



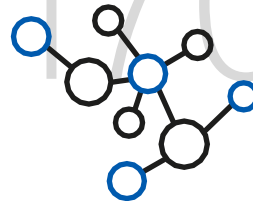
FICHTNER

Onshore Wind Power Fichtner Group

WindEnergy Hamburg Digital 2020
01 - 04 December 2020



Established in 1922 and
family-owned ever since



Project experience in
more than 170 countries



Total turnover of
€217 million in 2019



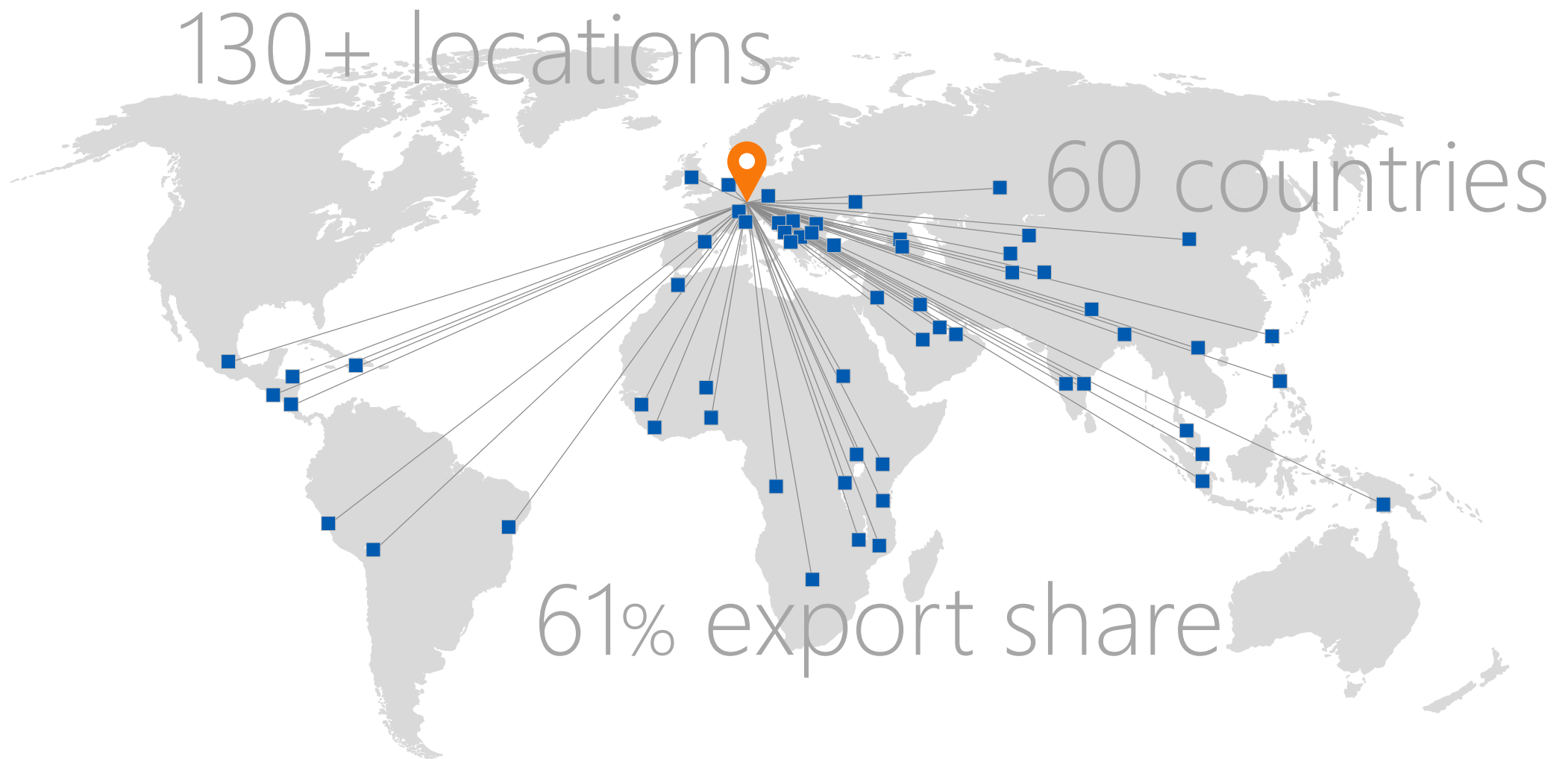
1500 employees
worldwide – over 500 of
these in our home office



Long-standing employees
from 66 nations



Certified systems for quality,
workplace health, safety, compli-
ance, environmental protection



Home office in Stuttgart | Present in 60 countries worldwide
Represented at over 130 locations by subsidiaries and affiliates, branches and project offices
61% of Group revenues generated outside of Germany

Onshore Wind Power

Services and Project Experience



Onshore Wind Power

Range of Services

The Fichtner Group can call on a network of highly qualified engineers and consultants to cover all aspects of onshore wind power. Our engineers are as conversant with the requirements of national and international investors and development banks as they are knowledgeable about local energy supply markets, tariff structures and regulatory permit approval procedures.

