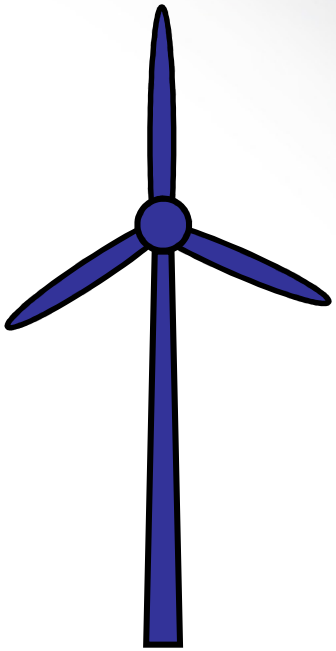
Projektzertifizierung und Due Diligence

Dr. Lars Sitzki
Global Product Manager Renewables
Treasurer IECRE

Content

- Due Diligence
- Project certification process
  - General
  - BSH approval
  - Danish approval



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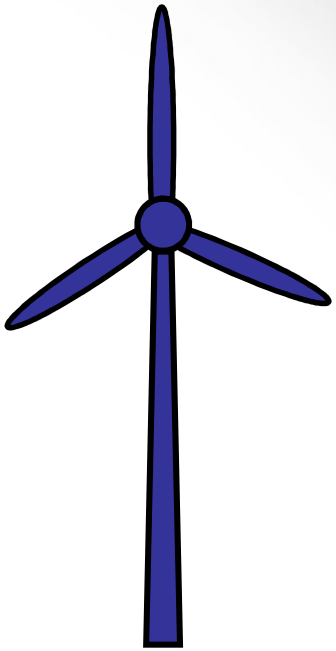

Due Diligence

- Assessment of plausibility of the energy yield (AEP) and wind potential prognosis or study
- Plausibility check of the calculated annual energy production (AEP)
- Assessment of plausibility of the current certification documents of the chosen wind turbine type
- Evaluation of technical risks of the turbine concept and technology
- Evaluation of technical risks of the foundation construction
- Assessment of plausibility of the maintenance and service concept
- Review of the interface management
- Review of the building permission and its obligations
- Assessment of plausibility of the present soil assessment reports
- Profitability analysis on the basis of the profit and loss account and the investment sum
- Review of the risks of the insurance concept
- Contract assessment on extend and completeness
- Contract assessment on legal content
- Assessment report with findings and recommendations

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Due Diligence

Investments

Costs per turbine

Costs for installation

Costs for foundation

Crane site

Grid connection

Project development, site management

Costs for transformer and cabling

Operational Costs

Insurance

Operation Management

Maintenance, service

Other costs

Repairs

Fees for technical inspections

Earnings

Energy yield brutto acc. to prognosis

Availability

Safety margin

Annual energy production netto

Feed-in tariff

Financing

Debt

Equity

Number of debt investors

Debt conditions

Economic Efficiency

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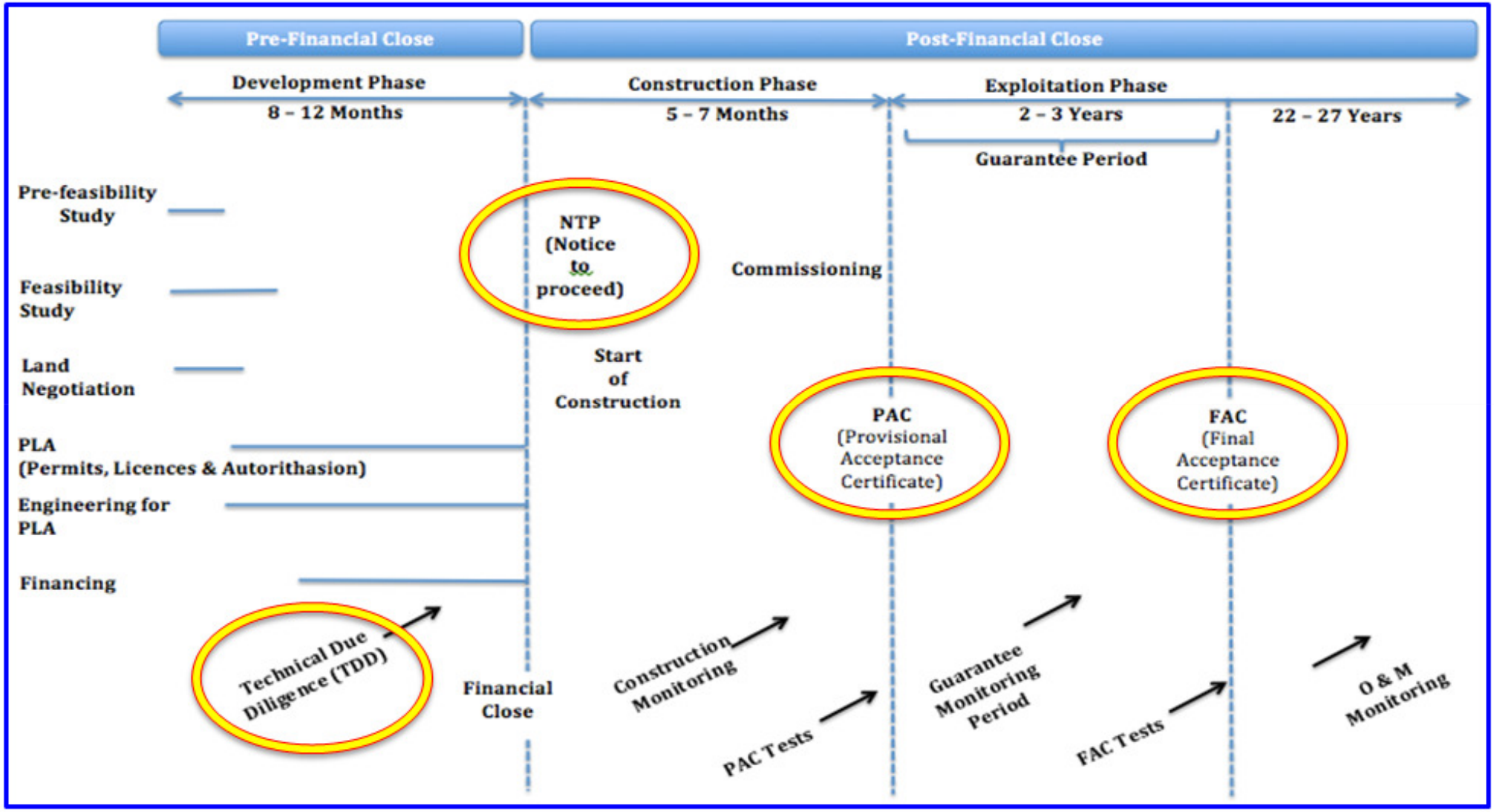
Due Diligence



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Certification of PV plants:

- Site conditions evaluation
- Site qualification report
- Application specific design parameters
- Contract review (EPC, warranty, connection, etc.)
- Utility contract, PPA & LGIA requirements into design
- Design evaluation
- Site-specific design evaluation
- Performance criteria review
- Component and equipment, procedural and contractual evaluation and selection
- Site specific acceptance of components
- Due diligence report
- Installation surveillance
- Component inspections during manufacturing
- Component inspections post manufacturing
- Intermediate status reports of construction phases
- Commissioning, yield determination and production estimate
- Preliminary acceptance certification
- Final evaluation and Certificate
- Operation and maintenance surveillance, monitoring and control, sensor calibration
- Production and yield survey

