



## Learning from the Experts Webinar Series

# Logistics of Offshore Construction



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**March 25, 2026**

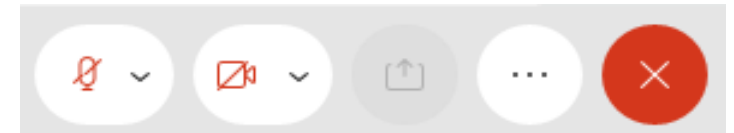
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You'll see  when your microphone is muted

# Learning from the Experts

This webinar series is hosted by NYSERDA's offshore wind team and features experts in offshore wind technologies, development practices, and related research.

**DISCLAIMER:**

The views and opinions expressed in this presentation are those of the presenter and do not represent the views or opinions of NYSERDA or New York State.



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*NYSERDA – Learning from the Experts – March 25 2026*












# **Logistics for Offshore Wind Construction**

We guide our clients at every phase of wind, solar, energy storage, and system integration projects





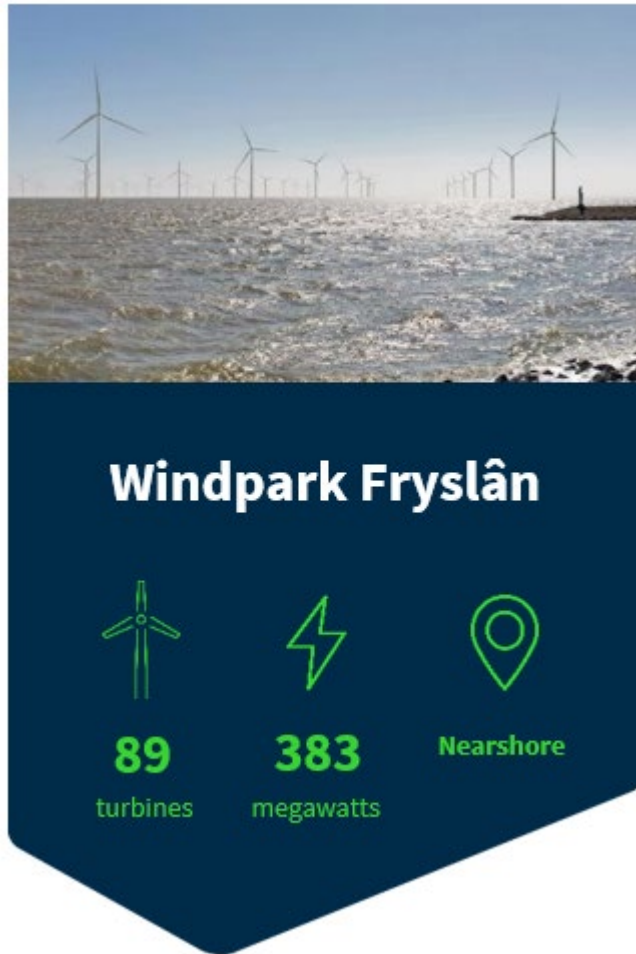
A leading player in The Netherlands, sought after for its unique expertise and way of working, Ventolines has successfully entered major foreign markets across the globe.

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Technical Due Diligence and  
Grid Compliance Studies
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Stenkalles Grund
-  Ireland  
Future Energy Island
-  Australia  
Elanora



**We aim for a world in which  
renewable energy projects  
are valuable for everyone**

# Example: Windpark Fryslân

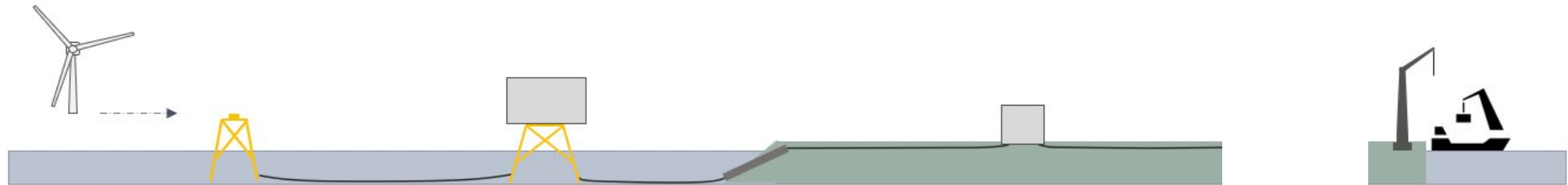


- Largest in-lake wind farm
- Onshore substation
- Export cable through front-line dam
- Construction of nature island
- Fit-for purpose installation method
- Construction during covid

