A few words about MAKE

Summary

- MAKE is one of the global wind industry's premier strategic consulting and research firms, serving the world’s leading wind companies from all parts of the value chain from raw material suppliers to IPPs and utilities.

  - MAKE is based in Aarhus (DK) and has offices in Hamburg (D), Chicago, Boston (U.S.) & Shanghai (China).

  - Publish industry leading wind energy research reports, analysis and databases

  - Consult on wind farm investments, market assessment, supply chain dynamics, technology, operations & maintenance, M&A advisory, business & market modelling and offshore wind

  - Due-diligence partner for European and international PE and industrial investors

Steen Broust Nielsen - Partner at MAKE

- More than 20 years of wind sector experience including from LM Wind Power.

- Has served on the Board of EWEA and GWEC.

- Extensive due diligence, consulting and senior management experience in the wind industry. Track record for driving and enabling profitable growth, through development and execution of focused business strategies. Master of Science in Economics and Business Administration
Leading insights into wind power industry dynamics

MAKE Reports and Industry Insights

Through a series of annually published reports, forecasts, research notes and data MAKE’s Regional Analysts provide comprehensive analysis and data for the key wind power markets globally, supply chain, technology trends and industry dynamics enabling our subscribers to:

- Understand key drivers and barriers in wind power development at global, regional, and country levels
- Evaluate countries and regions of interest based on detailed market attractiveness assessments
- Assess business opportunities for product positioning, commercial strategies and successful business development
Introduction

Global footprint and key milestones

2005
MAKE is founded in Aarhus, Denmark, with a focus on offering high-quality research products for the wind power industry.

2007
The first overseas office is opened in Shanghai, China.

2008
MAKE broadens its global presence through the establishment of another branch office in Chicago, U.S.

2010
Yet another office is opened in the U.S., in Boston. MAKE starts to build its technology team.

2011
The technology team is fully formed and launched for both intelligence and advisory services.

2013
MAKE launches new and improved research product portfolio.

2014
MAKE opens an office in Hamburg, Germany.

MAKE’s strategically placed global offices

Top 15 wind power markets

MAKE | Delivering renewable energy insight™

JSIM Committee Meeting
February 2015
Introduction

A sample of our clients
Global electricity generation increases by ~65% before 2035

Outlook for electricity generation 1990-2035e (TWh)

Growth in global installed electricity generation capacity from 2012 to 2035 from 5,649 GW to 9,760 GW, corresponding to 70% increase. 62% of global investments in new power plants are in renewables mainly wind, hydro and solar power.
Global Market Trends

Wind energy well positioned against other power sources

2014 LCOE – Global ranges and baselines

Globally, wind power is making progress towards grid parity and is expected to become cost competitive even with coal generation.
Global Market Trends

Wind power grid parity increasingly a demand driver

Global onshore grid parity timeline

- Onshore wind LCOE range
- Global wholesale electricity prices
- Defined scenarios

Note: Unsubsidized LCOE
Source: MAKE, IEA World energy outlook 2013 electricity price projections

30% onshore LCOE reduction through evolution of turbine technology, development of supply chain and best practices. 40% offshore LCOE reduction driven by next generation of advanced technology turbines, substructures, economies of scale and cost control of execution and management.
Continued evolution of platform-based products expected in order to leverage track record, decrease development cycles and cost optimize
Global Technology Trends

LCOE progress evident, further drops remain possible

2014 Technology

Wind energy nearing the critical point of grid parity in many markets, further progress will be driven by technology advancements.

2020 Scenario

2025 Scenario

<table>
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Source: MAKE
Sustained improvements in energy capture, cost position and operational expenses are possible through technical innovation.
30% reduction in onshore LCOE is possible through continued evolution of turbine technology and development of supply chain and best practices.
Major influencers to LCOE reduction

LCOE reduction opportunities

Technology improvements

- Larger turbines, advanced low OPEX drivetrains on larger wind plants further from shore
- Significant cost scale economies on new foundations enabled by advanced jacket structures
- Technical availability improvements due to higher reliability and operational excellence

Operational improvements

- Reduced perceived risk allows for reduced debt and equity cost
- Operational excellence and lessons learned allow for shorter development cycles and less costly project execution costs

40% reduction in offshore LCOE is will be driven by next generation of advanced technology turbines, substructures and cost control of execution and management

Note: Unsubsidized LCOE
Source: MAKE
Global Technology Trends

Key component technology trends

Carbon fiber use expected to decline with ramp-up in 2018

Direct drives expected to make modest gains in each region

Partial power converters expected to maintain over 50% market share

Controls technology a hotbed of innovation
Global Technology Trends

Key component technology trends

Tower technologies are diversifying and growing taller

Detailed analysis and date in the latest edition of Global Wind Turbine Trends

Offshore substructures experience innovation boom
Global Market Trends
Global wind power market to see sustained growth