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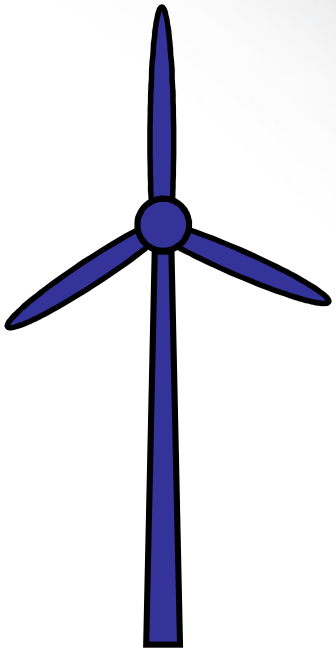

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TÜV NORD accreditations

- DAkkS accreditation (EA, ILAC, IAF) for certification of wind turbines and components (since 1994)
- Accreditation by German Government as authorized body for type approval of WTG (and amusement rides)
- Accreditation by BSH for Offshore Project Certification
- Listed as registered body by the DANISH ENERGY AUTHORITY

DAkkS Deutsche Akkreditie

Deutsche
German A

Entrusted accor
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Signatory to the
EA, ILAC and IAF

Accre

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Registration numb

Berlin, 14.06.2011

Head of Division

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

TÜV NORD
Service: CERT:
21. DEZ 2009 07 :56
Systems SysTec

BSH · Postfach 30 12 20 · 20305 Hamburg

TÜV Nord SysTec GmbH & Co. KG
Geschäftsstelle Essen
Langemarckstr. 20
45141 Essen

BSH
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Dienstsitz Hamburg

Datum
18.12.2009
Durchwahl
+ 49 (0) 40 3190 - 3534
Aktenzeichen
(bitte bei Antwort angeben)
522/Standard Konstruktion/09 M5304

Seeanlagenverordnung;
Standard Konstruktive Ausführung von Offshore-Windenergieanlagen (Standard Konstruktion)
hier: Zertifizierer/Prüfsachverständiger

Ihre Mail´s vom 13. , 21.10.2009 und 08.11.2009

Sehr geehrter Herr Petruschke,

auf der Grundlage der übersandten Akkreditierungsurkunde des "Deutschen Akkreditierungs Rat" in den Bereichen "Typen- und Projektzertifizierung von On- und Offshore Windenergieanlagen und deren Komponenten" komme ich zu der Einschätzung, dass die TÜV Nord SysTec GmbH & Co. KG in 45141 Essen über ausreichende Kompetenz hinsichtlich der Prüfung der Anforderungen des Standards "Konstruktive Ausführung von Offshore-Windenergieanlagen" verfügt.

Mit freundlichen Grüßen
Im Auftrag
Dr. Nolte

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BIC: MARKDEF1210

Certification Schemes

Certification Schemes
TÜV NORD Standard P20
IEC 61400-22
IEC WT 01
GL-Guideline 2010
GL-Guideline 2003/2004
BSH Offshore WEC
GL-Guideline Offshore 2005
DNV OS-J101
Danish Energy authority's Executive order
TAPS 2000
DIBt Guideline

The scope of TÜV NORD accreditation comprises all relevant certification schemes!

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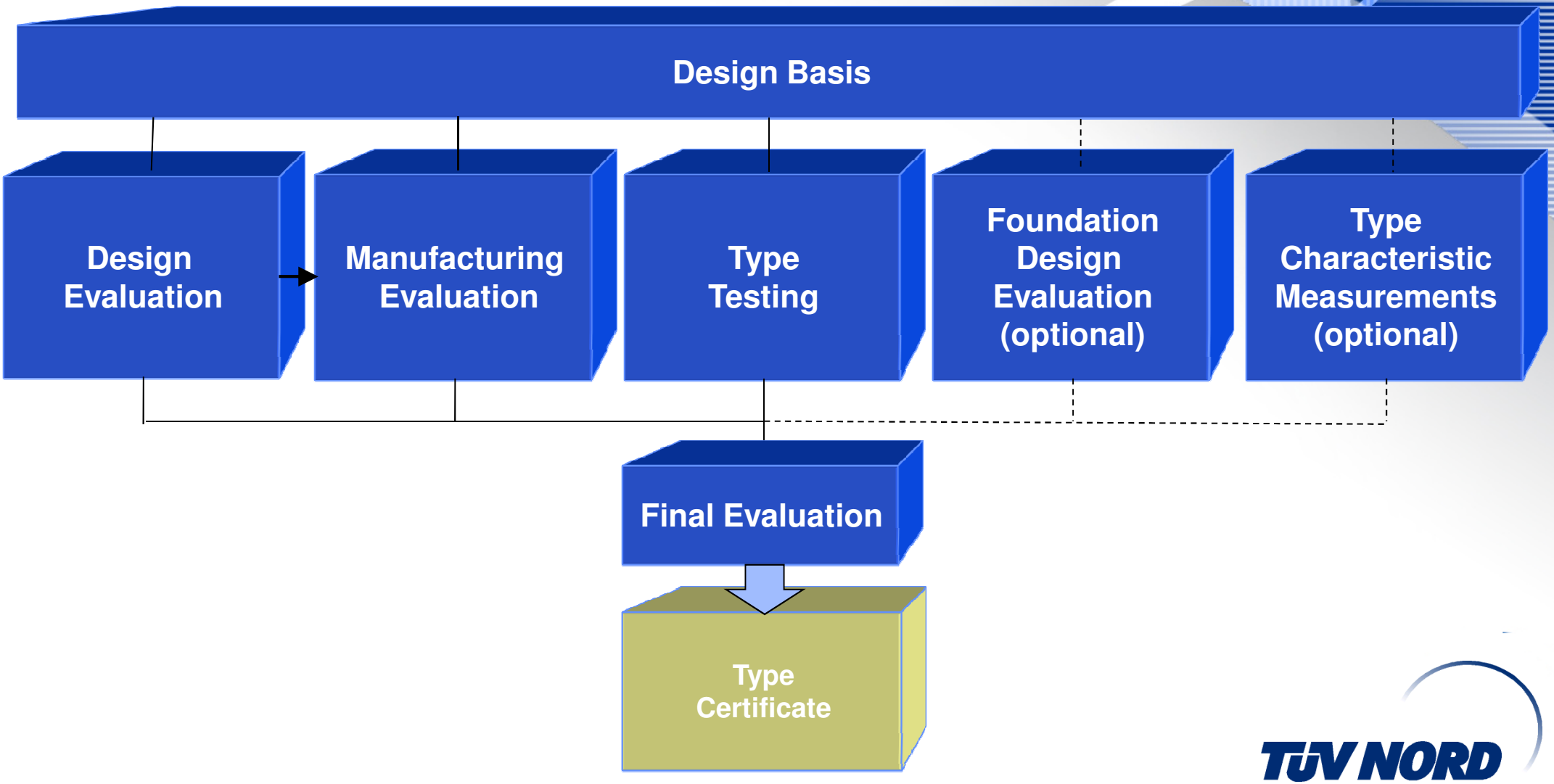
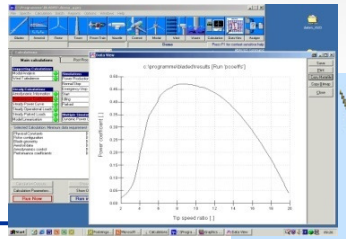
Type Certification according to IEC 61400-22