# Agenda

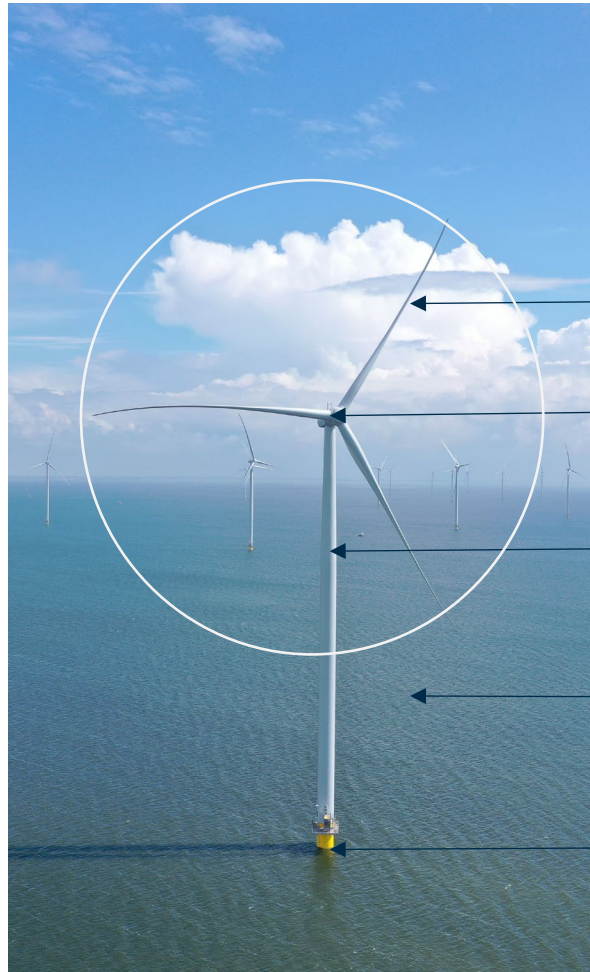
- Definitions and overview
- Activity flow and timelines
- Generic Take Aways
- Deep dive per activity
- Summary

# Offshore wind farm



<b>Wind turbines</b> <b>Example:</b> <ul style="list-style-type: none"> <li>• 15 MW WTG</li> <li>• 236m rotor Ø</li> <li>• 25 m tip low</li> <li>• 143 m hub height</li> <li>• 261 m tip height</li> </ul>	<b>Foundations</b> <ul style="list-style-type: none"> <li>• Monopiles</li> <li>• Jackets</li> <li>• Gravity based</li> <li>• Floating</li> </ul>	<b>Inter array cabling</b> <ul style="list-style-type: none"> <li>• 66 kV</li> <li>• Typically, 5 or 6 WTGs per string</li> </ul>	<b>Offshore Substation</b> <ul style="list-style-type: none"> <li>• 66kV - &gt;220 kV</li> <li>• Jacket foundation</li> </ul>	<b>Offshore Export cable</b> <ul style="list-style-type: none"> <li>• 220 kV</li> <li>• HVAC or HVDC</li> </ul>	<b>Onshore export cable</b> <ul style="list-style-type: none"> <li>• 220kV</li> </ul>	<b>Onshore substation</b> <ul style="list-style-type: none"> <li>• 275/330 kV</li> </ul>	<b>Onshore grid</b> <ul style="list-style-type: none"> <li>• 330 kV</li> </ul>	<ul style="list-style-type: none"> <li>• Fabrication locations</li> <li>• Marshalling harbour</li> <li>• Transport &amp; installation</li> </ul>
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# Components of an offshore location