Global grid-connected forecast: 2013-2023e

Americas and China drive market comeback in 2014/15 with global growth to stagnate until 2017 as North American and European onshore demand reduction balance emerging market and offshore growth. Wind power grid parity to drive post-17 onshore growth despite lower expected subsidies.
Global Market Trends

Offshore wind segment to more than triple in share of global market

Global grid-connected forecast: 2013-2023e

Offshore growth largely to be European until 2017 after which Chinese offshore is expected to be a key driver for global offshore

Source: MAKE

Offshore markets | Onshore markets
Global Market Trends

Europe key market for offshore in the medium term

Global offshore wind grid-connected forecast: 2013-2023e

European near term offshore wind growth, technology development and scaling and industrialisation of supply chain is key for reducing offshore wind LCOE
Global Market Trends
Development will remain concentrated in a few markets

Global offshore grid-connections

Offshore wind market will require investments of approximately €47 billion in 2023, mainly concentrated in Asia-Pacific and Europe
Global Market Trends

Global O&M revenue to exceed USD 13 Billion by 2020

Installed base to exceed 700MW by 2020

- Global Cumulative
- EMEA
- AMER
- APAC

Off warranty expected to exceed 300 GW

- APAC off-warranty
- EMEA off-warranty
- AMER off-warranty
- Global OEM service

A decade of strong growth in wind installations has led to a sizable market for O&M services outside of OEM warranty or service agreement.
Global Supply Chain Dynamics

Consolidation and market exits ease overcapacity, though additional action is required

- Global demand growth only at ~1% from 2014-2016e
- Profit margins squeezed throughout the value chain
- Heavy competition driving rapid product evolutions
- Market abandonment enabling supply contraction (U.S.)
- Consolidation rationalizing expansion in growth markets (EU offshore)
- Further consolidation/attrition is likely and needed, especially in China

2014 supply as % of demand, 2014-2016e

Source: MAKE
Regional supply v. demand highlights changes in U.S. market

Regional supply capacity v. demand (GW)

- AMER
- EMEA
- APAC

Source: MAKE

Demand 2014e  Demand 2015e  Demand 2016e
Global Supply Chain Dynamics

Europe remain a central supply hub for regional and global markets

Projected regional nacelle sourcing origins, 2014e-2016e

Global supply chain adjusts procurement strategies in face of stagnant markets and emerging opportunities. Supply chain footprint continue to be heavily influenced by policy incl. local content requirements and incentives.
Global Supply Chain Dynamics

Domestic manufacturing expectations too high in new markets

Market size comparison

- Investment in nacelle and subcomponent manufacture on a large scale has occurred historically in markets averaging over 2GW per year
- Russia, Ukraine, Saudi Arabia and South Africa are all attractive growth markets considering local content policies
- Unfortunately, these markets are projected to be less than a third of the size of traditional wind manufacturing markets that have significant supply chain capacity
- Brazil is an exception as the market is forecast to surpass 2GW annually and likely would have attracted multiple OEMs

Forecast demand is not sufficient to support an organic supply chain in several markets exploring local content policies. Focusing on specific opportunities is recommended.
Global Supply Chain Dynamics

MW ratings continue to rise in all global regions

Onshore turbine MW ratings

Offshore turbine MW ratings

N. America expected to graduate past the 2MW benchmark, following GE new products

Offshore MW rating growth will accelerate with installation of 2016+ projects

Note: Past averages based on identified wind projects.
Future averages based on product market share modelling
### Global Supply Chain Dynamics

**Analysis of M&A opportunities for market entry or expansion**

#### Opportunity for M&A activities across selected segments

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<th>Buyer segment</th>
<th>Asset owners</th>
<th>Non-wind industrial conglomerates</th>
<th>Conglomerate competitor</th>
<th>Pure-play competitor</th>
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Source: MAKE

- ✗ M&A
- ✗ Partnerships
About MAKE

Delivering renewable energy insight™
The renewable energy industry is evolving constantly. New markets are developing and market conditions are changing. Technological advances and global supply chain transformation are lowering the cost of energy day by day. For true and timely insight, you have to be where the action is. That’s why we have experts in key renewable energy markets, providing a global advantage to our clients.
An introduction to MAKE

In today’s environment of intensifying competition and shifting demand, staying ahead of the curve is the key to success. MAKE supports businesses across the globe to achieve this by providing in-depth data and forecasts – which have proved to be industry’s most accurate, year after year.
An introduction to MAKE

Through years of working with companies across the renewables value chain, MAKE has developed a global network of professional experts and decision makers. Our close relationship and interaction with leading investors, utilities, OEMs, suppliers, service providers, government institutions and NGOs provides a multifaceted view of the industry. It keeps us abreast of the newest developments and produces powerful insights.
Our global team of analysts and consultants offers deep knowledge of renewables, gained during years of working at leading companies in the business. Our team has been carefully assembled to offer the right blend of expertise about markets, the supply chain, technology and finance to accelerate results for our clients.
The MAKE knowledge model