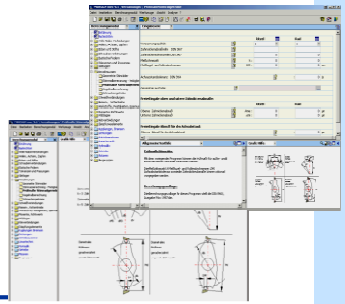


Design Evaluation

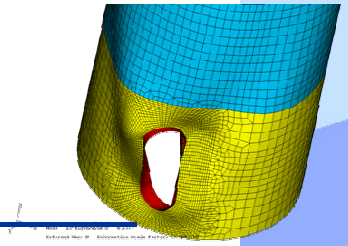
Loads



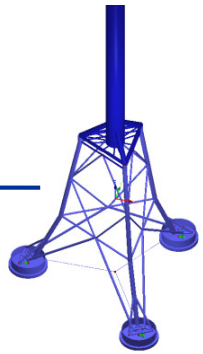
Machinery components

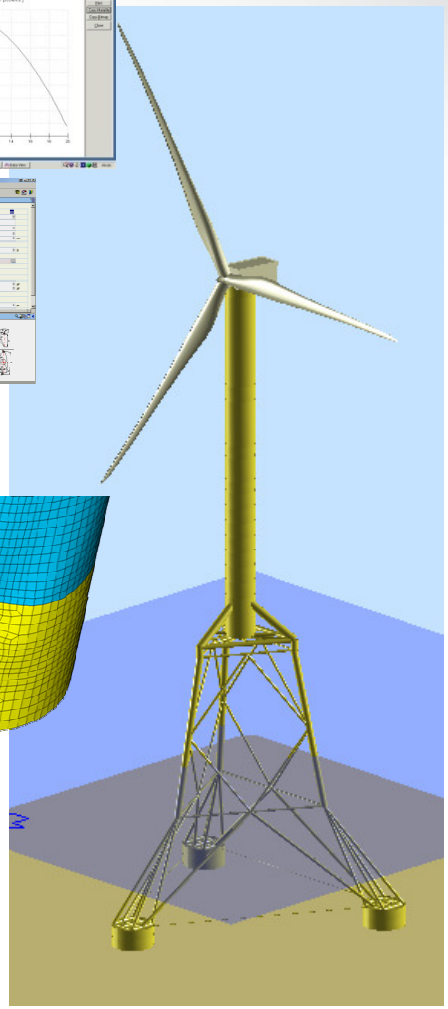


Tower



Substructure & Foundation





Safety System

Rotorblades

Electrical Components

Personnel Safety

Nacelle /Spinner

Manuals (maintenance, manufacturing, commissioning)

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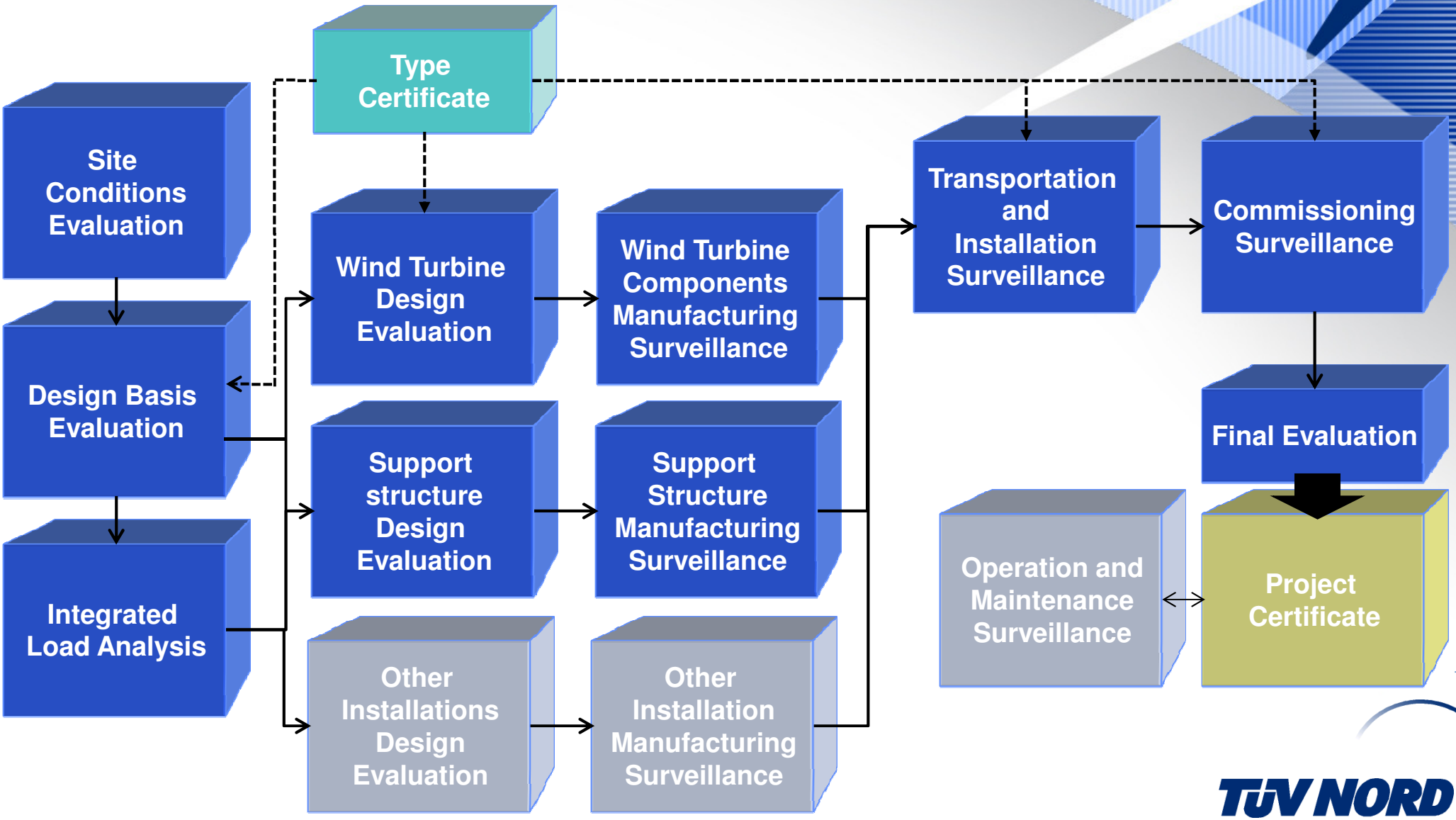
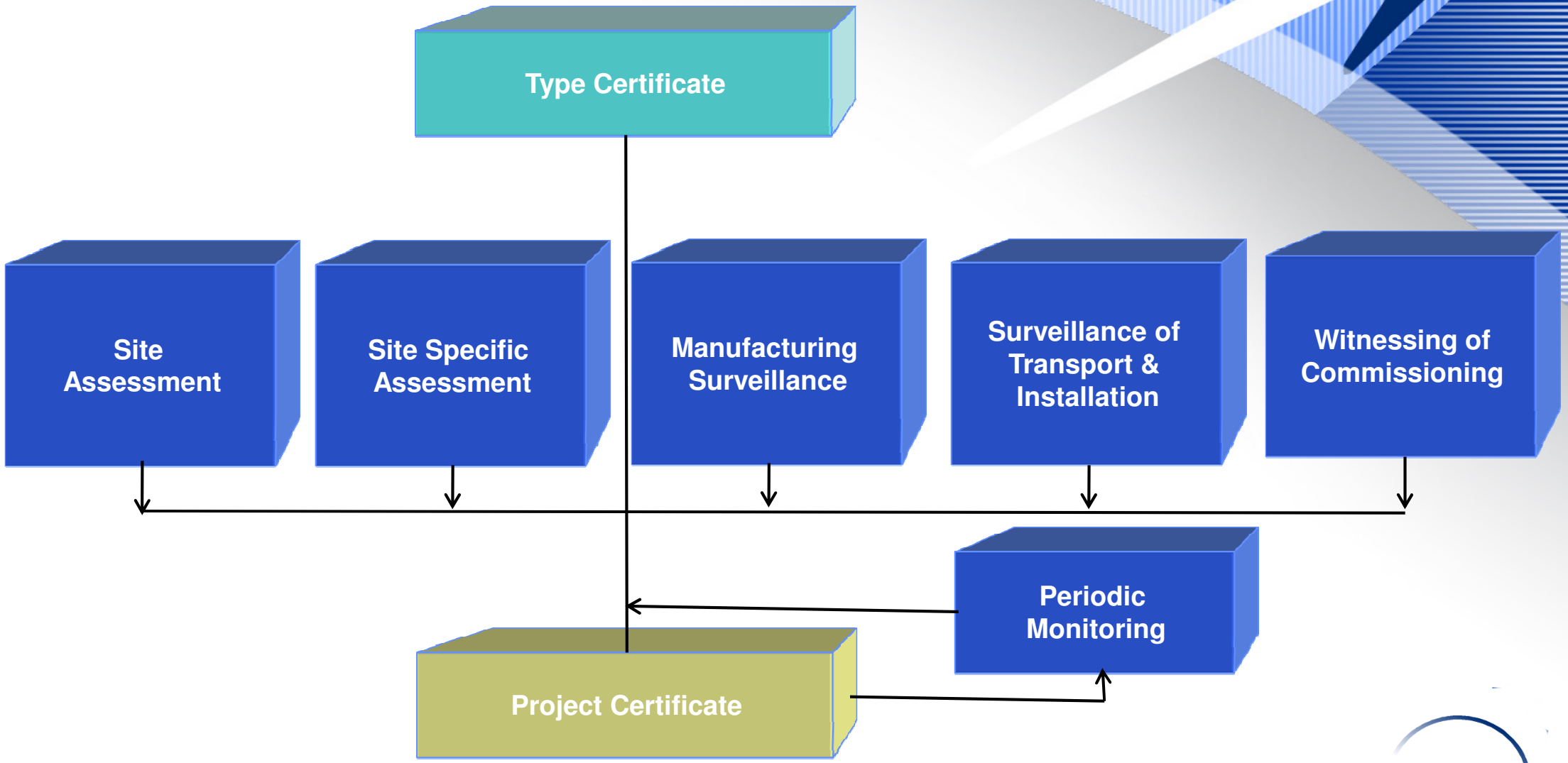
Project Certification according to IEC 61400-22

