involved in wind power generation.

It provides valuable insights when analyzing wind projects at different stages of development by providing:

- Analysis of target countries and their electricity markets
- Energy markets studies and modelling
- Road map of the permitting process
- List of key issues to look for when analyzing an investment opportunity, at project or national level
- Key clauses and provisions to be included in any negotiations with developers and or suppliers to mitigate risks
- Analysis of the impact of different scenarios from an IRR perspective of potential reductions in the tariff
- Financial analysis (model, structuring, re-structuring)
- PPA Contract and price advisory.



DEVELOPMENT

We provide Due Diligence, market entry and M&A advice

- Project development support
- Project and portfolio acquisition support
- Pre-feasibility and feasibility studies
- Site inspections
- Risk identification and mitigation
- Full plant design and optimization
- Bankable wind measurements and energy yield assessment
- Partner identification and negotiation (EPC, Equity/Debt providers, etc.)
- Contract reviews
- Environmental studies (geotechnical, hydrological, environmental, etc.)
- Electrical grid studies
- Local assistance with authorities and all stakeholders
- Negotiation support
- Financial modelling and optimization
- Testing, commissioning and certification.



CONSTRUCTION

We help our clients build quick and best-in-class projects

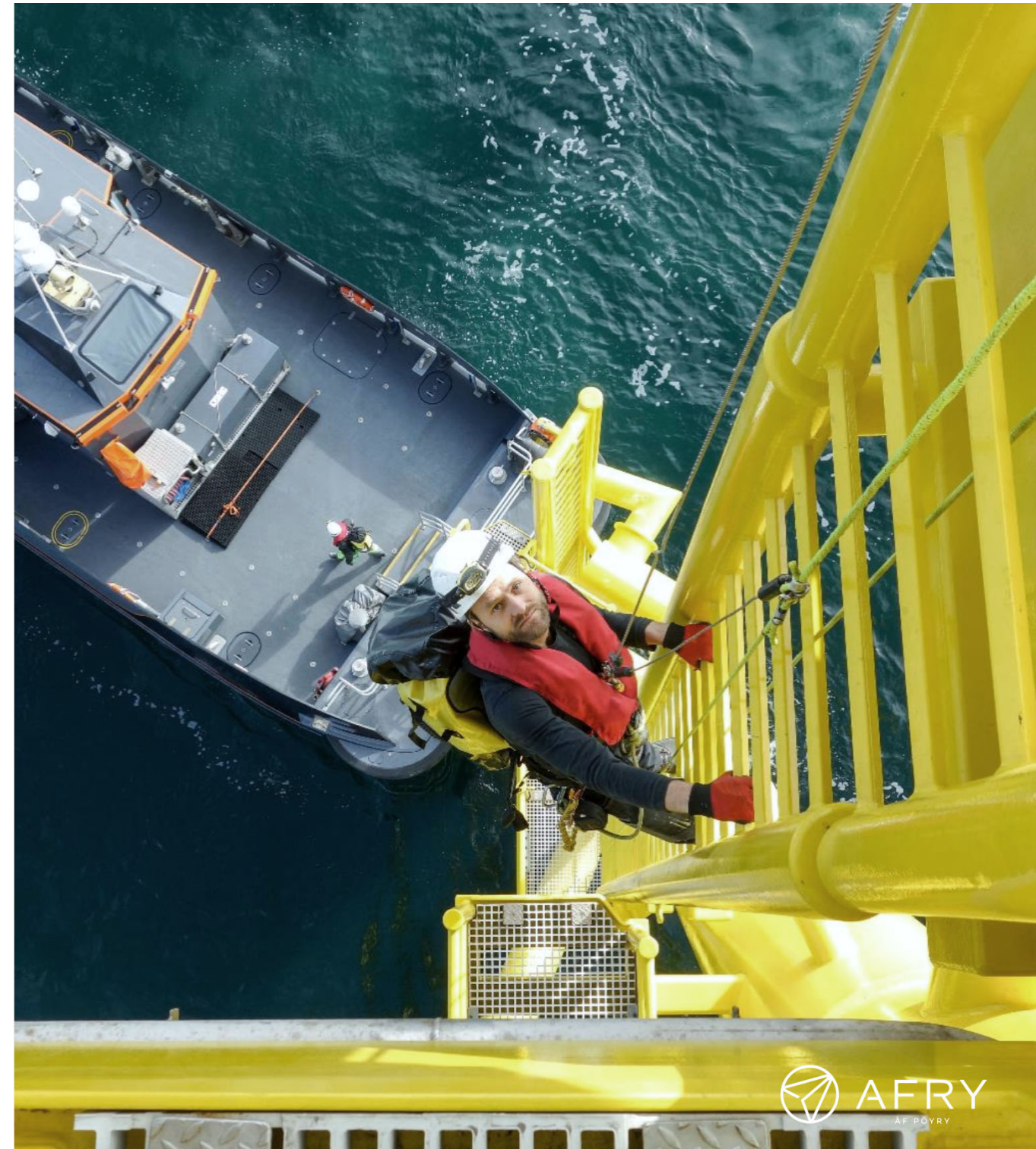
- Technical design or design review
- RFP Technical and commercial advisory
- Contracts review and negotiation support
- Project and construction management
- Health and safety management
- Site supervision including time and cost control
- Quality control and assurance of all the project phases
- Commissioning control
- Plant acceptance and certification.