To fully understand the current status and development of the global wind power industry – it is essential to have multi-faceted insights into burning issues that will impact the industry’s future. MAKE’s team of experts constantly analyzes global and regional data to provide a full spectrum of analytics that cuts across the 4 key drivers / barriers for growth: markets, value chain, technology and finance.
MAKE’s global team of analysts closely monitor macro-economic, policy and project developments, order placements and installations in over 140 key and emerging onshore and offshore wind power markets worldwide.
The MAKE knowledge model

The ever-evolving dynamics of supply and demand impact companies across the wind power value chain. MAKE constantly monitors all value chain segments for interesting developments, such as supply-demand imbalances, sourcing strategies, key company positions, M&A activity and much more.

- Wind plant development
- Raw material supply
- Component supply
- Wind turbine manufacturing
- Logistics
- Engineering, procurement and construction
- Asset ownership
- Operations & maintainance
The MAKE knowledge model

MAKE’s technology team closely monitors individual partners in the supply chain and their technical innovation and product development and forecasts technological trends in key areas, including:

<table>
<thead>
<tr>
<th>Wind Turbine</th>
<th>Balance of Plant</th>
<th>Offshore</th>
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<td>▪ Foundations</td>
<td>▪ Installation vessels</td>
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<tr>
<td>▪ Nacelle</td>
<td>▪ Substations</td>
<td>▪ Cable-laying vessels</td>
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<td>▪ Tower</td>
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<td>▪ Control systems</td>
<td>▪ Installation equipment</td>
<td>▪ Substations</td>
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<tr>
<td>▪ Components</td>
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<td>▪ Transmission cables</td>
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</tbody>
</table>
The MAKE knowledge model

As the demand for wind power ultimately depends on economic viability and cost-competitiveness, understanding the financial and cost developments is key. Our team studies various financial aspects of the industry:

- Renewable power generation portfolio strategies of global asset owners
- Regional financing mechanisms and structures for both onshore and offshore
- Capital markets and finance availability
- Competitiveness of wind versus other sources of energy, power pricing and levelised cost of energy by region and technology
- Understanding the key drivers of cost including technology, logistics and raw materials

Finance
Wind Power Research Products

To make the right decisions for your wind business and investments in today’s environment of intensifying competition and shifting demand, you need access to reliable and timely industry insights. MAKE delivers research, forecasts, data and a multi-faceted view of the global wind-power industry with unrivaled depth and accuracy, offering you a competitive advantage in accelerating business results.
An introduction to MAKE research subscriptions

MAKE offers tiered subscription plans for varying market intelligence needs

**BASIC**

The BASIC subscription package provides a perfect solution for clients looking for foundational knowledge of the wind power industry. It includes regional and market reports that provide updated industry outlooks and extensive information about the global status of wind power supply chains, technology, and asset ownership.

**EXTENDED**

The EXTENDED subscription includes all products inside the BASIC subscription +

- Sector Reports providing in-depth insight into the offshore wind and O&M sectors
- Research Notes on key global issues and developments in wind, including wind power market share analysis, LCOE forecast, and much more
- Semi-annual forecast updates

**PREMIUM**

The PREMIUM subscription is a more advanced package, which includes all products inside the EXTENDED subscription +

- Quarterly forecast updates that ensure continuous updates on market development
- Flash Notes providing instant analysis and insight into the latest events in the industry and keeps our clients on the cutting edge of wind power development

**PREMIUM+**

The PREMIUM+ subscription is a complete toolbox of wind power research, insights, data and analytical support. It contains all products inside the PREMIUM subscription +

- Global Wind Turbine Order Database
- Global Wind Power Project Installation Database
- Global Offshore Wind Power Project Database
- Global Wind Turbine Technology Database
- 10 Analyst Access Hours

**SUPERIOR**

The SUPERIOR subscription is our most elite research package, containing all of MAKE’s research products. It is the most complete toolbox of wind power research, insights, data, and analytical support. It contains all products inside the PREMIUM+ subscription +

- Global Wind Turbine Order Database
- Global Wind Power Project Installation Database
- Global Offshore Wind Power Project Database
- Global Wind Turbine Technology Database
- 10 Analyst Access Hours
- Semi-annual Wind Turbine OEM Market Share Forecast

**OFFSHORE**

The OFFSHORE subscription is specially designed for the specific intelligence needs of our offshore wind power clients.

