Standardization, certification and training needs in Taiwan
A European perspective

Per Enggaard Haahr
25 April 2019
Agenda

01 Brief introduction to DNV GL
02 Standardization
03 Certification
04 Offshore wind challenges
05 Training needs
OUR PURPOSE

TO SAFEGUARD LIFE, PROPERTY AND THE ENVIRONMENT
We apply deep insights and diverse industry domain competence

- We **classify, certify, verify and test** against regulatory requirements, standards and recommended practices
- We develop new **rules, standards and recommended practices**
- We **qualify new technologies** and operational concepts
- We give **expert advice** on safety, technology, data management, efficiency, performance, risk management
DNV GL in the energy industry

2300
2,300 energy experts in wind, solar, grids, storage and energy management

30
Offices in 30 countries in every continent

90
90 years experience in the power industry, including 40 years in wind energy and energy management and more than 20 years in solar
Broad and deep expertise in offshore wind projects

FEASIBILITY
- Market intelligence
- Strategic advice
- Technology evaluation/Technology qualification
- Certification of wind turbines, offshore substation and cables

DEVELOPMENT
- Concept selection
- Measurements
- Resource and energy optimization
- Technical due diligence
- Pre-construction energy assessment
- Certification of wind turbines, offshore substation and cables

ENGINEERING
- Project engineering optimization
- Operation and maintenance planning
- Turbine and support structures consulting
- Interconnection review
- Certification of wind turbines, offshore substation and cables

CONSTRUCTION
- Construction optimization
- Monitoring and marine warranty
- Project management
- Construction monitoring
- Banks’ engineer
- Certification of wind turbines, offshore substation and cables

OPERATION
- Asset management optimization
- Operation and maintenance optimization
- Performance and condition monitoring
- Inspections and audits
- Operational energy assessments
- Project portfolio due diligence
- Certification of wind turbines, offshore substation and cables
- Condition monitoring systems

*Our testing, certification and advisory services are independent from each other
65GW
We have analysed over 65GW of operational wind projects

2400+
We conduct over 2,400 wind inspections each year

1GW
We are technical advisor to the lenders on Fosen, the world’s largest onshore wind farm at 1GW

90%
90% of certified offshore wind farm projects utilized our project certification

No. 1
Our BLADED tool is the world’s best-selling design tool for wind turbines

1st
We conducted the world’s first hardware-in-the-loop testing for an entire wind farm

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Standardization

- **Standardization:**
  - is the *process* of implementing and developing *technical standards* based on the *consensus* of different parties that include firms, users, interest groups, standards organizations and governments (CNS 15176-22, 15176-1)
  - Standardization can help to *maximize* compatibility, interoperability, *safety, repeatability, or quality* (TDD or PC)
  - It can also *facilitate commoditization* of formerly custom processes

- Standards and Standardization for **Certification** (safety & compatibility)
- Standardised **training** of personnel
- Standardization to **cost optimize**
Technical standards

- Increased adoption of a **new technology** as a result of **standardization** is important because rival and incompatible approaches competing in the marketplace can **slow** or even **kill** the growth of the technology.
- Accepting internationally recognised standards improve the **speed of introduction** of wind energy to Taiwanese market due to transparency.
- Adopting these standards increase the **speed** with which developers are able to implement **localized production**.
- Having defined and recognized standards **clarifies** to all stakeholders the requirements for **approval** and operation.
- Standards can also be the basis for **explaining** to the **public** what is required for implementing and securing operation of assets and some **transparency for the cost of development**.
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Certification vs. verification and consultancy

CERTIFICATION
- Perform independent third party evaluation
- Scope and assessment criteria fixed -> international / industry standards
- Standards reduce uncertainty and costs for owners
- **CAN NOT** participate in design work

VERIFICATION
- Perform independent third party evaluation
- Scope and assessment criteria decided by client
- Larger uncertainty and costs for owners
- **CAN NOT** certify the product

CONSULTANCY
- Give advice / participate in design work
- **CAN NOT** certify the product
Taiwan Government and Energy

BSMI is responsible for technical requirements.

BoE is responsible for permitting process for operation.

BoE

BSMI

Industrial Development Bureau

Bureau of Foreign Trade

Bureau of Standards, Metrology and Inspection

Bureau of Energy

Bureau of Mines

Ministry of Economic Affairs

Ministry of Interior

Ministry of Foreign Affairs

Ministry of National Defense

Ministry of Education

Ministry of Finance
Taiwan and Project Certification 2022

BoE issues final permission for operation based on Certification approved by BSMI.