- Owner's / Lender's engineer throughout all project phases
- Energy yield assessments and wind measurement
- General site selection and turbine micrositing
- Feasibility studies
- Drawing up operation and maintenance concepts
- Tendering and contract award for EPC and IPP projects
- Construction Supervision
- Wind turbine inspections
- Analyses of operating data (post construction EYA)
- Lifetime assessments
- Due diligence audits



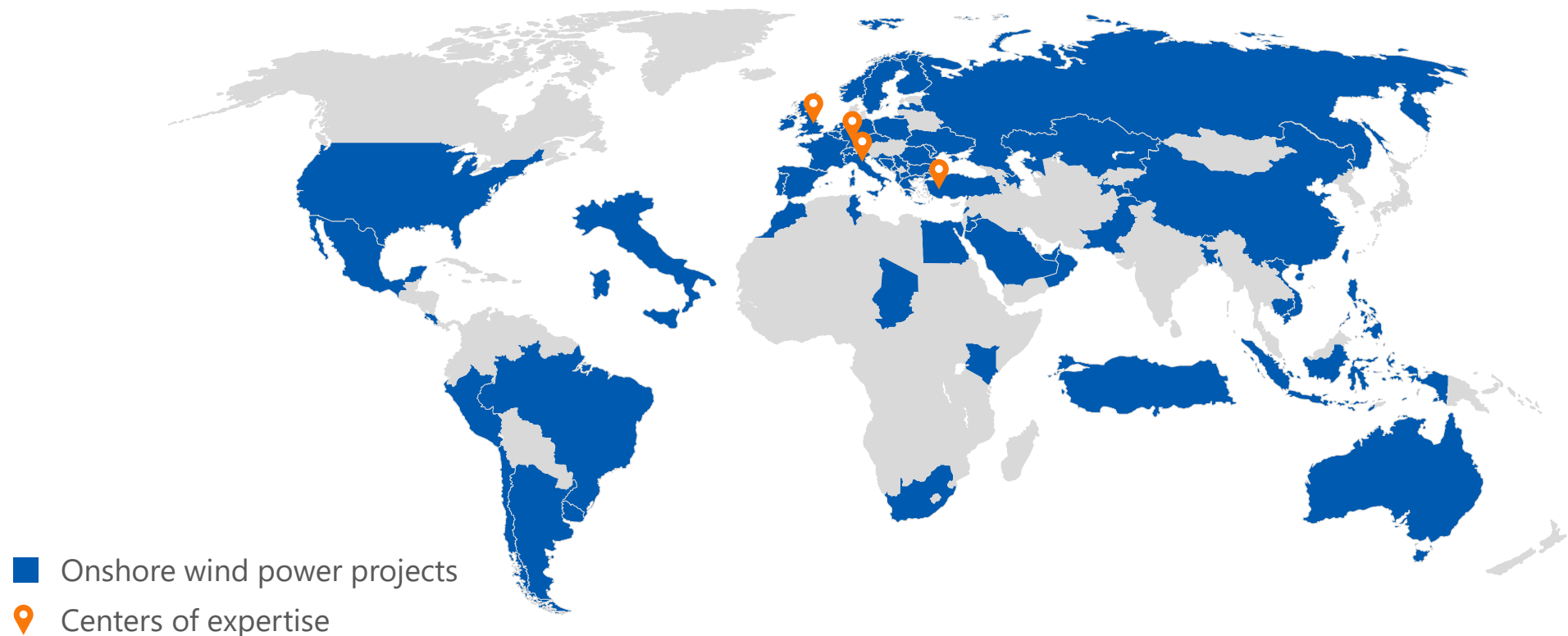
Onshore Wind Power

Experience – Overview



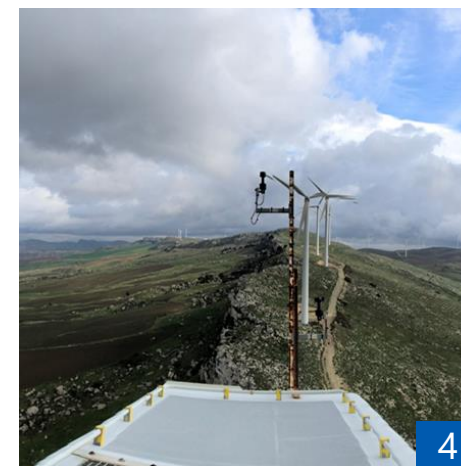
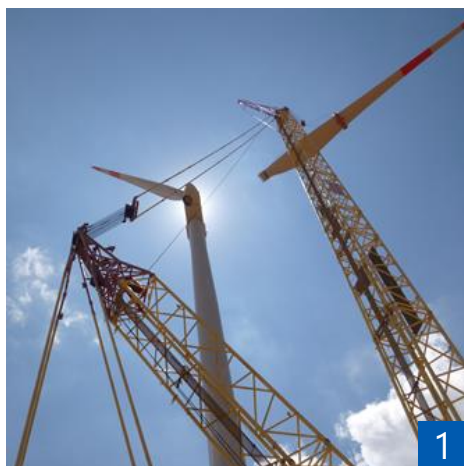
Fichtner has assisted in the realization of more than 350 projects with a total capacity of 51 GW, including:









- 210 lender's engineering and due diligence projects
- 120 projects as owner's engineer
- 250 studies, with 70 feasibility studies and over 125 energy yield assessments



Onshore Wind Power

Reference Projects (selection of global key projects)



1	Owner's engineer for Phu Lac Wind Farm, Vietnam	 11/2013 – 08/2020	 24 MW
2	Technical consultant for tendering with contract award of IPP wind power projects in Saudi Arabia	 01/2017 – ongoing	 400 MW
3	Due diligence for a wind power and solar PV portfolio in Central America	 07/2016 – 09/-2016	 324 MW
4	Lifetime assessment for operational portfolio of 16 wind farms in the UK and Italy	 10/2018 – 01/2019	 675 MW

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Owner's engineer for Phu Lac Wind Farm, Vietnam

Thuan Binh wind power Joint Stock company is developing Phu Lac wind farm with a capacity of 24 MW, located 250 km northeast of Ho Chi Minh City. This will be Vietnam's first wind farm to be operated under the feed-in regulation that was introduced in 2011.

Fichtner's services

- Engineering and consultancy services
- Tender and technical specifications preparation
- Tender support
- Contract negotiations
- Contract awards
- Implementation of EPC contract
- Construction and commissioning supervision
- Operation supervision during the guarantee period



Thuan Binh wind power Joint Stock company



11/2013 – 08/2020



24 MW

Onshore Wind Power

Technical consultant for tendering with contract award of IPP wind power projects in KSA