It includes all products with offshore wind power content that are included in our PREMIUM package + our Global Offshore Wind Power Project Installation Database
Product and subscription overview

**MAKE offers a range of product categories containing various individual publications**

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<td>The must-have forecast on OEM positioning across the globe for the next five years</td>
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<td>10 Analyst Access Hours</td>
<td>Direct consultation with our regional research teams across the globe</td>
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<tr>
<td>Global Wind Turbine Technology Database</td>
<td>The definitive global wind turbine model database complete with technical specifications and data</td>
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<td>Global Wind Power Project Installation Database</td>
<td>A definitive list of all installed Onshore projects across the globe</td>
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<tr>
<td>Global Wind Turbine Order Database</td>
<td>Monthly global wind turbine order intake data</td>
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<tr>
<td>Global Offshore Wind Power Project Database</td>
<td>A definitive list of all Offshore projects – installed and in the pipeline</td>
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<td>Quarterly Market Outlook Updates + Webinars</td>
<td>Updates of global forecasts for onshore and offshore markets, order flow and turbine pricing</td>
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<td>Flash Notes</td>
<td>Instant analysis and insight into the latest industry developments</td>
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<td>Special reports on global offshore wind power and global wind turbine O&amp;M sectors</td>
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- All products in category can be purchased as single reports
- All products in category are included in the offshore subscription
- Offshore-related products in category are included in the offshore subscription
Six competitively priced subscriptions to suit your intelligence needs

Subscription Overview and Pricing

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All products in category can be purchased as single reports. Regional Reports are available at €1,500 per report. Market and Sector Reports are available at €2,500 per report.

All products in category are included in the Offshore subscription.

Offshore-related products in category are included in the Offshore subscription.
Add-ons to suit your intelligence needs

Subscription add-ons

MAKE provides a range of supplementary research services and data products to support your specific business needs

Analyst Access Hours

Analyst Access Hours are designed for our subscription clients to consult directly with our regional research teams in Denmark, U.S., China, the U.K. and Germany. Access hours can be used for Q&A sessions, tailored online or even minor ad hoc projects.

Price:
EUR 200 per hour for a minimum of 10 hours.

Global Wind Turbine Order Database

Monthly updated global database of firm wind turbine orders

- Continuous monitoring and tracking of order intake of 40+ wind turbine OEMs
- Monthly updates of new order intake and comprehensive overview of tracked onshore and offshore orders year-to-date
- 14 data points for registered order entries
- Data provided for announced, public and unannounced firm order

Price:
EUR 2,000 for a one year subscription with monthly updates.
**Add-ons to suit your intelligence needs**

**Subscription add-ons**

MAKE provides a range of supplementary research services and data products to support your specific business needs.

### Global Wind Power Project Installation Database

- The definitive listing of installed wind power projects across the globe
  - 29,000+ listed projects in the AMER, EMEA and APAC regions
  - Includes projects in 140+ markets
  - Up to 16 data points for registered projects

**Price:** EUR 4,000 for a one year subscription, released annually.

### Global Offshore Wind Power Project Database

- The definitive listing of offshore wind power projects across the globe
  - 900+ listed projects in the AMER, EMEA and APAC regions
  - Include installed as well as planned projects in 30+ markets
  - Up to 28 data points for registered projects

**Price:** EUR 1,500 for a one year subscription, updated quarterly. (Included in the Offshore subscription)

### Global Wind Turbine Technology Database

- The definitive global wind turbine model database complete with technical specifications and data
  - Key information on over 250 turbines offered from the top 20 global turbine manufactures
  - Data on turbine configuration, technology architecture and drivetrain choices
  - Suitability according to IEC wind class and certification

**Price:** EUR 3,000 for a one year subscription, released annually. (Included in the Premium+ and Superior subscription)
Add-ons to suit your intelligence needs

Subscription add-ons

MAKE provides a range of supplementary research services and data products to support your specific business needs

Semi-annual Wind Turbine OEM Market Share Forecast

The must-have forecast on OEM positioning across the globe the next five years

- Five-year market share forecast for top-15 turbine OEMs split by
  - MW and units
  - MW turbine segment
  - Offshore and onshore
  - Major countries*
  - Region (SA, NA, EU, MEA, CN, APAC)

Price: EUR 4,000 for a one year subscription, released semi-annually in xls format. (Included in the Superior subscription)

*Countries included are Germany, U.K., Turkey, France, Sweden, Italy, Netherlands, Poland, Belgium, Ireland, Finland, Romania, Spain, U.S., Brazil, Canada, Mexico, China, India, Australia, Japan, South Africa
Wind Power Consulting Services

As wind experts, we understand the industry’s dynamic nature and your need for timely and objective advice. We rely on our team’s proven track record in the international wind industry, our first-hand industry contacts and our collective specialist skills to analyze challenges from every angle and provide a wide range of consulting services.
MAKE’s Consulting services

Market Assessment

Our clients demand detailed information and analysis of specific markets or segments in order to make qualified strategic decisions. We constantly monitor the global wind market to provide our clients with accurate market forecasts and analysis of the legal and political frameworks in the various markets, including assessment of opportunities and risks involved. We conduct Voice of Customer surveys to map buying criteria and buyer preferences and we analyse the competitive dynamics and landscape.