1) Project sends design documents for Third Party approval (Project Certification)
2) Project receives PC from the CB
3) Projects sends PC to BSMI for approval according to scheme (CNS 15176-22)
4) BSMI sends approval to Project
5) Projects sends BSMI accept of PC to BoE for permission to operate
6) BoE gives permission to operate to Project
Wind power plant – ASSETS
Power plant project and certification: Phases

Project phases

Simplified phases

- Development
- Construction
- Operation and Maintenance
- Decommissioning

Certification phases

- Concept
- Design basis
- Design
- Manufacturing
- Transport and installation
- Commissioning, Operation and Maintenance
- In-service
- Lifetime extension
- Decommissioning
- Repowering
PROJECT CERTIFICATE

Certificate No.
Issue Date

Issued for:
(Wind Power Plant)

Issued by:
(Wind Power Plant Developer)

According to:
DNVGL-SE-0190:2015-12 Project certification of wind power plants

Based on the documents:

STATEMENT OF COMPLIANCE

Statement No.

Issued for:
(Wind Power Plant)

Issued by:
(Wind Power Plant Developer)

According to:
DNVGL-SE-0190:2015-12 Project certification of wind power plants

Based on the documents:

Benefits by independent 3rd party – Accredited Certification Body

- **Confirmation of requirements** as stated by project developers, investors, operators, manufacturers governmental and non-governmental organisations
- **Building of trust** in the design and construction (confidence in technical integrity)
- **Increasing reliability** in the **governmental** and consumer interests
- Securing **sustainable energy production** throughout life cycle
- Supporting **authority approvals** and allow for subsidies
- **Secure investments** and optimise return of investment
- Secure **better insurance rates** and **increased coverage**
- **Minimising financial project risks**, eases **buying** decision
- Independent **expertise** by an objective 3rd-party (four-eyes-principle)
- Support of **internal quality** management
- **Mitigate risks to environment and people**
## Agenda

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### Localization requirements, Taiwan

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<th>Lead time</th>
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**Timeline**

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Offshore wind challenges globally – Need of Standards or training?

- Quality of site investigations
- Turbine model for load determination
- Conservative design
- Design basis
- Turbine fit for the site
- All interfaces
- Standards applied
- Fatigue
- Quality versus price
- Damping
- Corrosion protection
- Delays

Maybe need of Standards AND training
Taiwan offshore challenges

- Developers
- Financing
- Site conditions
- Designers
- Legislation
- Regulation (consent/approval)

- Contractors
- Manufacturers
- Ship owners & operators
- Ports
- Infrastructure
- Legislation
- Regulation (consent/approval)

- Grid infrastructure
- Grid connections
- Service operators
- Ports
- Spare parts
- Legislation
- Regulation (consent/approval)

For all technical related areas DNV GL has experts & services that can help build local capacity
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Training needs

- Public information and understanding of renewables
- Understanding the environment for development related to permitting processes
- Understanding financial risks for offshore investments and RoI
- Understanding the necessary data needed for design of offshore wind assets
- Engineering skills in offshore engineering according to relevant technical standards
- What is the long term targets and Subsidy plans and guarantees
- How flexible is the regulation and what may change. Are the right standards in place
- Third party approvals?
Training needs

- Understanding rules & regulation for offshore work in Taiwan & Taiwan strait
- Shop approval or relevant certification of QMS and personnel for offshore assets
- How to operate in Taiwan ports and strait. Class rules and vessel availability
- Ports availability for storing and handling facilities
- Local and global transportation
- Grid connections. Regulation of power supply
- Requirements for localisation
- Permitting process
- Third party approvals?

Construction

- Contractors
- Manufacturers
- Ship owners & operators
- Ports
- Infrastructure
- Legislation
- Regulation (consent/approval)
Training needs

- GCC and how to regulate (LVRT, HVRT)
- Connection points and transformers
- Technical training wrt. Maintenance requirements and threshold parameters
- Safety training
- Port logistics and handling facilities
- Availability of spare parts. Local manufacturing?
- Requirements for inspection and surveillance from authorities
- Third party approvals?
Standards are available

- **Certification schemes for offshore wind are available:**
  - International: IEC(RE), DNV GL
  - National schemes are often based on IEC with local amendments (Germany, USA, The Netherlands, Denmark, Taiwan etc.)

- **Design and fabrication standards for offshore wind are available**
  - International: IEC(RE), ISO, DNV GL Standards
  - National standards are based on local requirements and often on standards for onshore construction or for offshore O&G

- **HSE requirements for working in wind is covered mainly by GWO**

- **Standards for onshore construction and offshore O&G are not appropriate for offshore wind**
Still developing industry

- Social awareness is important
- There are global challenges
- There are local challenges
- Standards do exist
- Training is needed globally
- Training is needed locally

- If we work together we can hopefully bring out the best for our industry

- and project certification independently checks that all the right standards and methods are applied
Thank you

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SAFER, SMARTER, GREENER