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

Introduction

Shane Sun – Head of APAC at MAKE

- Heads MAKE’s operations in Asia-Pacific and leads the execution of custom consulting projects.
- Solid background in the Chinese wind industry including from Goldwind Science & Technology
- Extensive investor relations, market research, financial analysis consulting and senior management experience in the wind industry.
- BSc Honours in Management
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.
Introduction

A sample of our clients
Introduction

Our team that is always ready to serve you
Introduction

Launching the MAKE app

Renewable energy intelligence at your fingertips
Global Wind Power
Growing Opportunities for Japanese Companies
Global electricity generation increases by ~64% to 2040

Outlook for electricity generation 1990-2035e (TWh)

Growth in global installed electricity generation capacity from 2014 to 2040 from 6,117 GW to 11,168 GW, corresponding to 83% increase. 63% of global investments in new power plants are in renewables mainly wind, hydro and solar, while 1,500 GW conventional power plant is expected to retire.
Global Market Trends

Global wind power market to see sustained growth

Global grid-connected forecast: 2013-2025e

Emerging markets and offshore the strongest growth segments overall. US and Europe remain stable demand drivers to 2020, while China demand growth has slowed due to grid congestion.
Global Market Trends

Offshore wind segment to triple in share of global market

Global grid-connected forecast: 2013-2025e

Offshore growth largely to be European until 2020 after which Chinese offshore is expected to be a key driver for global demand
Global Market Trends

Europe key market for offshore in the medium term

Global offshore wind grid-connected forecast: 2013-2025e

European near term offshore wind growth, technology development and scaling and industrialisation of supply chain is key for reducing offshore wind LCOE
More than 70% of new offshore wind farms in Europe will be commissioned in the UK, Germany, and the Netherlands. France will also become a key market from 2020.
Asia Pacific offshore wind power demand

Asia Pacific market to add 23.5GW through 2025

Transition to large-scale nearshore projects helps China maintain its market leader position. Port projects will boost Japan’s share from 2020 onwards.
American offshore wind power demand
US offshore wind outlook: 1.6GW expected by 2025

US offshore wind outlook, 2016e to 2025e

Outlook by state, 2016e to 2025e

Four states in the Northeast – MA, RI, NY, and MD – comprise 98% of the 10-year offshore outlook. Demand in NY and MA drives most of the capacity built offshore of RI.

Source: MAKE
Thanks to its maturity as an asset class, offshore wind increasingly attracts financial investors such as banks, pension funds and infrastructure funds.
Utilities’ power generation in 2015

<table>
<thead>
<tr>
<th>Utility</th>
<th>Renewables</th>
<th>Other</th>
</tr>
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<tbody>
<tr>
<td>DONG Energy</td>
<td>55%</td>
<td></td>
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<tr>
<td>SSE</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Iberdrola</td>
<td>24%</td>
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<tr>
<td>Statkraft</td>
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</tr>
<tr>
<td>Vattenfall</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>E.ON</td>
<td>6%</td>
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<tr>
<td>RWE</td>
<td>5%</td>
<td></td>
</tr>
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</table>

European utilities are under significant pressure

- Low power prices have deteriorated conventional power generation business
- Utilities such as DONG Energy, E.ON and RWE are transitioning from fossil fuel to renewable generation assets
- Asset owners’ strategies involve strengthening of balance sheets, lower dependence on fluctuating commodity prices and focus on regulated activities to secure stable

Subdued power prices are threatening conventional power generation assets as utilities sell or decommission their fossil fuel assets to increase renewable generation.
Global Market Trends

Global O&M revenue to exceed USD 22 Billion by 2025

O&M market opportunity varies by region

- Americas near-term O&M boom from repowering
  - Aging US fleet being retrofitted with longer blades for 10 years of additional PTC
  - ISP acquisition and new O&M business models have changed competitive landscape in US
  - Brazil O&M remains in OEM control in near-term
- Europe O&M is largest market segment in 2015
  - High cost of service due to age of fleet and wind plant demographics
  - Regionally distributed and technically diverse fleets prohibits building O&M economies of scale
- Asian market to grow rapidly, will be largest market by 2025
  - Many Chinese asset owners establishing in-house teams to provide service to growing fleets
  - Services pricing lower than other regions, but expected to escalate over time
- Offshore O&M presents unique challenges
  - Full analysis of Offshore O&M market reserved for separate MAKE Research Note (Q4/2015)