Supply Chain Dynamics

Smart supply chain management is a source of competitive advantage that enables our clients to meet multiple strategic objectives. Decisions to buy or make and on how to set up a global supply chain are complicated by a vast array of market factors. MAKE can facilitate such decisions by providing relevant data and advice concerning production footprints, procurement strategies, value chain positioning, supplier screening, assessment and business modeling. Our extensive knowledge base allows for a wide range of services including capacity forecasts, identification of sourcing opportunities, supply chain mapping, analysis of the competitive landscape, benchmark analysis and conducting make/buy analyses.

Technology

The product and technology landscape of the wind industry is evolving constantly. Today, winning technology cannot be developed in isolation but must be understood in the context of market and supply chain dynamics. We monitor technology trends continuously and advise clients on strategic product and technology positioning. To help them make informed decisions on systems design, we assist our clients in developing successful product and technology roadmaps, tapping our understanding of the entire turbine to achieve the optimum solution.
MAKE’s Consulting services

Operations & Maintenance

Globally, the installed wind power base is increasing rapidly. Optimising wind farm operations and maintenance represents a value enhancement opportunity for asset owners and a strategic business opportunity of growing importance for equipment manufacturers and service providers. MAKE advises utilities, IPP’s and other asset owners on O&M strategy and advanced OPEX modelling, benchmarking both service and product offerings. MAKE also advises equipment manufacturers and service providers on business development strategies, including market assessment, competitive analysis, positioning and design of business models and offerings for the O&M markets. Our services provide your organization with a competitive edge, enabling you to achieve your strategic targets and business objectives while guaranteeing the availability of your wind assets.

M&A Advisory

Successful M&A action requires in-depth research and industry experience. MAKE is the independent, unbiased partner you need to prepare a sale or refinancing, screen investment opportunities, conduct target analysis, perform due diligence studies, allowing your organisation to draw well-informed conclusions and prepare successful investment and exit strategies.

Offshore Wind

Offshore wind power is one of the fastest growing market segments globally with a large and untapped potential for renewable power generation. The industry is focused on reducing the cost of energy from offshore wind. This requires stable long-term policy framework, continued innovation and development of new technology and investments in scaling and industrialising the supply chain. MAKE advises policy makers, investors, utilities, OEMs and suppliers on market dynamics, technology and supply chain. We support our clients in developing market entry, business development or supply chain strategies, as well as technology roadmaps. Our services can help you grow your offshore wind business successfully.
MAKE’s Consulting services

**Business & Market Modeling**

Our proprietary approach provides powerful tools to support our clients’ business development decisions. Our suite of business and market models include onshore and offshore wind farm investment tools, wind turbine CAPEX and OPEX tools and detailed market and supply chain models able to estimate demand on the segment and component level.

**Wind Farm Investments**

Making profitable wind farm investments and accurately assessing opportunities and risks require in-depth understanding of the market and legal environments, wind turbine performance and costs, and project finance. At MAKE, we possess the right skills and experience for successful wind farm portfolio screening and project valuation and to advise clients on their investment strategies.

**Management Consulting**

Whether you are developing a strategy, planning an acquisition, considering an investment project, improving your cost structure, or mapping new technologies that affect your business, MAKE has the proven track record to drive your project to a quick and successful closure. We aim to improve your business prospects by employing the right mix of experience and out-of-the-box thinking to apply an unbiased viewpoint based on a clear analytical framework and a solid working process. We provide management consulting services at both the strategic and operational level.
A sample of our wind industry due diligence engagements

- Commercial due diligence on a global top-5 wind turbine manufacturer (conducted for a large private equity fund, 2014/15)
- Commercial and technical due diligence on a global fleet of wind power asset (conducted for an industrial buyer, 2014)
- Commercial due diligence on a leading gearbox manufacturer (conducted for a large private equity fund, 2014)
- Vendor due diligence on a globally leading blade manufacturer (conducted for the owner, 2014)
- Vendor due diligence on a globally leading tower internals suppliers (conducted for the owner, 2014)
- Technical due diligence on leading wind turbine manufacturer (conducted for the owner, 2014)
- Commercial due diligence on an offshore project pipeline (conducted for a large financial institution, 2014)
- Commercial and technical due diligence on a smaller European wind turbine manufacturer (conducted for a Chinese industrial company, 2013)
- Commercial due diligence on a leading sub-sea services provider conducted for a medium sized private equity fund (2013)
- Commercial and technical due diligence on a leading offshore cable protection system supplier conducted for a medium sized private equity fund (2013)
- Commercial due diligence on a leading blade core material supplier conducted for a medium sized private equity fund (2013)
- Commercial and technical due diligence on a Chinese wind turbine manufacturer conducted for a medium sized private equity fund (2013)
Business principles and code of conduct