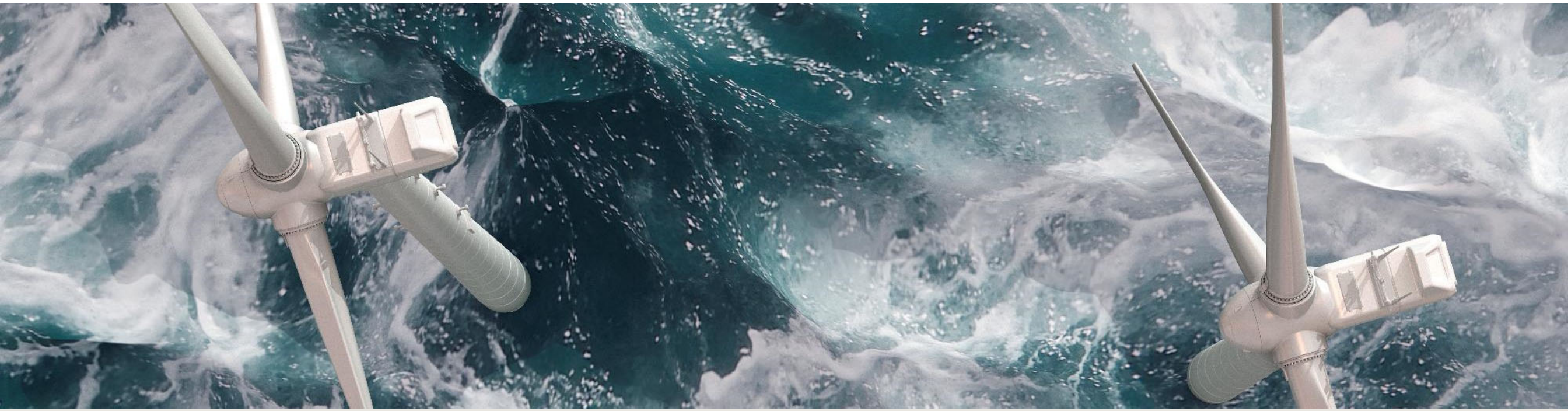


OPERATION AND MAINTENANCE

We help our clients maximize returns and retain high yields

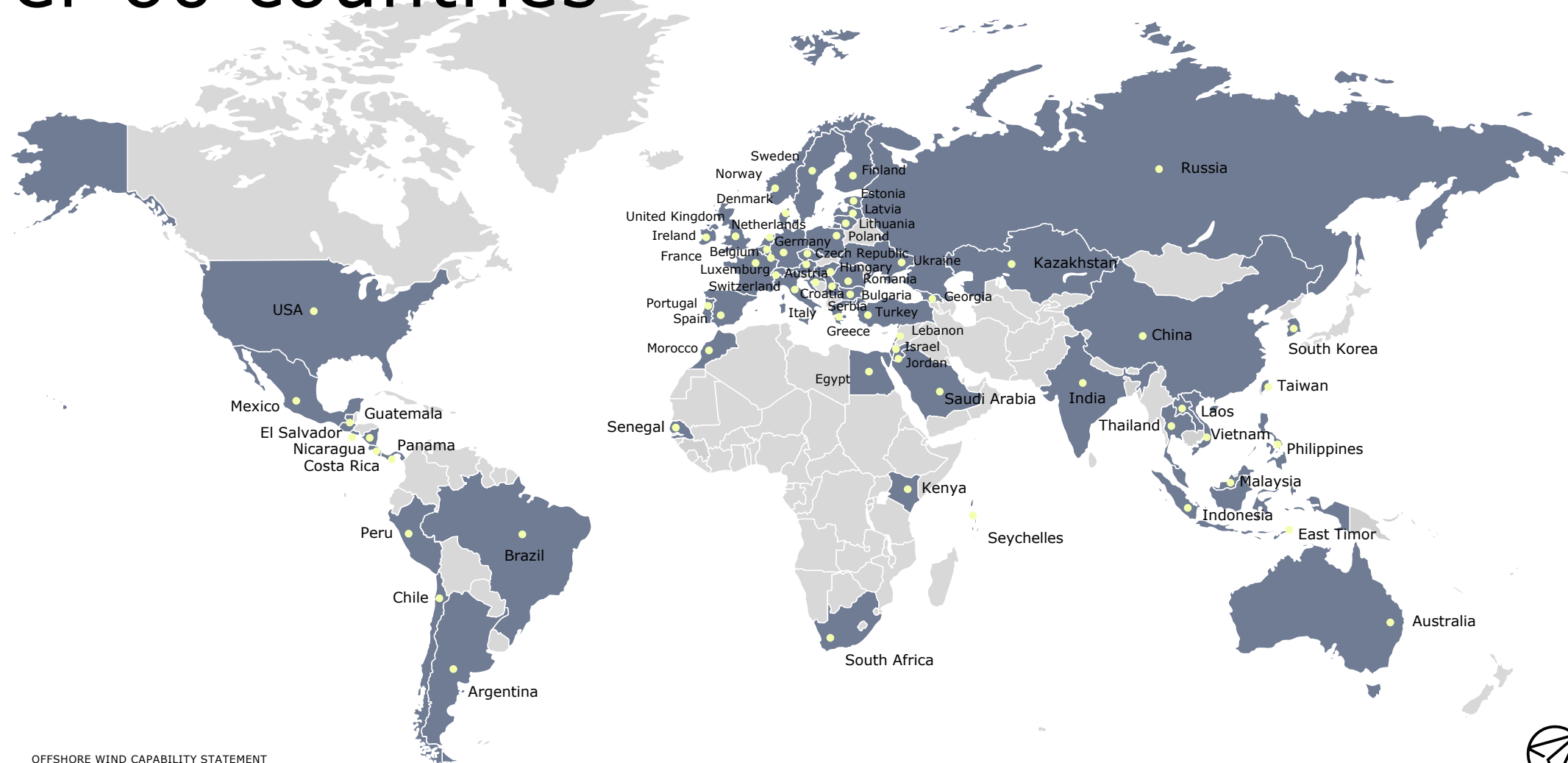
- Asset management assistance
- O&M Strategy review
- OPEX Optimization (budget VS current expenses)
- Monitoring of O&M services
- Energy production analysis (Generation forecast VS actual production)
- Technical troubleshooting and support
- Site inspections to inspect the status of the plant
- Power curve degradation analysis
- Wake loss and sector management analysis
- Drone inspections
- Repowering and retrofits analysis and support
- Quality assurance and testing.