with optional modules



Project Certification according to GL



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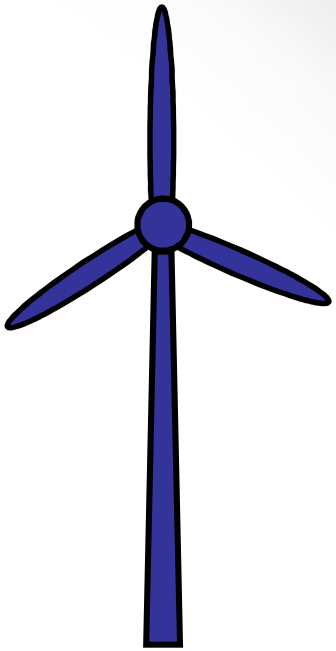

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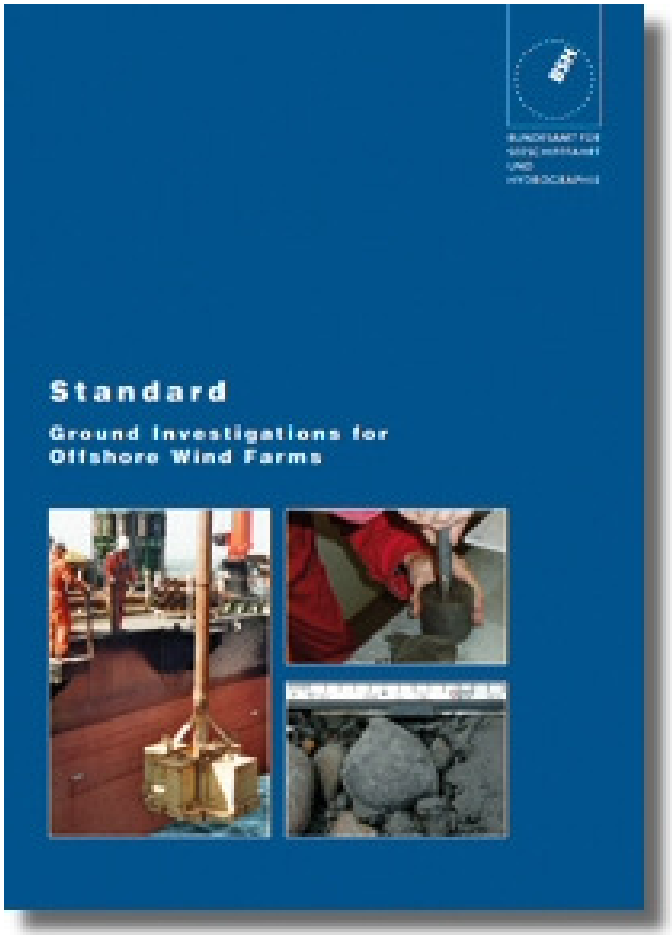
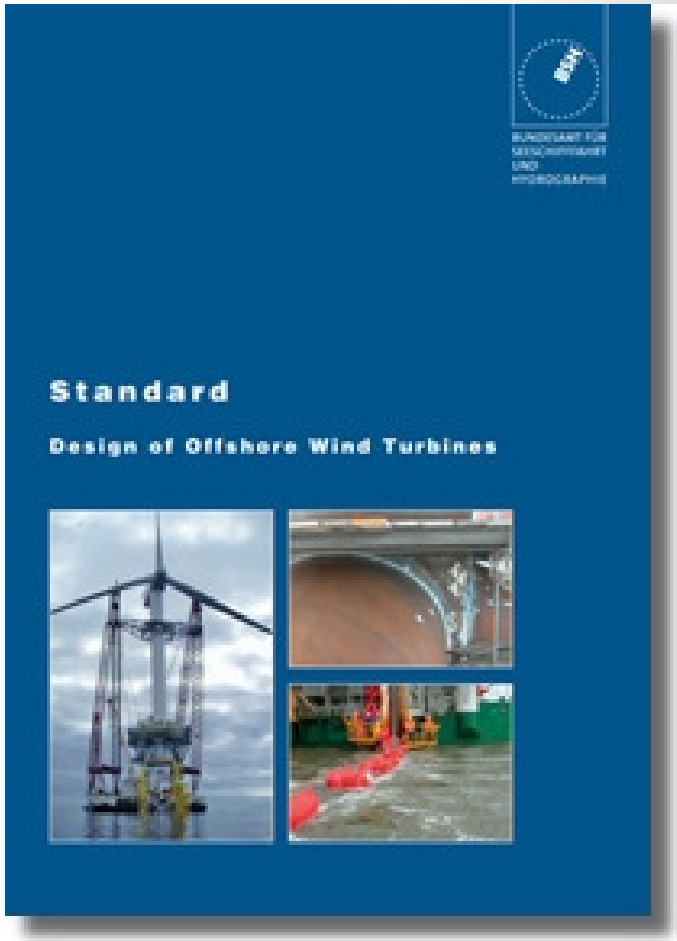
BSH Approval – Standards