As part of a restructuring initiative in the Kingdom of Saudi Arabia, Fichtner has been contracted as Technical Advisor by the Ministry of Energy, Industry and Mineral Resources (MEIM) to assist with the development of several renewable energy IPP projects (Wind, PV and CSP). This includes the wind projects Midyan 300 MW, Dumat Al Jandal 400 MW and Yanbu (850 MW).

Fichtner's services

- Technical due diligence of RPPs
- Define/Recommend the technical structure of the IPP tender and prepare draft agreements
- Tender plan, management and communication
- RFQ and RFP
- Finalizing IPP agreements
- Providing support up to financial close
- Lessons learned report and presentation



Ministry of Energy, Industry and Mineral
Resources (MEIM)



01/2017 – ongoing



1550 MW

Onshore Wind Power

Due diligence for a wind power and solar PV portfolio in Central America

CMI is a leading energy company, which has a total of 711 MW installed capacity of hydro, wind and solar energy, as well as 55 MW under construction and a portfolio of projects to be developed throughout the Central American region. CMI has contracted Fichtner to perform a Due Diligence for a Wind and PV portfolio located in Costa Rica, Nicaragua and Honduras

Fichtner's services

DD Review including

- Status of projects
- Energy Yield; Post and Pre Construction
- O&M Setup and Structure
- Contracts
- CAPEX and OPEX
- Site Visit and WTG Inspection
- Risk Analysis



Corporación Multi Inversiones (CMI)



11/2017 – 11/2018



324 MW

Onshore Wind Power

Lifetime assessment for operational portfolio of 16 wind farms in the UK & Italy

Fichtner was contracted by a wind farm operator to perform a detailed assessment to identify the required measures and refurbishments to extend the wind turbine lifetime. Detailed aeroelastic load calculation for each asset was done. The analytical lifetime assessment included analysis of the main KPIs per wind farm resulting in a specific site & technology rating, asset ranking matrix to obtain classification regarding the ratings, lifetime extension potential per component per wind farm and uncertainty analysis based on FMEA. Practical assessment consisting of on-site visual inspections provided complementary information on actual condition of the wind turbines based on O&M history.