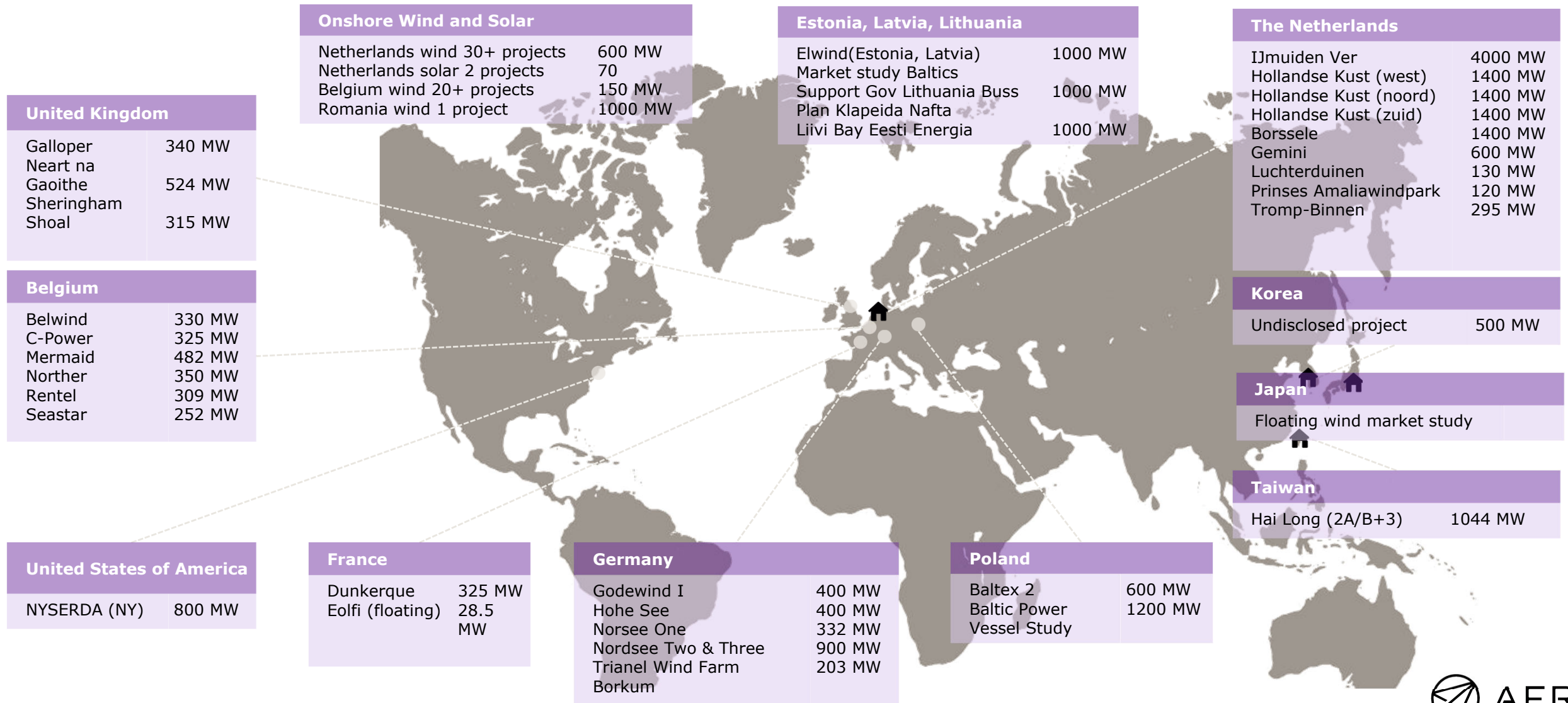
Offshore wind power projects

We have delivered wind power projects in over 60 countries



AFRY has acquired BLIX, a specialized Dutch wind power consultancy in offshore wind projects

BLIX project experience - 20GW of offshore wind in 13 countries



Site Screening & Market Study for Large Offshore Wind Farm in the Philippines

Client

Confidential (2022 – Ongoing)

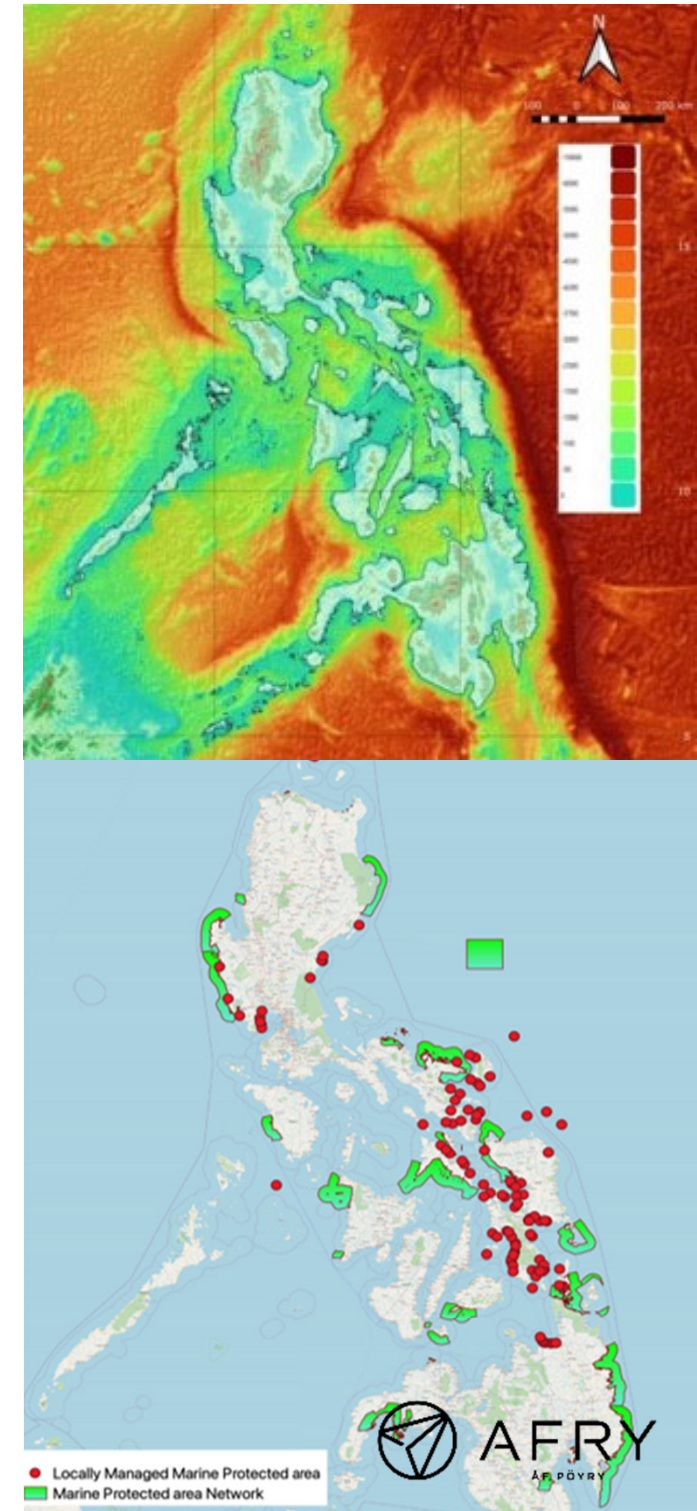
Services provided

- Greenfield screening for potential wind power offshore areas in Philippines (focused on Luzon and Visayas areas) based on technical and marine criteria (wind resource, bathymetry, soil types, shipping lanes, marine protected areas, etc.)
- Selection of primary sites for more detailed assessment in regard to the Energy Yield Assessment
- Pre-Feasibility studies for the shortlisted four site areas with capacity of at least 500-1,000 MW: estimated total capacity and indicative layout; production estimates incl. wake losses; grid connection alternatives.

- Philippine electricity market study and forecast for wholesale electricity price projections
- Routes to market study: review of energy offtake options for an offshore wind farm in the Philippines
- Recommendations on further development steps.

Results and Value added

- The screening helped the Client to better understand the potential of the Philippines offshore wind power.
- The most potential wind power areas were identified and analyzed for further development.



Business case and supporting interventions for a Dutch offshore wind farm, Netherlands

Client

Ministerie EZK, The Netherlands (2019 – 2020)

Services provided

- Assessed the business case for offshore wind under a range of different market and regulatory uncertainties, considering the impact on the expected return on investment
- Identified a number of interventions that could be made to help make the business case more robust to change, including:
 - demand growth and offshore wind development are aligned,
 - incentivising time-shifting flexibility and
 - improving the allocation of financing risk.

- Study design under the leadership of a Steering Committee comprised of the Ministry of Economic Affairs and Climate Policy, InvestNL, PB (Netherlands Environmental Assessment Agency) and representatives from the Dutch wind industry.