- The BSH approval process for offshore windfarms is generally based on the following two standards:





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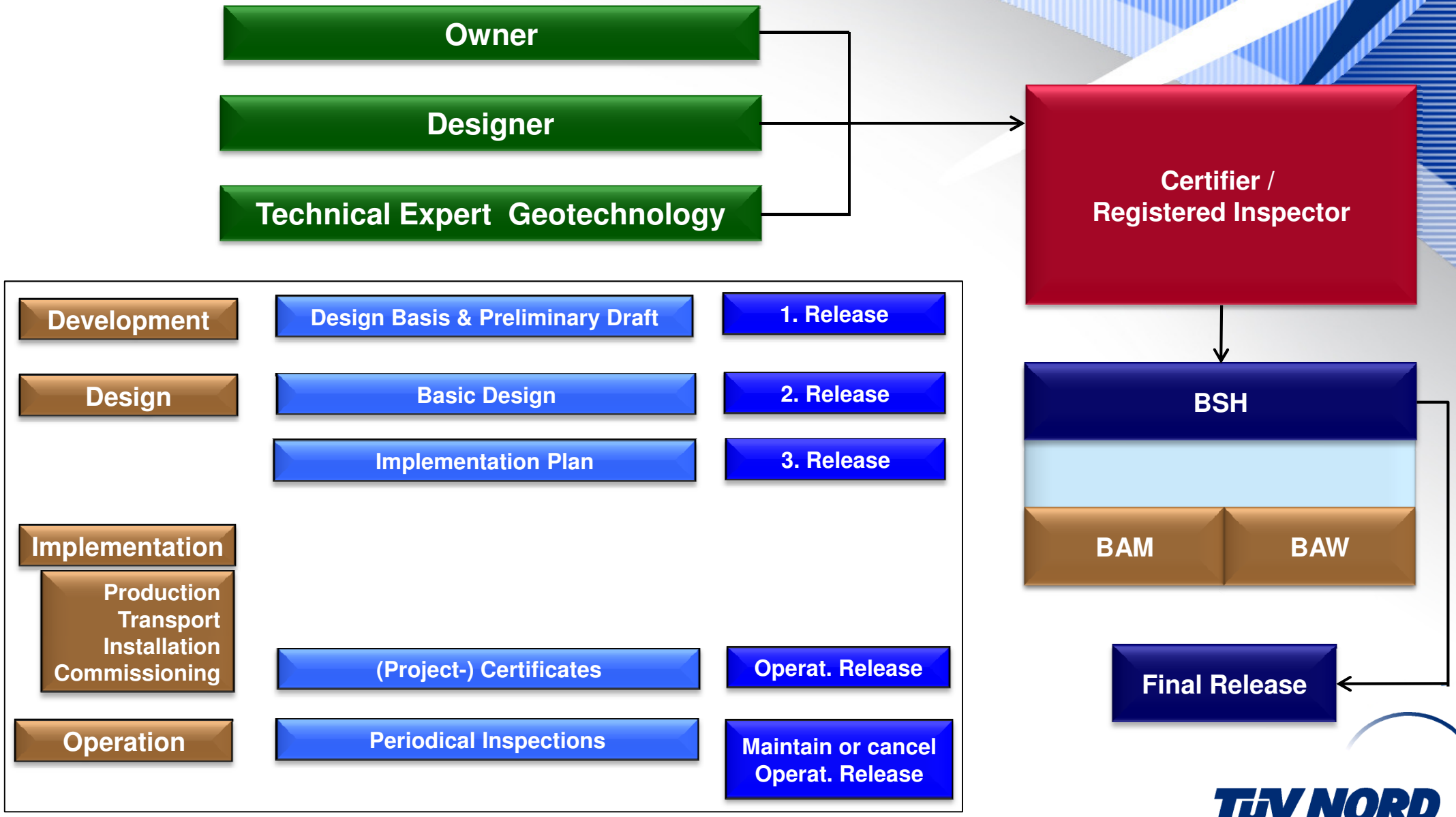
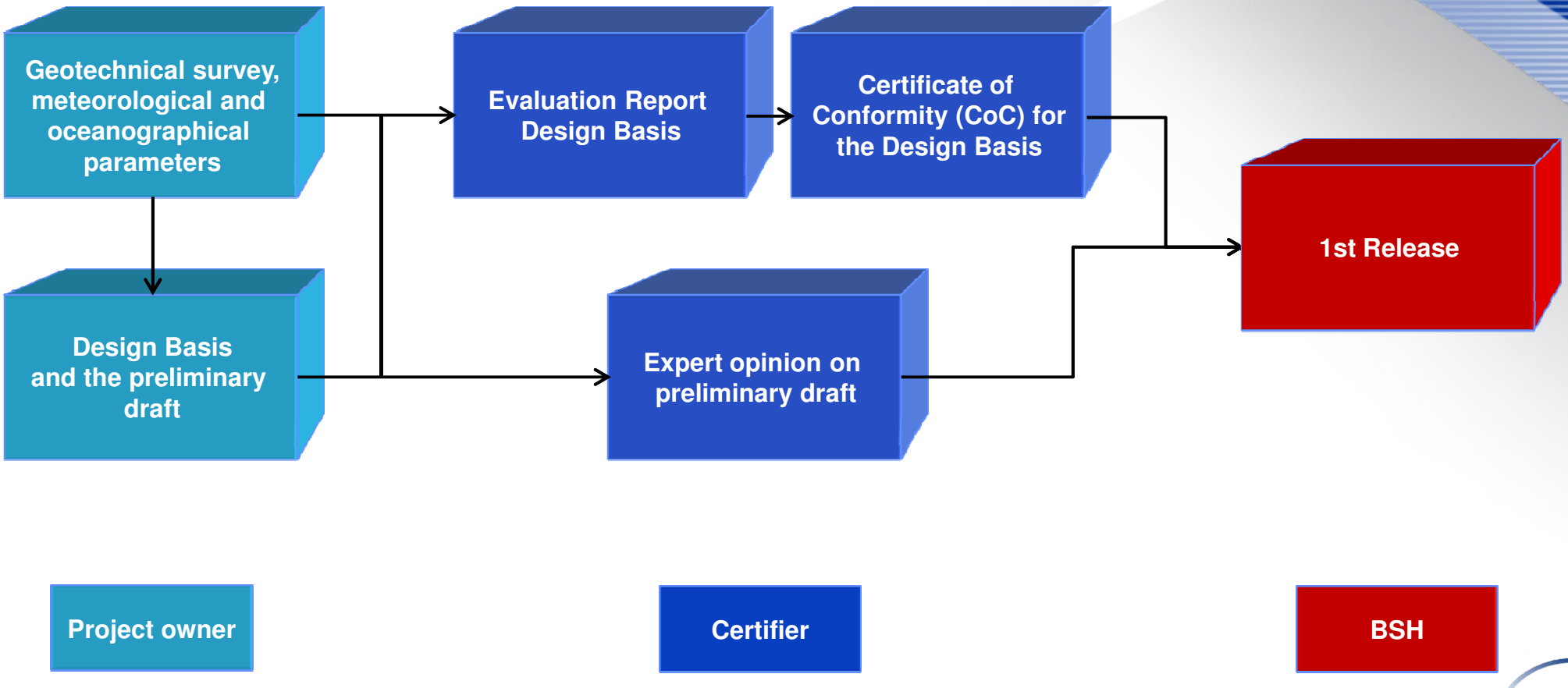
BSH Approval – Procedure and Releases