Fichtner's services

- Visual site inspections
- Maintenance track record analysis
- Analytical Lifetime Assessment
- Uncertainty analysis based on FMEA
- Risk analysis in respect of the Lifetime Assessment
- CAPEX & OPEX input to life extension financial model



Onshore Wind Power

Bankable EYA incl. updates with CFD modelling for three wind farms in Norway

Fichtner was contracted by an international developer to perform Energy Yield Assessments for three wind farm projects in Norway with a total installed capacity of more than 100 MW. The sites were visited by a Fichtner expert. On-site measurement data was processed, analyzed and long-term corrected. Wind flow modelling was preliminary performed with WindPro/WAsP and updated with a comprehensive CFD model due to the complexity of the terrain. The annual energy production was calculated, losses were assumed and uncertainties assessed.

Fichtner's services

- Site visit
- Measurement data processing and analysis
- Long-term correction
- Wind flow model (both with WindPro/WAsP and WindSim CFD)
- Calculation of annual energy production
- Loss assumption/calculation
- Uncertainty analysis

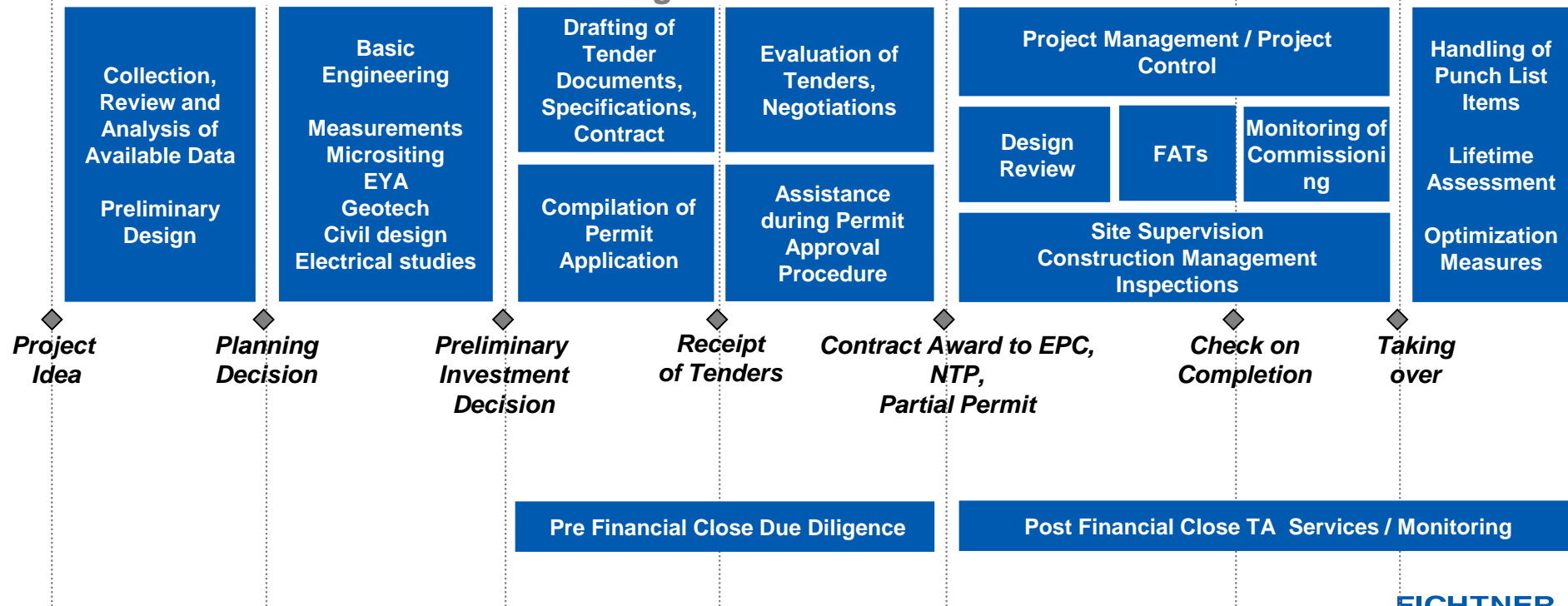


Fichtner's Wind Power related Service Portfolio

Project Phases

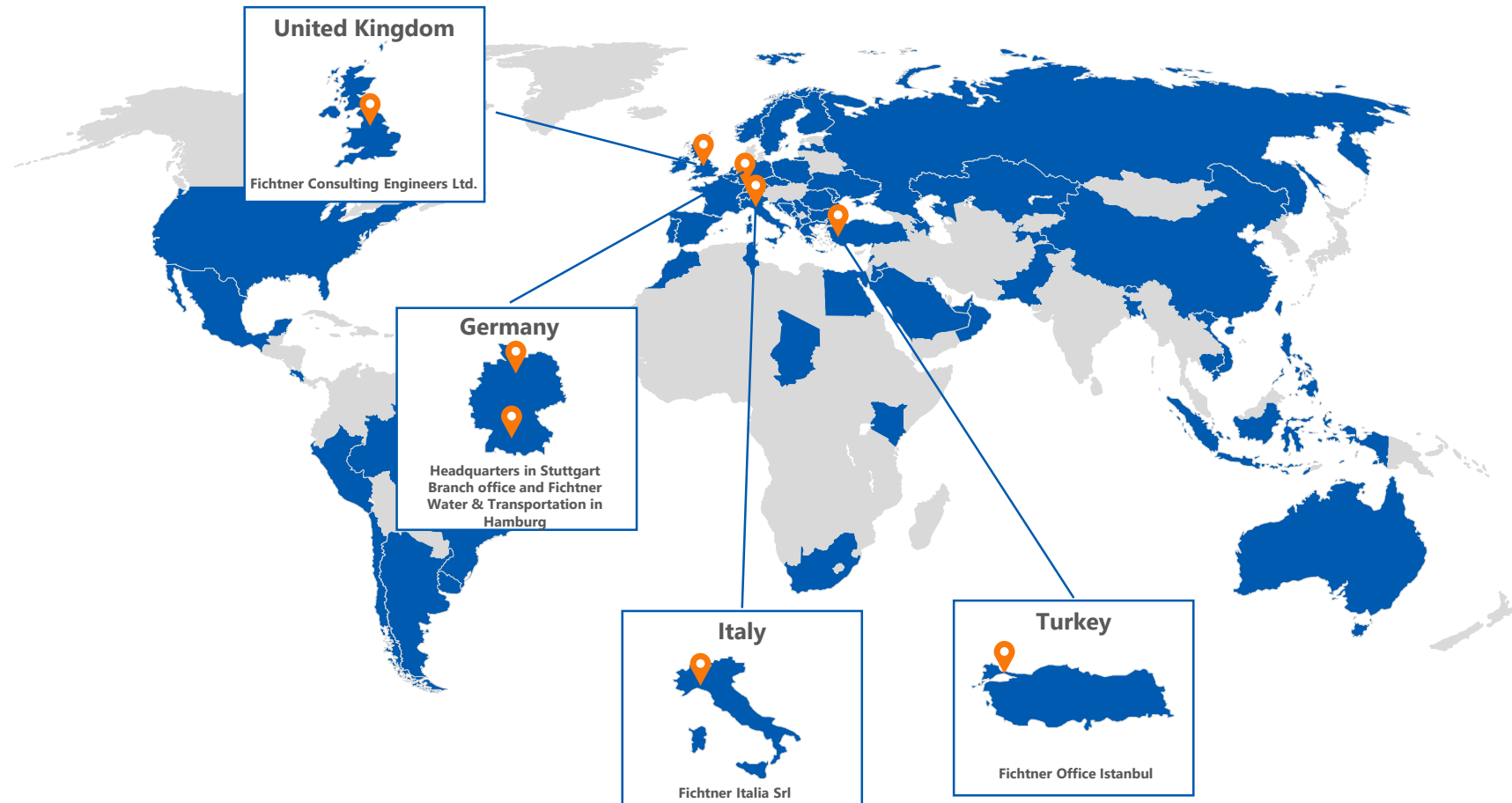


Fichtner's Services as Owner's Engineer



Onshore Wind Power

Centers of Expertise – Presence in Key Markets



■ Onshore wind power projects

📍 Centers of expertise

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