Global O&M revenue to grow by 10%

Market opportunity defined by scale and age of installed base, in addition to price sensitivity of regional markets
Global Market Trends

Wind energy LCOE leaders have established scale

### Wind energy LCOE by country - 2016 (€/MWh)

<table>
<thead>
<tr>
<th>Country</th>
<th>LCOE (€/MWh)</th>
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</thead>
<tbody>
<tr>
<td>US</td>
<td>47</td>
</tr>
<tr>
<td>Brazil</td>
<td>48</td>
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<tr>
<td>Germany</td>
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<td>India</td>
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<td>France</td>
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<tr>
<td>UK</td>
<td>78</td>
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</table>

### Sensitivity of LCOE to input factors

#### Change in LCOE (€/MWh)

<table>
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<th>Change in LCOE</th>
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<tr>
<td>ENERGY</td>
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<td>OPEX</td>
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<td>CAPEX</td>
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<tr>
<td>WACC</td>
<td>-10%</td>
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<tr>
<td>WACC</td>
<td>-20%</td>
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</tbody>
</table>

#### % change in input variable

FX: (EUR/-) USD:0.88, BRL:0.25, GBP:1.25, ZAR:0.058, kINR:13, RMB:0.14

Note: All LCOE shown in Nominal 2016 EUR/MWh

Source: MAKE

Note: Germany onshore 2016 baseline scenario

Source: MAKE

Americas have LCOE leadership, due to growing installs and high winds

High production, turbine pricing and low cost of capital are critical to LCOE leadership
Global Market Trends

LCOE improvements will be enabled by technical innovation

Onshore wind energy LCOE reduction and impact from technology development

Improving cost position and higher turbine performance are largely due to technical shifts in blades, towers and drivetrains.
Global Market Trends

Record low offshore subsidy prices increase confidence in sector

Recently awarded subsidies

Race to the bottom expected through tenders in Denmark, the Netherlands and the UK. China reduce costs later due to short-term move from inter-tidal to nearshore projects.
Offshore wind LCOE

Offshore wind has cost reduction opportunities in multiple areas including scale

**Turbines & plant**
- Larger turbines and wind farms
- Increased reliability
- Scale effects and industrialisation

**Substructures**
- Standardised and optimised offshore foundation design and design criteria
- Industrialised manufacturing

**Transmission**
- eBoP optimisation of substation and transmission capex
- Innovative transmission solutions
- Improved grid access

**O&M**
- Low OPEX drivetrains
- Turbine and component quality
- Condition monitoring, diagnostics, preventive maintenance

Source: Siemens, MHI-Vestas, MAKE
Monopiles will continue to dominate towards 2020

The application of suction bucket jackets has increased the benefits of jackets as the suction buckets allow for cost reductions in both installation and decommissioning.
European opportunities for Japanese companies
EMEA with above average growth from offshore and EMs

EMEA grid-connected forecast: 2013-2025e

<table>
<thead>
<tr>
<th>Year</th>
<th>Offshore</th>
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</tbody>
</table>

Source: MAKE

Northern Europe account for 86% of EMEA offshore demand from 2017 to 2025 and today the entire offshore wind supply chain and know-how is centered in Northern Europe.
European opportunities for Japanese companies

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

Source: MAKE
European opportunities for Japanese companies

Europe supply chain concentrated around historic markets

Nacelles production footprint of key suppliers, Europe

Denmark, Germany and Spain pioneered wind power development and supply chain and knowledge footprint is heavily concentrated around those markets.
## European opportunities for Japanese companies

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

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

<table>
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<tr>
<th>Component segment</th>
<th>Buyer segment</th>
<th>Asset owners</th>
<th>Non-wind industrial conglomerates</th>
<th>Conglomerate competitor</th>
<th>Pure-play competitor</th>
<th>Private equity funds</th>
<th>Opportunity for M&amp;A activity in short/medium term</th>
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<tr>
<td>O&amp;M/ISPs</td>
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<td>Controls/Tech</td>
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</tbody>
</table>