BSH Approval Development Phase



BSH Approval Design Phase

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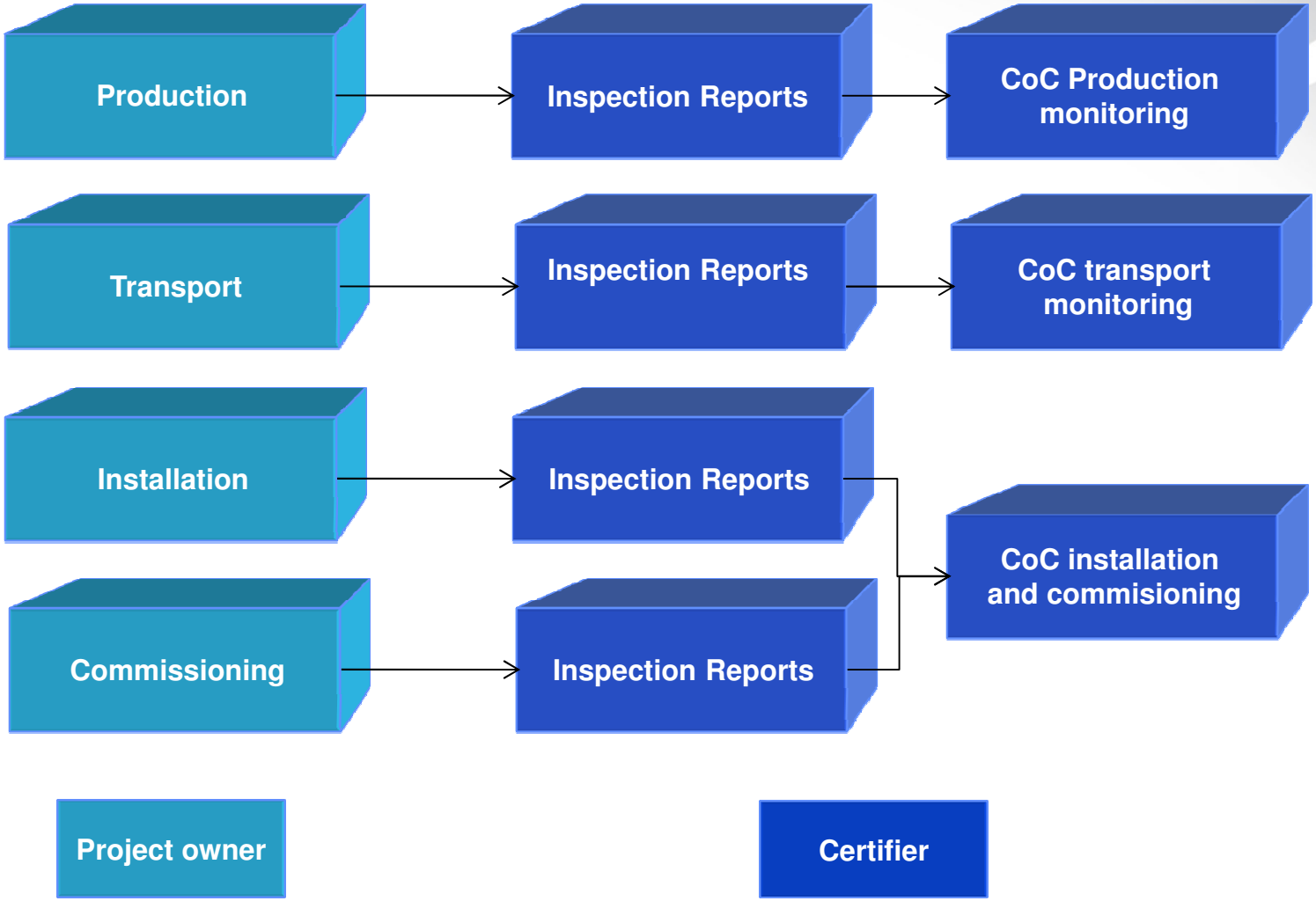
BSH Approval Implementation Phase