Results and Value added

- Supporting the Dutch government in assessing and preparing the long-term policy targets and required market measures to efficiently utilize the offshore wind power potential.
- Public report released by the Ministry of Economic Affairs and Climate Policy: <https://www.rijksoverheid.nl/documenten/publicaties/2020/03/05/the-business-case-and-supporting-interventions-for-dutch-offshore-wind>



EXAMPLE 3: MARKET ENTRY STRATEGY ADVISOR

Analysis of offshore wind tendering processes for a large European utility on nine countries

Client

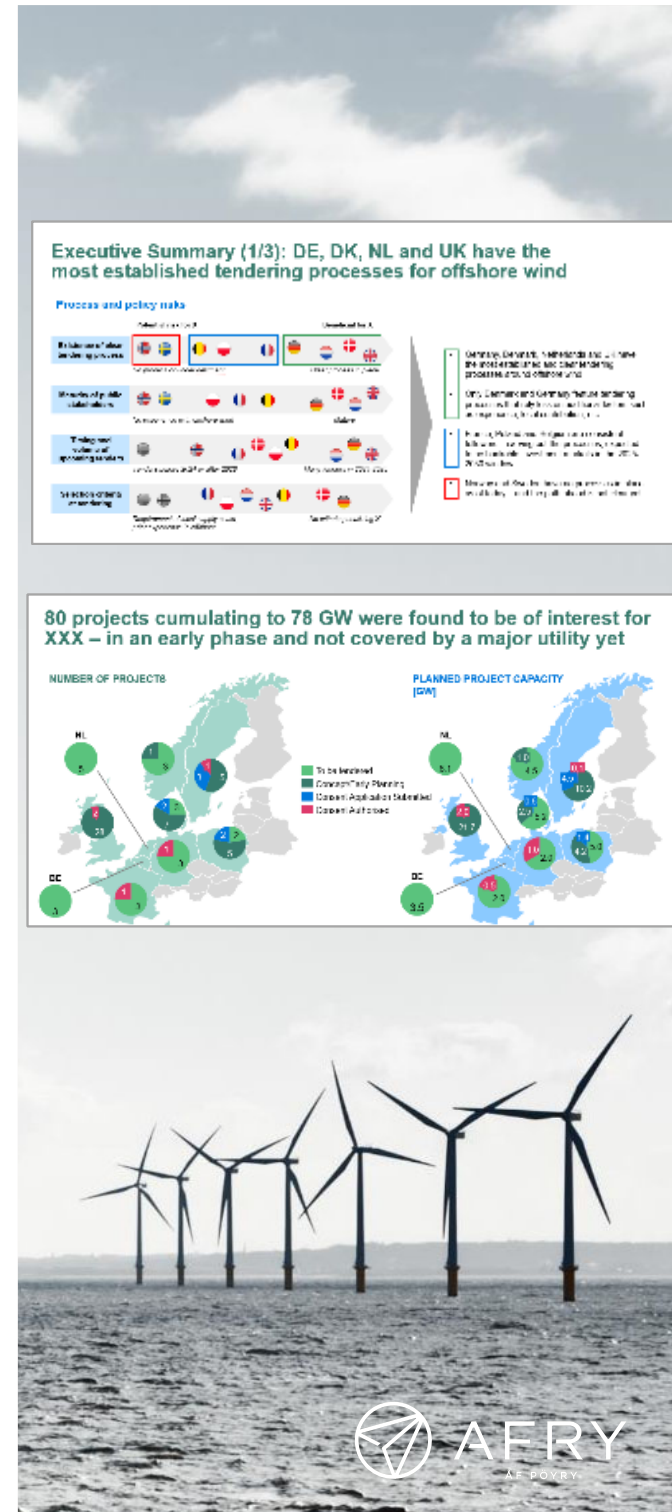
Confidential multi-national European utility (H1 2022)

Services provided

- For nine European countries, AFRY delivered an in-depth analysis of the offshore wind tendering processes and the benefits/drawbacks from the client perspective
- AFRY filtered a list of 800 ongoing offshore wind projects down to 80 of highest relevance for the client, analysing the involved parties for their partnership potential with the client
- AFRY analysed the market leaders' operational and strategic approach to offshore wind, to provide guidance to the client's management team.

Results and Value added

- The client was provided with a better understanding of the offshore wind market, its processes and the market leaders' business approaches
- The information will be useful for the client to decide on a market entry strategy into offshore wind – deciding on the country, the timing and the targeted role in the value chain



Analysis of different scenarios for shared offshore grid, UK

Client

TenneT, Vattenfall, Crown Estate (2017-2018)

Services provided

- Analysis of socio-economic and commercial case of the 'WindConnector', where offshore wind farms were linked directly or via a platform to create an interconnector
- Modelled three scenarios: reference case (no additional interconnector), regular interconnector, 'WindConnector'
- Assessed the commercial case of the WindConnector and impact on offshore wind revenues
- Compared socio-economic benefits of adding a WindConnector.

Results and Value added

- Provided a comprehensive commercial assessment for the profit a WindConnector could capture
- Provided a social net benefit analysis in order to inform client's presentation to the regulator.



Merit order study on an offshore wind farm in UK

Client

Confidential fund manager, UK (2021)

Services provided

Database of key project information for each UK offshore wind asset over 50MW (close to 40 operating projects plus ca. 30 in development and construction).

Valuation tool to allow economic modelling and strike price projections of all offshore wind assets in the UK. This included:

- revenues from AFRY's offshore wind capture price projections and relevant subsidy schemes,
- load factors relating to P50 approximations,
- cost assumptions taking into consideration factors such as water depth, distance from shore, turbine model, foundation type, OFTO arrangements, insurance, decommissioning, and
- financial model and assumptions, such as loan tenor, target equity IRR and project WACC.

Results and Value added

- Client has an accessible tool which they have been using to guide their internal decisions-making.
- Through an iterative and interactive process with the Client, the tool has been designed in a bespoke manner.



Long-term strategy for renewable integration in the Faroe Islands

Client

SEV A/S (2018 – ongoing)

Services provided

- Simulation and analysis for the TSO/DSO grid on Faroe Islands for long-term strategy scenarios aiming to become 100% carbon neutral before year 2030,
- Analysis includes integration of offshore wind farm, solar plant, pumped hydro power plant and battery storage solutions (BESS),
- Theoretical simulation model for long-term scenarios of consumption and production on Faroe Islands,
- The work was carried out by desktop research, workshops and model design. Obtained information was combined with our previous experience from similar market design exercises.

Results and Value added

- The project covers production portfolio, consumption, mobility and conversion from oil-based production to renewables in order for Faroe Island to become 100% carbon free before 2030.



Roadmap for Åland offshore wind development, Finland

Client

Ålandsbanken and Helen (2021)

Services provided

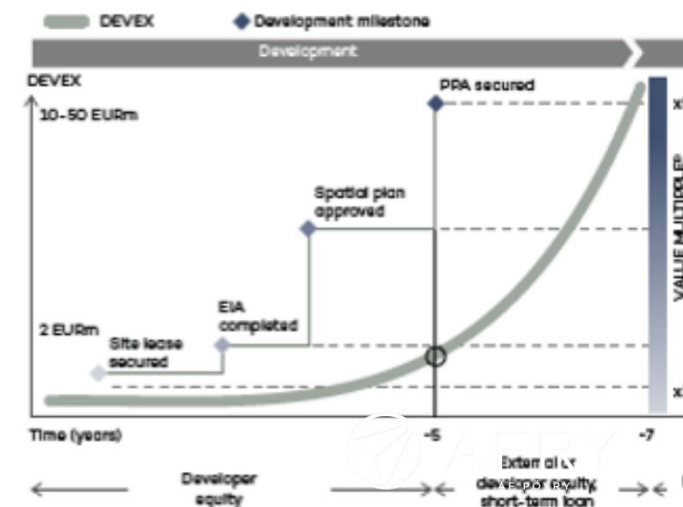
- The objective of the study was to provide material that supports the clients in proactively positioning them in the development of offshore wind in the autonomous province of Åland.
- AFRY prepared a roadmap for developing offshore wind projects in Åland, including:
 - Identifying realistic potential in the territorial waters governed by the Province,
 - Assessing various grid connection alternatives including meshed grids,
 - CAPEX, OPEX and LCOE analysis,
 - Timeline and cost scale of project development,
 - Roles and responsibilities of various private and public stakeholders.