We are a reliable and professional company
- Our material is fact based, peer reviewed and of the highest quality
- Our material is based upon our own extensive databases, and supported by structured analysis and research processes
- Our sources are well-known and reliable industry experts with proven success in the wind industry
- We only take on tasks that we are capable of completing to the expectations of our clients

We operate with honesty and integrity
- We are committed to conduct our business with the highest degree of integrity and ethics and in compliance with all applicable laws and regulations
- We protect the intellectual property of all of our clients in all of our business activities
- We maintain complete confidentiality of all data sourced from our global network of industry experts
- We require our employees to act lawfully, honestly and with integrity
- We do not tolerate bribery, corruption, improper payments, facilitation payments or fraudulent practices of any kind
- We do not tolerate any anti-competitive practices
- We do not allow our employees to engage in any act that might result in a conflict of interest between their own interests and those of the company. For example, our employees cannot undertake board work in other companies within the industry and cannot hold shares in any company within the industry

We are committed to provide a healthy and safe workplace and to operate in an environmentally and socially responsible manner
- We are committed to protect the health and safety of all employees within MAKE
- We expect our employees to comply with applicable local laws, standards and instructions relating to health and safety in their workplace
- We strive to provide authoritative opinion with the purpose of guiding and enhancing renewable development
Europe wind power market outlook

Germany and UK offshore will drive European market development

Flat onshore market
- Consistent growth from 2014 to 2020e
- Germany, UK and Turkey are the largest onshore markets totaling 39% of onshore installations from 2014 to 2020e
- Northern Europe accounts for 56% of total European installations in the period 2014-20e while Eastern Europe and Southern Europe make up 15% and 29% of total European installations, respectively
- Slow recovery in Southern Europe expected post 2015e

Significant offshore growth
- Europe leads the offshore segment with 1.8GW installed in year to date
- Overall significant growth expected in the sector from 2014-2020e with a CAGR of 16%
- Despite some regulatory uncertainty in the key offshore markets, investments in offshore assets are still expected to remain attractive enough to encourage growth in the sector

Source: MAKE Q4/2014 Market Outlook Update
Note: Capacity numbers are based on annual installed capacity except for offshore which is grid-connected capacity
Europe wind power market outlook

European onshore upgraded in the North, South and in the East

N. Europe – UK and Germany upgraded

- Onshore and offshore upgrades result in net 4GW upgrade in the subregion, mostly thanks to German onshore - driven by enhanced regulatory clarity - and Swedish offshore growth, due to new political support
- MAKE upgraded Swedish onshore by 100MW for 2014 based on accelerated activity; we have downgraded it by 175MW for 2015 due to investor uncertainty stemming from low power and green certificate (GC) prices. GC prices to pick up again for 2016
- Dutch onshore has been downgraded by 100MW for 2014 due to licence delays. Upgrades have been made for Austria (50MW) and Belgium (40MW), following the expected connection of a higher amount of projects

S. Europe, France to drive growth

- We project an overall 254MW upgrade in Southern Europe over the 10-year outlook thanks to France
- Very modest activity in Spain in the aftermath of the subsidy crisis
- A 400MW upgrade in France in 2014 and 2015 is due to more favorable regulatory conditions for wind growth established by the Energy Transition Bill
- A 150MW downgrade in Italy for 2014 reflects slower activity and increased investor uncertainty as to the future of renewable energy subsidies

Source: MAKE
Europe wind power market outlook

Eastern Europe marks slight growth

E. Europe – Croatia and Romania upgraded

- A 241MW upgrade in Eastern Europe driven by Romania and Croatia
- A 160MW upgrade for 2014 in Romania based on increased activity
- Croatia, Czech Republic and Montenegro have been upgraded due to commissioning of new projects from 2014 to 2020
- Ukraine downgraded by 31MW due to prolonged unrest in the eastern part of the country
- MAKE has redistributed new capacity in Russia (51MW in 2015, 70MW in 2016 and 150MW in 2017), with a slight downgrade

Uncertainty in MEA leads to downgrade

- A significant 10% downgrade from the Q3 outlook
- Significant downgrade (800MW) in Saudi Arabia due to lower confidence in the government’s intention to support wind development, as solar becomes more likely to get priority
- A 500MW downgrade in South Africa after REIPPPP Round3 financial close delays due to grid issues, which creates uncertainty for the 4th round
- Despite a very ambitious plan, MAKE has downgraded its forecast for Ethiopia (300MW) due to slow progress
- Announcement of a 225MW project for Mainstream Renewable in Ghana results in an upgrade in 2017
Market forecast, 2014e – 2020e – *Installed capacity*