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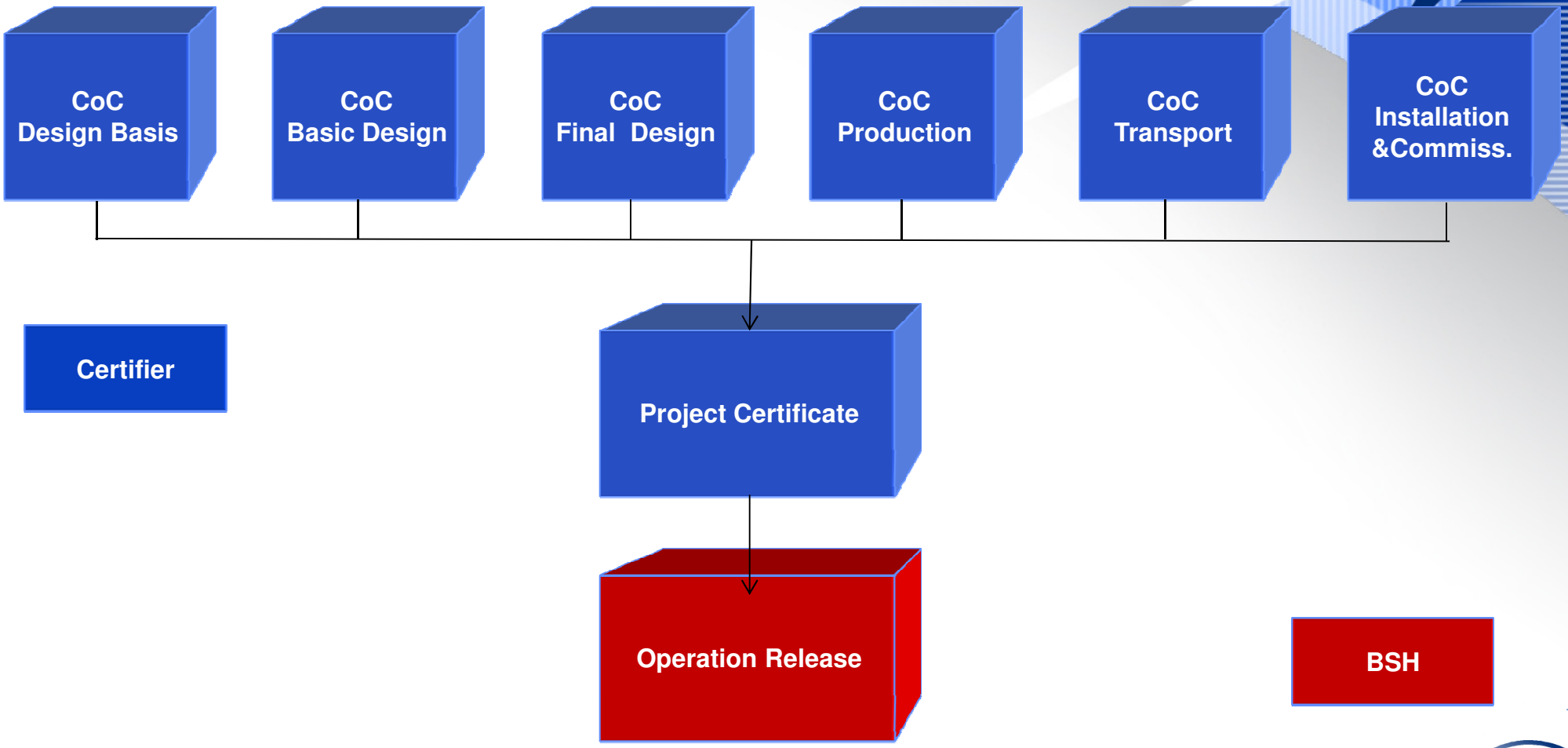
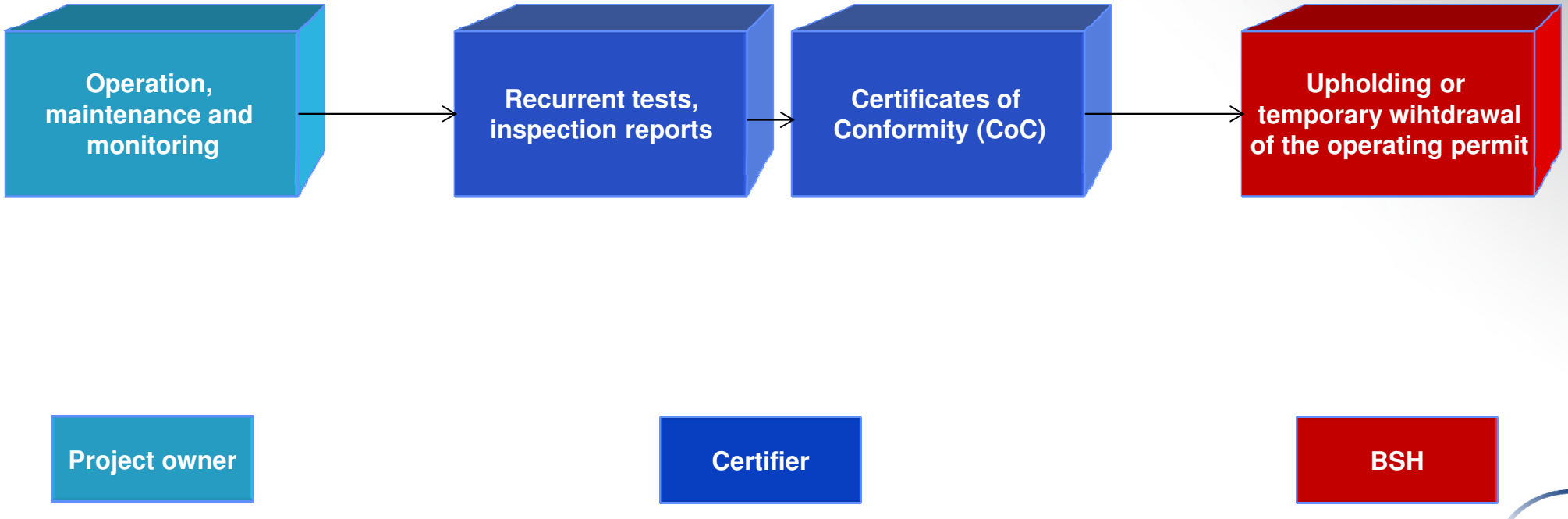
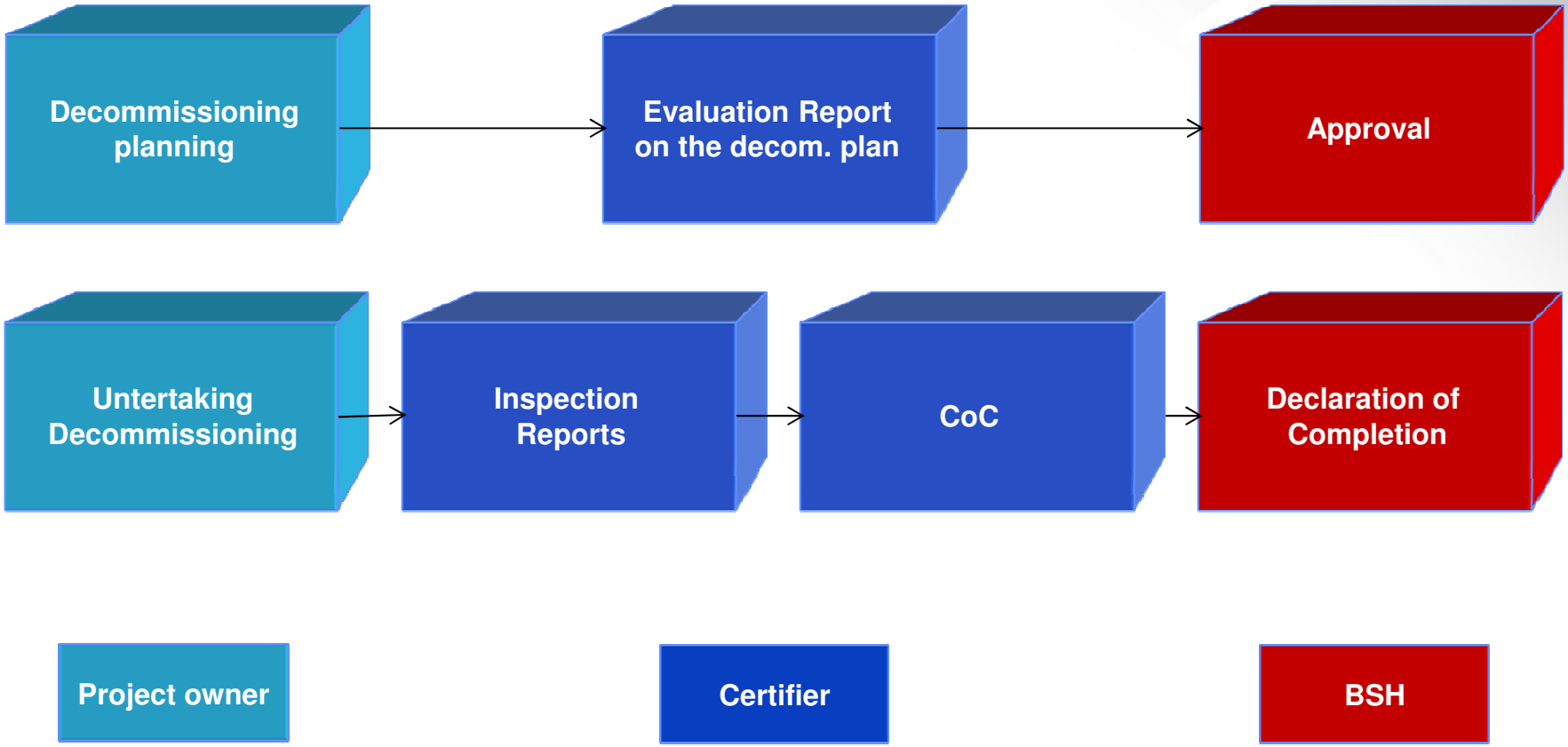
BSH Approval Implementation Phase