Results and Value added

- The study outlined concrete steps and decisions to be made to launch an attractive market, as well as specified the local direct and indirect value of offshore wind to motivate political efforts.
- Clients gained solid knowledge of offshore wind. The study output facilitates lobbying activities and the development of clients' future businesses.



FIGURE 5 - ILLUSTRATION OF DEVEX PROFILE AND PROJECT FINANCING



10 GW+ International wind and solar project pipeline in several countries

Client

Aker Horizons (2020)

Services provided

- High-level Technical Due Diligence on the Target Company's existing assets and development portfolio of over 10 GW in Chile, South Africa, Vietnam and the Philippines, including onshore and offshore wind as well as solar PV projects.
- The main focus was to assess / verify the development status and maturity of individual projects, feasibility of development projects, and key risks, as well as the Target Company's capabilities, approach and methodology applied in project development and implementation, and development needs in the company organization.

- Throughout the process, AFRY was closely collaborating and coordinating with Aker's other advisors (financial, tax, legal) to support their work streams.

Results and Value added

- The Client acquired a controlling interest in Mainstream Renewable Power, a leading independent renewable energy company. The deal is one of the largest transactions in Aker's history.
- The equity investment in Mainstream will help the developer finance ongoing construction projects.



20 GW International wind project pipeline, several countries

Client

Altor Fund Manager (2020)

Services provided

- Assessment of commercial and technical records and performance of the Target Company OX2
- Commercial assessment of the Target's business based on proprietary market intelligence and AFRY electricity market model (BID3)
- Analysis of the technical performance and the corresponding capital and operating expenditures
- Independent review of the portfolio of 2.5 GW of operational onshore wind projects, 1.2 GW under construction and more than 9 GW onshore and 7 GW offshore under development, including Deep Dive technical assessment of 11 priority projects
- A detailed review of the Target's core markets Sweden and Finland, as well as a lite review of the new markets Poland, France and Spain.

Results and Value added

- The Client acquired a 30% share in a leading independent wind project developer company.
- The equity investment will help OX2 finance ongoing projects.



Environmental Impact Assessment for 5.5 GW offshore wind farm, Sweden

Client

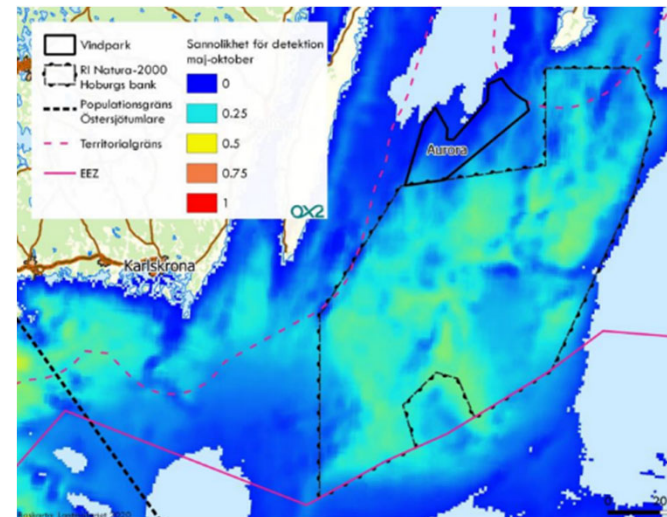
OX2, Swedish RES project developer (2021)

Services provided

- Environmental impact assessment for 5.5 GW offshore wind project (in accordance with standards Natura 2000, CSA, SEZ, MB)
- Coordination of environmental assessments
- Provision of bird behavior/migration expertise
- Provision of sedimentation expertise
- GIS support

Results and value added

- Provided client with comprehensive environmental impact assessment for large offshore wind project.



Environmental Impact Assessment and basic design for a 1.3GW offshore wind farm, Finland

Client

Metsähallitus, Finland (2021 –)

Metsähallitus operates both as a project developer for wind power and as an issuer and lessor of reservation and access rights contracts.

Services provided

- Full Environmental Advisory package including Environmental Impact Assessment, permitting and spatial planning services as well as the field surveys.
- Basic design and technical description required for the EIA and spatial planning: wind farm layout, cabling and grid connection, wind turbines, foundations, offshore substation, sea cables and overhead lines, and construction works.

- Technical and environmental advisory services are covering both the actual wind farm area as well as the planned power transmission route offshore and onshore.

Results and Value added

- Supporting the client through early-stage development of Finland's largest offshore wind farm project.



EXAMPLE 12: ENVIRONMENTAL ADVISOR

Environmental Impact Assessment for 700 MW offshore wind farm, Finland

Client

Suomen Hyötytuuli Oy, Finnish wind power production company (phase 1: 2006, phase 2: 2022)

Services provided

- Environmental impact assessment for offshore wind farm Tahkoluoto (phase 1: 30 MW, phase 2: 700 MW)
- Spatial planning
- Permitting

Results and value added

- Supported the client with deep knowledge about environmental regulations and permitting processes around offshore constructions