Source: MAKE

- ![Green](green) M&A
- ![Red](red) Partnerships
European opportunities for Japanese companies

Get industry leading research and advise on wind power M&A

Favourable global wind power demand dynamics despite recent pricing plunge in energy commodities

EMEA with solid demand and attractive technology and supply chain opportunities for market entry or international expansion and business development

Denmark and Europe offers excellent M&A opportunities for market entry or expansion by Japanese companies

“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 commercial and technical due diligence, allowing your organization to draw well-informed conclusions and prepare successful investment and exit strategies.”
MAKE

Delivering renewable energy insight™

About MAKE
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.
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.
The MAKE knowledge model

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.

**Markets**

**Tier I Markets:**
- China
- U.S.
- India
- Germany
- United Kingdom
- Brazil
- Canada

**Tier II Markets:**
- Mexico
- France
- Turkey
- Australia
- Sweden
- Netherlands

**Tier III Markets:**
- Italy
- Poland
- Ireland
- Japan
- South Africa
- Chile
- Denmark
- Belgium
- Finland
- Greece
- Russia
- Romania
- Ukraine
- Norway
- Egypt
- Argentina
- Austria
- Morocco
- Pakistan
- South Korea
- Ethiopia
- Spain
- Peru
- Venezuela
- Saudi Arabia
- Uruguay
+ 100 more markets
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 & maintenance

Value Chain
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:

- **Wind Turbine**
  - Rotor
  - Nacelle
  - Tower
  - Control systems
  - Components

- **Balance of Plant**
  - Foundations
  - Substations
  - Electrical work
  - Installation equipment

- **Offshore**
  - Installation vessels
  - Cable-laying vessels
  - Foundations
  - Substations
  - Transmission cables
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
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.
Renewable Energy Intelligence Suite

Introducing Solar

MAKE now offers eight different subscription packages
# Renewable Energy Intelligence Suite

## MAKE tiered subscription structure

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<thead>
<tr>
<th>BASIC</th>
<th>EXTENDED</th>
<th>PREMIUM</th>
<th>PREMIUM+</th>
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<td>0 Regional Reports</td>
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### Semi-annual Global Wind Turbine OEM Market Share forecast
- 2 Solar Market Outlook Updates
- 10 Analyst Access Hours
- > 25 Flash Notes

### OFFSHORE
- The OFFSHORE subscription is specially designed for the specific intelligence needs of our offshore wind power clients. It includes:
  - 2 Company Reports
  - 2 Company Databases
  - > 5 Research Notes
  - > 6 Research Notes

### SOLAR
- The SOLAR subscription is specially designed for the cover the most important areas and challenges facing solar power today. It includes:
  - 1 Market Report
  - 1 Company Report
  - 2 Databases
  - All relevant Flash Notes
  - Analyst Presentations

### € 8,000
- All relevant Flash Notes
- Analyst Presentations

### € 6,000
- All relevant Flash Notes
- Analyst Presentations
## Subscription overview

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# Renewable Energy Intelligence Suite

## Subscription overview

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### Publishing schedule

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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 MAKE’s recent wind industry due diligence engagements

- Commercial due diligence on a global top-5 wind turbine OEM (Client: PE)
- Commercial and technical due diligence on a global fleet of wind power assets (Client: Industrial conglomerate)
- Commercial due diligence on a leading gearbox manufacturer (Client: PE)
- Vendor due diligence on a globally leading blade manufacturer (Client: Owner)
- Vendor due diligence on a globally leading tower internals suppliers (Client: Owner)
- Technical due diligence on leading wind turbine OEM (Client: Owner)
- Commercial due diligence on an offshore project pipeline (Client: PE)
- Commercial and technical due diligence on a European wind turbine OEM (Client: Industrial conglomerate)
- Commercial due diligence on a leading sub-sea services provider (Client: PE)
- Commercial and technical due diligence on a leading offshore cable protection system supplier (Client: PE)
- Commercial due diligence on a leading blade core material supplier (Client: PE)
- Commercial and technical due diligence on a Chinese wind turbine OEM (Client: PE)
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
Contact

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ssu@consultmake.com

consultmake.com

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