BSH Approval Operation Phase



BSH Approval Decommissioning Phase



BSH Approval – Phases and Components

Development → Design → Implementation → Operation → Decommissioning

Turbine	• Nacelle • Rotor blades
Support Structure	• Tower • Substructure • Piles
Cabling	• Individual installations within windfarm • Connection at transformer substation
Transformer Substation	• Including platform
Power Export System	• From transformer substation to grid connection on land

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BSH Approval – Test Procedure

1. Type certificate for the turbine
2. Site evaluation incl. soil properties
3. Site specific design evaluation
4. Certificate of conformity / test certificate for site-specific design
5. Test and evaluation of facilities for inspecting the offshore wind turbines as an overall system
6. Testing and evaluation of sea operations and the decommissioning concept
7. Production inspection
8. Inspection of transport, installation and commissioning
9. Certificate of conformity / test certificate for the inspection services following completion
10. Project certificate
11. Periodical inspections for maintaining the test certificate and the operating permit
12. Testing and inspection of the decommissioning and issue of associated test certificates

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BSH Approval – Technical Codes of Practice

- DIN 1055-4: 2005-03, „Einwirkungen auf Tragwerke“
- IEC 61400-3, „Design requirements for offshore wind turbines“, 2009
- API RP 2A-LRFD / WSD, „Recommended practice for planning, designing and constructing fixed offshore platforms“, 1993 / 2007
- GL Guidelines for the Certification of Offshore Wind Turbines, Edition 2005
- DNV-OS-J101, „Design of Offshore Wind Turbine Structures“, September 2011
- GL Rules and Guidelines IV, Industrial Services, Section 6, „Offshore Technology“, Edition 2007
- Diverse DIN (EN) codes
- Etc.

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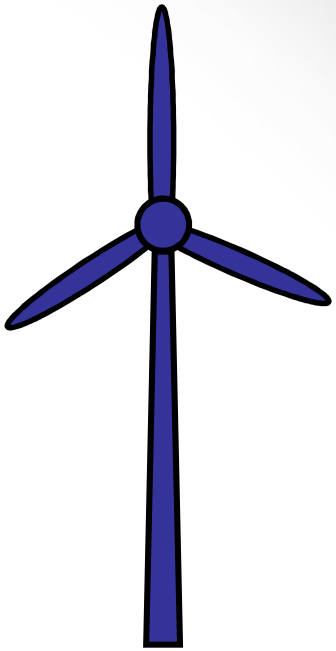

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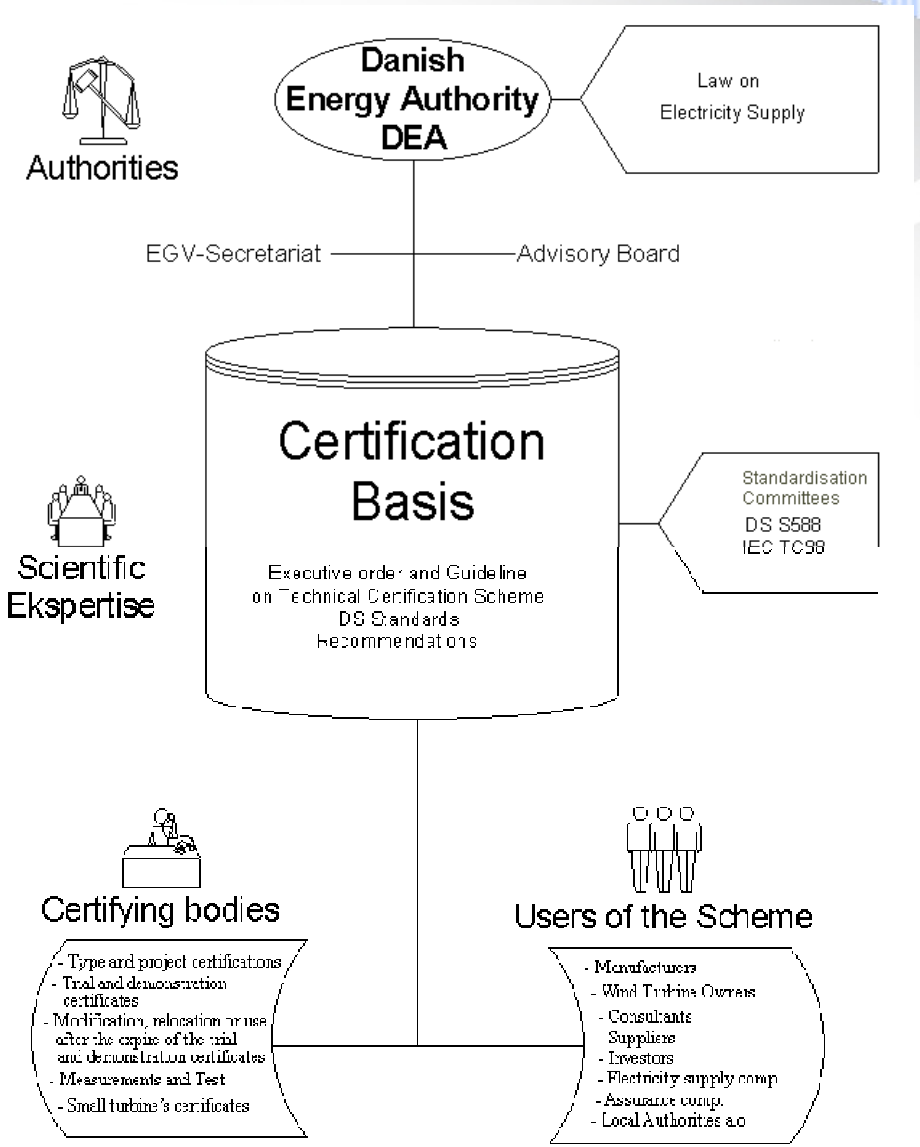
Danish Approval – Scheme



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Danish Approval – Rules & Regulations

- The Danish Energy Agency's Executive order on the technical certification scheme for the design, manufacture, installation, maintenance and service of wind turbines, June 28 2008 nr. 651
- The Danish Energy Agency's guidelines for the technical certification scheme for the design, manufacture and installation of wind turbines in Denmark 2008
- IEC System for Conformity Testing and Certification of Wind Turbines IEC WT01, 1st edition.
- Regulation TF 3.2.5 Wind turbines connected to grids with voltages over 100 kV by the TSO company Energinet.dk.
- Regulation TF 3.2.6 Wind turbines connected to grids with voltages below 100 kV by the TSO company Energinet.dk

⇨ *Type & Project Approval are based on IEC WT01 as described previously*

TÜV NORD

Thank you very much for your attention

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