Noise assessment for 240 MW offshore wind farm, Sweden

Client

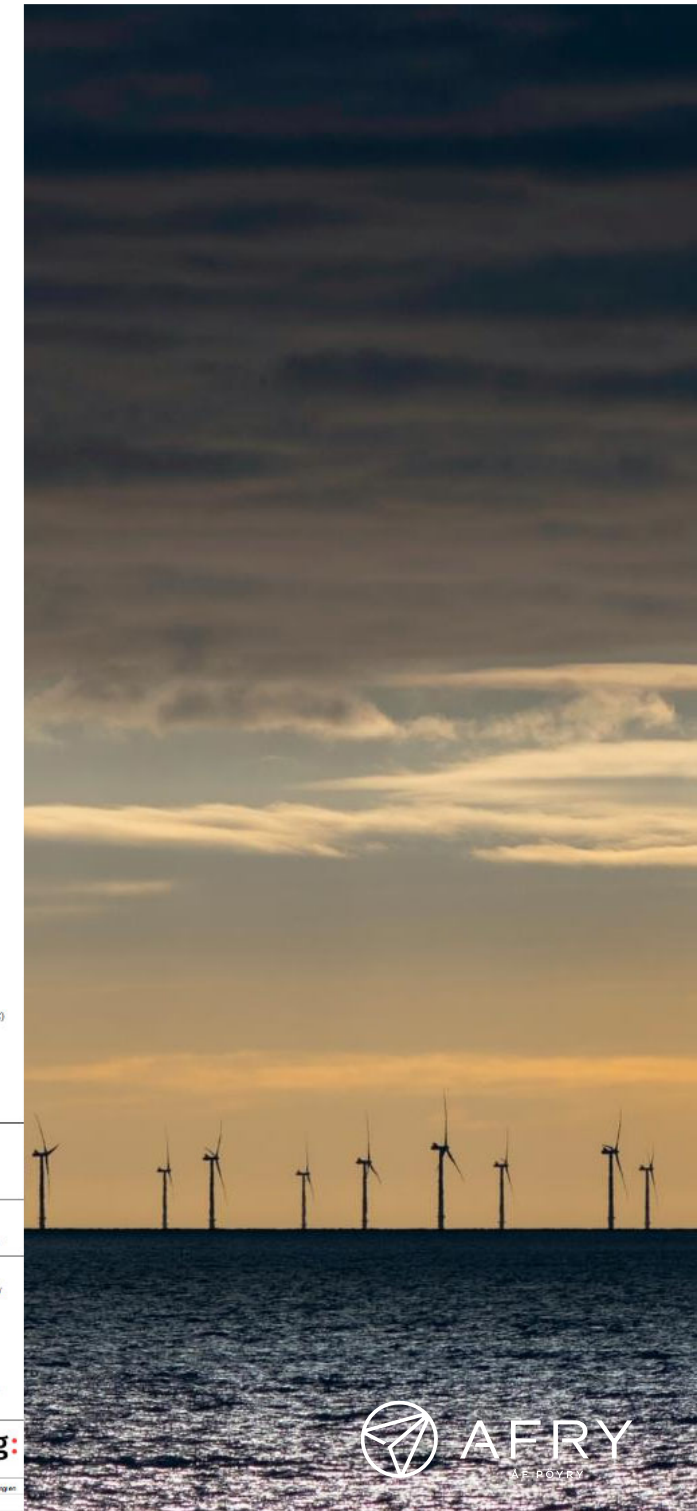
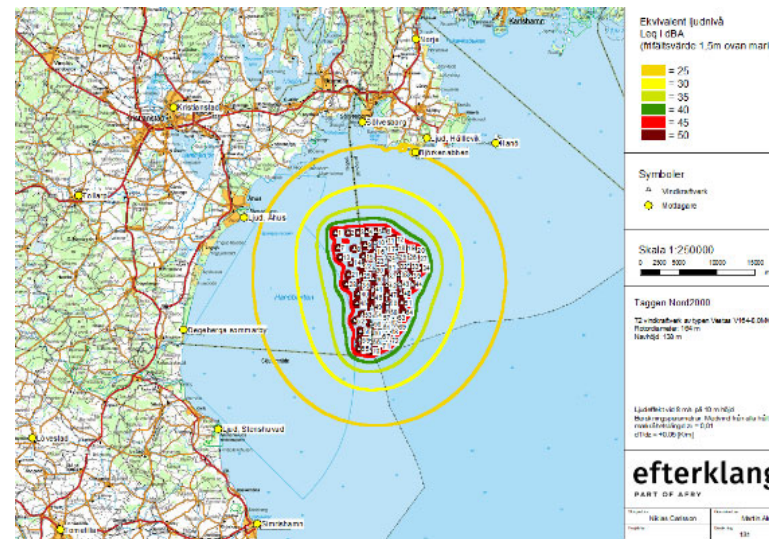
Blekinge Offshore AB, Swedish joint venture for offshore wind project development (2008 – 2019)

Services provided

- Noise propagation calculations for planned 240 MW offshore wind farm in Sweden
- Using state-of-the-art calculation models and local regulations
- Investigation low frequency noise and underwater noise
- Supported client in permit negotiations in court.

Results and value added

- Provided client with state-of-the-art expertise in noise and vibration assessments, including both above-water and underwater impacts



EXAMPLE 14: TECHNICAL ADVISOR

10,000 MW Wind power project developer, Finland

Client

Confidential (2020 - 2021)

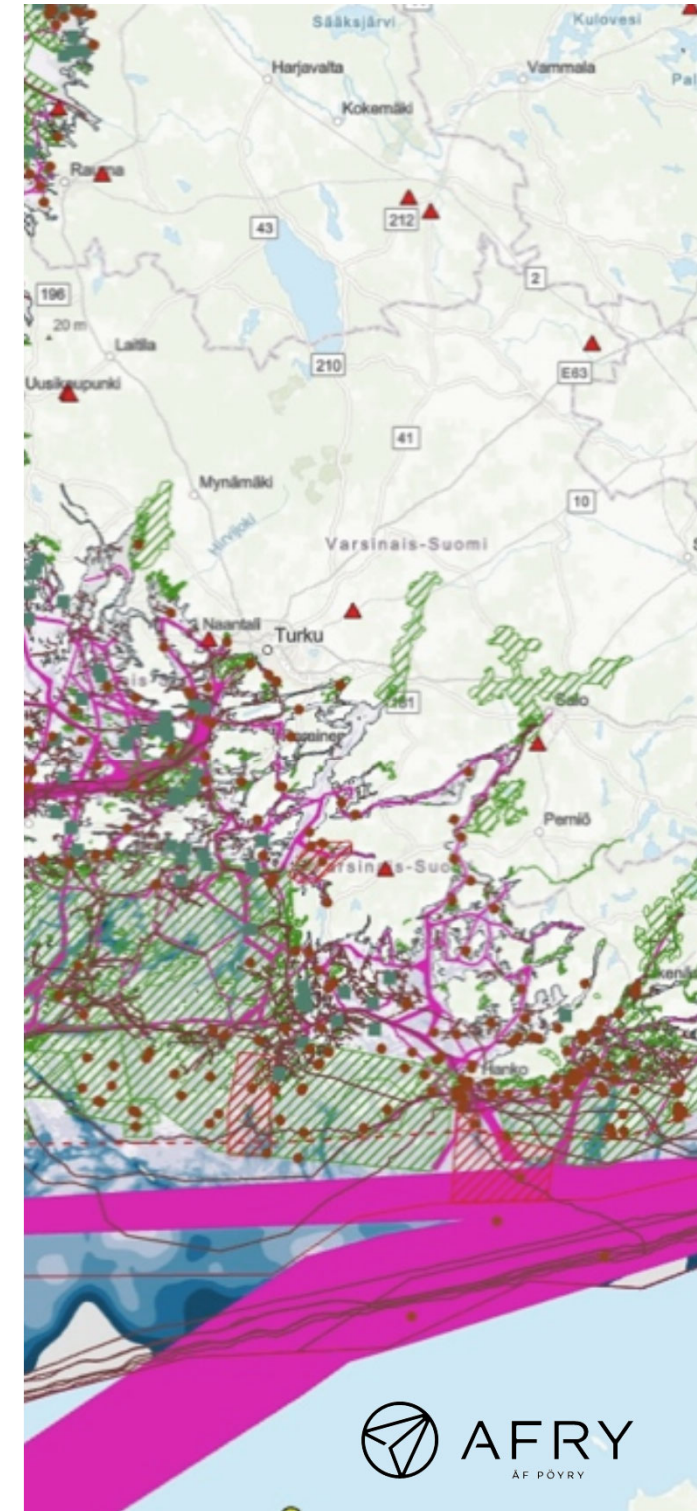
Services provided

- Greenfield screening for potential wind power offshore areas in Finland based on technical and environmental criteria (wind resource, bathymetry, soil types, shipping lanes, bird migration routes, etc.)
- Selection of primary sites for more detailed assessment.
- Pre-Feasibility studies for the shortlisted four site areas with combined total capacity of ca. 10 GW: estimated total capacity and indicative layout, production estimates incl. wake losses, construction and logistics related considerations, grid connection alternatives, key environmental considerations.