(MW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Offshore</th>
<th>Onshore</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014e</td>
<td>3.800</td>
<td>784</td>
</tr>
<tr>
<td>2015e</td>
<td>2.400</td>
<td>1,971</td>
</tr>
<tr>
<td>2016e</td>
<td>2.400</td>
<td>690</td>
</tr>
<tr>
<td>2017e</td>
<td>1.600</td>
<td>970</td>
</tr>
<tr>
<td>2018e</td>
<td>1.800</td>
<td>828</td>
</tr>
<tr>
<td>2019e</td>
<td>1.800</td>
<td>492</td>
</tr>
<tr>
<td>2020e</td>
<td>2.000</td>
<td></td>
</tr>
</tbody>
</table>

-11% decrease

Drivers and barriers

Drivers
- The new EEG* 2014 has set a target of 35% of gross electricity production derived from renewables in 2020
- Similarly, there are interim targets of 40-45% by 2025 and 55-60% by 2035
- 12GW of nuclear energy is to be shutdown by 2022. Additional renewable energy will be necessary to fill the gap
- Although the tariffs offered through the EEG 2014 are slightly lower than those offered through the EEG 2012, MAKE expects them to be sufficient to deliver stable growth in the market
- Development plans for expansion of German grid both to integrate onshore and offshore wind exist, and continuous discussions about further plans continue

Barriers
- Regulatory uncertainty post 2017 creates difficulties in planning forward
- There is an annual expansion cap set at 2.5GW for onshore wind in 2016
- Grid expansion needs to further adapt to transition from nuclear to wind energy

Market evaluation

<table>
<thead>
<tr>
<th>Macro and policy related criteria</th>
<th>Evaluation</th>
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<tr>
<td>Macro conditions</td>
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<tr>
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<td></td>
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<tr>
<td>Overall assessment</td>
<td></td>
</tr>
</tbody>
</table>

Source: MAKE
Note*: EEG - Erneuerbare Energien Gesetz (Renewable energy source act)
Review of key wind power markets

UK

Market forecast, 2014e – 2020e – Installed capacity

(MW)

Drivers and barriers

Drivers
- Wind specific NREAP* target is around 27.9GW by 2020 (14.9GW of onshore and 13GW of offshore)
- NREAP* target is to achieve 15% of energy consumption from renewables by 2020
- U.K. has increased its national target for offshore to 18GW by 2020
- A guaranteed revenue stream is one of the clear advantages of the CfD* compared to the RO*, as generators under the RO are exposed to fluctuations in power prices and ROC* prices

Barriers
- Concerns over the budget pertaining to the CfD allocation has created a certain amount of uncertainty in the market. Fearing many projects may not be able to secure funding
- Discontinuation of the intended export deal between Ireland and the UK will hit onshore drastically
- The power mix in the UK still primarily consists of fossil fuels

Market evaluation

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</table>

Source: MAKE

Note*: CfD - Contract for difference, RO - Renewables obligation, ROC – Renewables obligation certificate, NREAP - National renewable energy action plan
Review of key wind power markets

France

Market forecast, 2014e – 2020e – Installed capacity

(MW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Offshore</th>
<th>Onshore</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014e</td>
<td>900</td>
<td>2</td>
</tr>
<tr>
<td>2015e</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>2016e</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>2017e</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>2018e</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>2019e</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>2020e</td>
<td>1,000</td>
<td></td>
</tr>
</tbody>
</table>

+8%

Drivers and barriers

Drivers

- France has a target of 25GW by 2020 – 19GW onshore and 6GW offshore in order to reduce its reliance on nuclear power from the current 75% to 50% by 2025
- Introduction of carbon tax with proceeds going towards energy transition
- Restoration in the French FIT* scheme will create certainty amongst investors
- Growth expected from energy transition bill:
  - 23% renewables share of gross final consumption 2020
  - 40% reduction of greenhouse gas emission from 1990 to 2030
  - 30% reduction of fossil fuels consumption by 2030

Barriers

- Lengthy permitting procedures create bottlenecks in construction of wind projects
- Grid delays as well are main concern

Market evaluation

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Source: MAKE

Note*: FIT – Feed in Tariff
**Turkey**

**Market forecast, 2014e – 2020e – Installed capacity**

(MW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Onshore</th>
<th>Offshore</th>
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<tbody>
<tr>
<td>2014e</td>
<td>600</td>
<td>850</td>
</tr>
<tr>
<td>2015e</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>2016e</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td>2017e</td>
<td>600</td>
<td>850</td>
</tr>
<tr>
<td>2018e</td>
<td>600</td>
<td>900</td>
</tr>
<tr>
<td>2019e</td>
<td>1,200</td>
<td>1,200</td>
</tr>
<tr>
<td>2020e</td>
<td>1,200</td>
<td>1,200</td>
</tr>
</tbody>
</table>

**Drivers and barriers**

**Drivers**
- Ambitious wind target of 20GW by 2023. The potential for wind energy is 48GW
- Target of 30% of energy to be produced from renewables sources by 2023
- Strong dependence on oil (93 to 94%) and gas (98 to 99%) for its domestic consumption
- The new EML to create favourable conditions for future wind investments and as a step towards increased renewable energy integration
- Significant local content bonus of up to 2.95 ct/kWh for fully locally produced wind turbine