- Recommendations on further development steps.

Results and Value added

- The screening helped the Client to better understand the potential of the Finnish offshore wind power.
- The most potential wind power areas were identified and analyzed for further development.



Stake disposal and financial closing of 1.1 GW offshore wind farm Seagreen 1, Scotland

Client

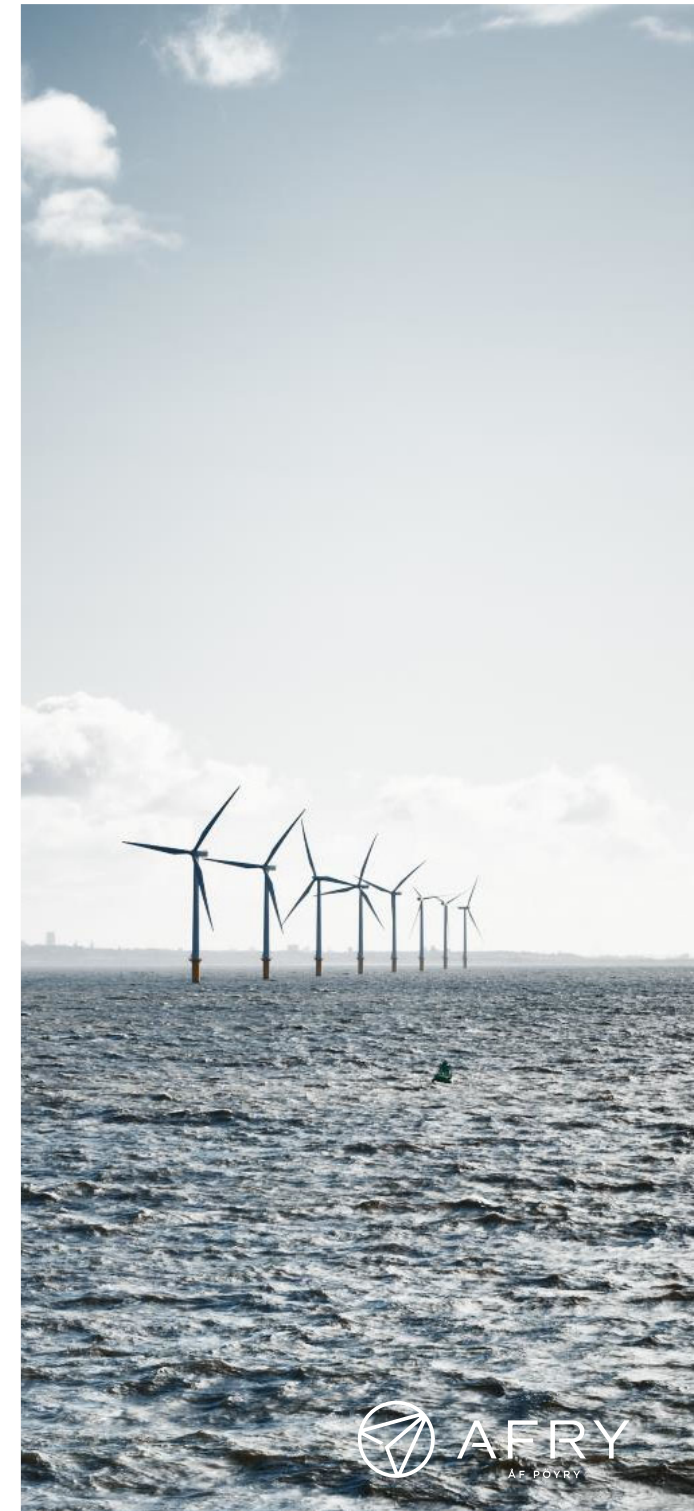
TOTAL S.A., France (2020)

Services provided

- SSE was selling a 49% share of the 1.1 GW Seagreen Offshore Wind Project in Scotland. Only 454 MW of this has secured a CfD subsidy contract, with the remainder being developed as an unsubsidized merchant wind farm
- AFRY provided buy-side commercial and regulatory DD
- We run Total's in-house gas and carbon assumptions through BID3 to derive a bespoke price scenario
- Particular issues for Scottish projects, such as risk of curtailment, high network charges, opportunity for constraint management revenues, were also assessed.

Results and Value added

- The 1,140 MW project reached simultaneously a final investment decision and financial close, while the purchase agreement also covers a potential extension opportunity of up to 360 MW
- Once completed, it will be Scotland's largest offshore wind farm, and one the first offshore wind farms partly implemented on purely merchant basis.



Stake disposal and the €1.3bn debt financing of offshore wind farm Borssele, Netherlands

Client

Borssele Devex B.V., The Netherlands (2017 – 2018)

Project Blauwind consortium members wished to sell 45% of their stake and debt finance OWF Borssele, a 700 MW Dutch offshore wind farm

Services provided

- AFRY provided a market advisor report to the Lenders, and a set of independent projections to illustrate the mechanics of the project's revenue streams
- Assessment of market income and policy exposure under the wholesale electricity market and SDE+ Contract for Difference support scheme
- Assessment of implications of the new Dutch coalition's Regeerakkoord on the Dutch energy market and generation mix.

Results and Value added

- Provided a comprehensive independent market report
- Project successfully sold its 45% stake to Partners Group (January 2018) and went to financial close in June 2018.



Hornsea 1 and Hornsea 2, 1200 + 1400 MW, UK

Client

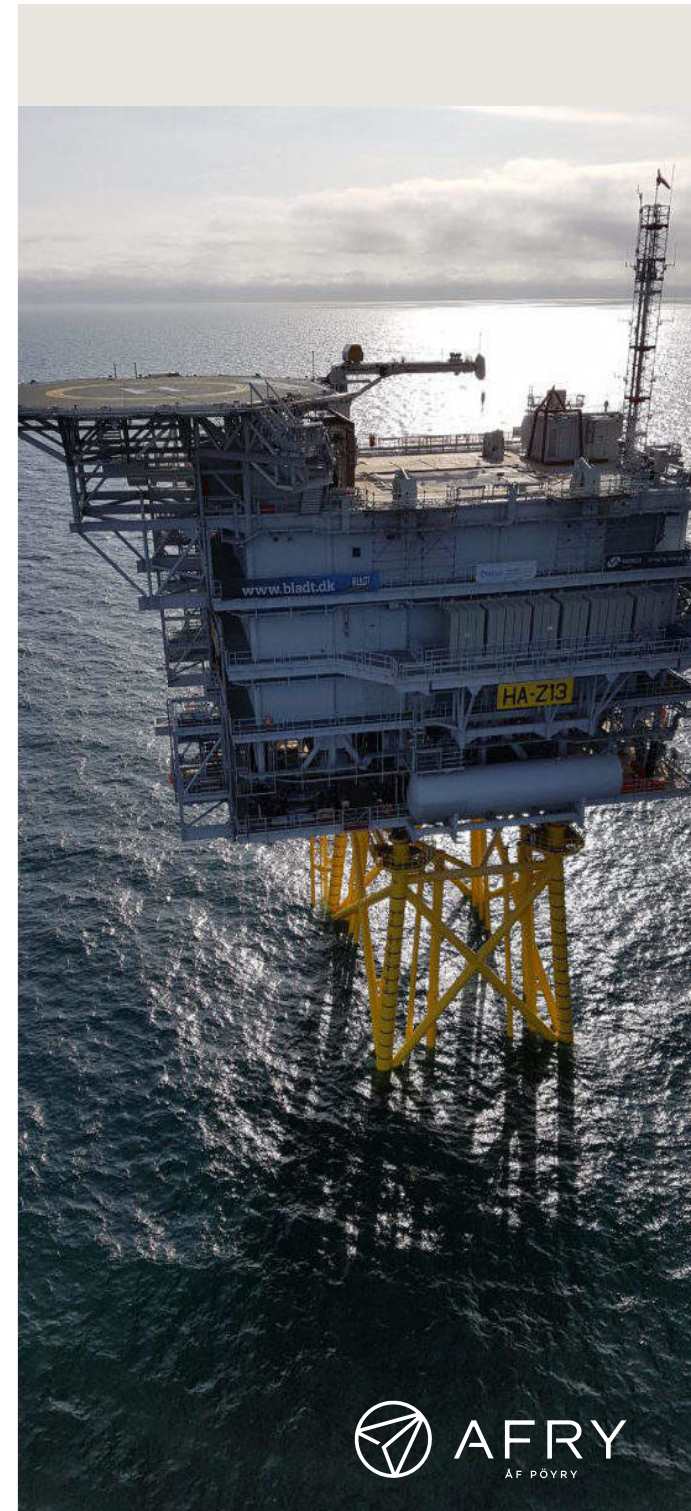
Ørsted Windpower (2017 - 2021)

Services provided

- AFRY provided a similar scope of services to both Hornsea 1 (1200 MW) and Hornsea 2 (1400 MW) offshore wind farms.
 - Concept design and implementation of metering system for windfarms Hornsea 1 and 2. The metering system contains systems for: Revenue metering system regarding power production, dynamic system monitoring and fault recorder system for electrical fault in the 400/220/36kv system as well as metering in the substation LV system onshore and offshore.
- Performed services:
 - Project Management
 - Technical feasibility studies
 - Conceptual Design of system
 - Detail design
 - Execution including test and commissioning
 - Coordination towards TSO requirements

Results and Value added

- Contributed to development and construction of two of the **largest wind farms in UK**
- Supported the client in a value driven, state of the art metering system



48 MW Nearshore wind farm, Vietnam

Client

Sermsang Power Corporation PLC. (SSP), one of Thailand's fastest growing independent power producers (2019 – 2021)

Services provided

- Review on project preparation and design, project conceptual design and previously conducted Feasibility Studies
- Technical Advisory for selection of WTG and BOP suppliers including preparation of RFBs with technical requirements, technical bid evaluation, and negotiation support
- Project Management and full construction supervision covering civil and electrical Balance of Plant, connection to public grid, and WTG erection and commissioning.

Results and Value added

- Contributed to development and construction of one of Vietnam's first offshore wind farms
- Supported the client in implementing their first offshore wind power project.



DMR/TETRA communication systems for several offshore wind farms, Denmark

Client

Ørsted Windpower (2017 - 2019)

Wind offshore farms: Lincs, Gunfleet Sands, Race Bank, Westermost Rough

Vattenfall (2020 - ongoing)

Norfolk project – Design and implementation of communication on 3 Wind farms.

Services provided

Ørsted had problems within band bandpass filter interference on the TETRA output stage resulting in interference to the DMR radio communication system. AFRY made a solution with a reject filter system installed and measured for final solution for the reject interference problem.

Performed services:

- Project Management
- Design of redundant TETRA setup
- Design of redundant AIS setup

- Implementation of the radio “shack” at the offshore station and merger with the existing DMR radio system owned by another operator
- Coverage simulation and coverage measurement confirmation
- Design of the repeater solution for wind turbine
- Execution including test and commissioning
- FAT radio system, SAT on radio system and IT network infrastructure including onshore offshore installation.

Results and value added

- AFRY provided support and a solution for interference problem in DMR/TETRA radio setup.
- Research & Design: AFRY supported the client in a value driven path, from scratch to operational Wind Farms.



EXAMPLE 20: TECHNICAL ADVISOR

Borkum Riffgrund 03 offshore wind farm, Denmark

Client

Ørsted Windpower (2021 - 2022)

Services provided

AFRY delivered Servers, Switches, Firewalls, GPS Clock's, RTU's (PLC's) Cabinets and the SCADA System for monitoring and control of the entire Windfarm section.

Performed services:

- Project Management
- Design of network topology
- Design of SCADA, and PLC-system
- Design and delivery of cabinets
- Execution including test and commissioning
- 24/7/365 service and support on alarm calls.

Results and value added

- Supported the customer in choosing a new control and monitoring system
- New and modern SCADA-system for control and monitoring of the entire wind park.



Delivery of SCADA for 900 MW offshore wind farm, Denmark

Client

Ørsted, Danish multinational power company
(2020 – 2023)

Services provided

- Delivery of SCADA system for monitoring and control of offshore wind farm Borkum Riffgrund 03 (900 MW, Germany)
- 24/7 support & troubleshooting on installation
- Optimization / implementation of several functionalities.

Results and value added

- Provided client with single-source solution for SCADA and control system, including installation, troubleshooting, support and transition to 24/7 operation.



Portfolio of offshore wind assets in Taiwan, Japan and South Korea

Client

Confidential (2022)

Services provided

- Buy-side commercial and market due diligence in relation to portfolio of offshore wind assets in Taiwan, Japan and South Korea, including:
 - Regulatory analysis
 - Market study report
 - Projection of wholesale prices and other potential sources of revenue
 - Analysis of curtailment risk
 - LCOE analysis
 - Competitor assessment
 - Assessment of local content requirement
 - Review of the FiT/PPA commercial terms
 - Review of the commercial sell-side financial model inputs
 - Preparation of red flag report

Results and Value added

- Comprehensive analysis of the commercial and market related issues and risks related to the transaction





Why AFRY?

Why AFRY?

ACCELERATING THE ENERGY TRANSITION

- AFRY is a leading advisory for clean energy technologies, covering PV, on- & offshore wind, hydro, biofuels and carbon removal technologies

DRIVING CHANGE

- AFRY has dedicated itself to the 1.5°C Roadmap, halving its own CO₂ footprint by 2030 and supporting our clients in reaching their own ambitious decarbonisation targets
- AFRY leads by example by following the UN's 17 Sustainable Development Goals

TRUSTED PARTNER

- AFRY has consulted clients in 30+ transactions around offshore wind assets with deep commercial and technical know-how
- AFRY has provided strategic and market entry advice for offshore wind to several large European utilities

DID YOU KNOW?

- AFRY has worked on offshore wind projects in the Baltics, Denmark, Finland, Germany, Ireland, Malaysia, Netherlands, Norway, Philippines, Sweden, Taiwan, UK, USA and Vietnam – our international footprint enables us to deliver market-leading services to all regions of the world!

Disclaimer

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A wide-angle photograph of an offshore wind farm. Numerous white wind turbines are scattered across a dark blue sea under a clear, light blue sky. The turbines are three-bladed and mounted on tall, slender towers. The perspective is from a low angle, looking across the water towards the horizon.

Making Future