**Barriers**
- Duration of preliminary license of 24 months under new EML puts a great deal of pressure on investors concerned about bureaucratic processes
- Entrance of nuclear power in the will have an impact on the generation mix

**Market evaluation**

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</table>

Source: MAKE
Note: EML – Electricity market law
Review of key wind power markets

Sweden

Market forecast, 2014e – 2020e – Installed capacity

Drivers and barriers

Drivers
- NREAP* target is to achieve 49% of energy consumption from renewables by 2020
- Wind specific NREAP target is around 4.5GW by 2020 (4.4GW of onshore and 0.2GW of offshore)
- Joint GC system with Norway, where a combined target has been set for 13.2TWh by 2020
- Strong renewable energy support mechanisms in the form of tax incentives as well as the possibility of GC quota increase drive growth of wind

Barriers
- Strong dominance by nuclear and hydro power drive power in Norway
- Low electricity prices at present deter renewables investment
- Compliance with renewable energy target could lead to slower growth

Market evaluation

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</tr>
</tbody>
</table>

Source: MAKE
Note*: NREAP – National renewable energy action plan
Glass alternatives to carbon fiber increasingly used to avoid quality issues
Truss structure blades and AT show promise to grow rotors while reducing loads and cost
Component technology trends
Direct drives expected to make modest gains in each region

2014e drivetrain segmentation

<table>
<thead>
<tr>
<th>Region</th>
<th>Medium Speed</th>
<th>Direct Drive</th>
<th>High Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMER</td>
<td>11%</td>
<td>29%</td>
<td>62%</td>
</tr>
<tr>
<td>APAC</td>
<td>89%</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>EMEA</td>
<td>38%</td>
<td>9%</td>
<td>72%</td>
</tr>
<tr>
<td>Offshore</td>
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</table>

2020e drivetrain segmentation

<table>
<thead>
<tr>
<th>Region</th>
<th>Medium Speed</th>
<th>Direct Drive</th>
<th>High Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMER</td>
<td>11%</td>
<td>25%</td>
<td>74%</td>
</tr>
<tr>
<td>APAC</td>
<td>89%</td>
<td>33%</td>
<td>64%</td>
</tr>
<tr>
<td>EMEA</td>
<td>8%</td>
<td>33%</td>
<td>59%</td>
</tr>
<tr>
<td>Offshore</td>
<td></td>
<td></td>
<td>28%</td>
</tr>
</tbody>
</table>

Direct drive growth expected in all regions, high speed gearboxes will maintain majority
Offshore expected to converge on direct drive with 50% marketshare by 2020
Direct drive commercial uptake is lagging geared systems

Generator technology roadmap

Component technology trends

Direct drive technology shows lots of innovation potential
Cost control of heavy generators will be critical to commercial adoption
Component technology trends

Global converter segmentation – architecture and location

2014 converter segmentation

<table>
<thead>
<tr>
<th>Region</th>
<th>AMER</th>
<th>APAC</th>
<th>EMEA</th>
<th>Offshore</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>84%</td>
</tr>
<tr>
<td>32%</td>
<td>63%</td>
<td>10%</td>
<td>6%</td>
<td>18%</td>
</tr>
<tr>
<td>34%</td>
<td></td>
<td></td>
<td>26%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Total GW: 11.4

2020 projection – converters

<table>
<thead>
<tr>
<th>Region</th>
<th>AMER</th>
<th>APAC</th>
<th>EMEA</th>
<th>Offshore</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>84%</td>
</tr>
<tr>
<td>32%</td>
<td>63%</td>
<td>10%</td>
<td>6%</td>
<td>18%</td>
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<tr>
<td>34%</td>
<td></td>
<td></td>
<td>26%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Total GW: 11.2

Source: MAKE

Partial power converters expected to maintain over 50% marketshare due to cost, reliability and efficiency advantages over full power converter systems
Controls technology roadmap

- Drivetrain
- Loads

Evolution path for CMS technology

Adoption rates of various CMS technologies

- Temperatures (oil, coolant, bearings)
  - 95+
- Drivetrain vibration
  - 60
- Gearbox oil particles
  - 25
- Rotor loads
  - <5

CMS success stories will translate to increased adoption of complex CMS technologies

Source: MAKE

Change in total CAPEX cost
(Euros/MW)

Source: MAKE

Significant opportunity for controls technology to reduce loads, increase energy production and improve operations and maintenance expenses
Component technology trends

Tower technologies are diversifying and growing taller

**Average hub height trends**

- Onshore average hub heights (meters)
- AMER
- APAC
- EMEA

**Global tower type segmentation**

- Alt. steel
- Concrete
- Steel tubular

Steel towers will continue to provide lion's share of global installations
Demand for taller towers will stimulate innovation in steel alternatives and concrete