**WTG:** the wind turbine generator is the total of rotor, nacelle and tower

**Rotor:** the rotor consist of the **blades** which connect to the **hub**

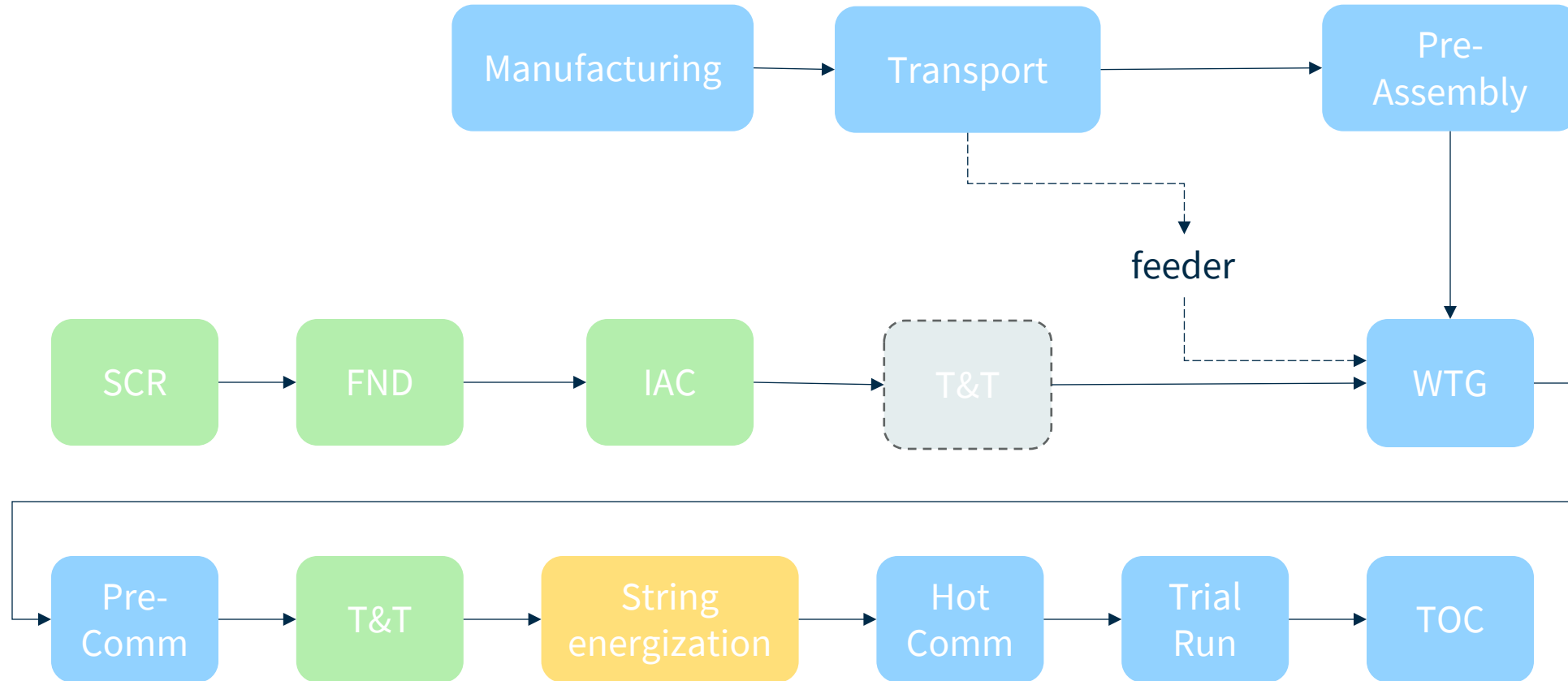
**Nacelle:** houses the generator, inverters and transformer (on some types)

**Tower:** supports the nacelle and rotor on top of a foundation

**Inter Array Cables (IAC) and Fibre Optics (FO)** – not visible: subsea cables connect one WTG to the next in a string. Multiple strings connect to an Offshore High Voltage Substation

**Foundation:** fixes the WTG to the seabed. The example shows a **Monopile** with an external **Main Access Platform**. A **boat landing** and **main access ladder** are optional (depending on access strategy)

# Offshore activity flow



Please refer to last slide for presentation abbreviations



# Generic take-aways

- Ensure optimisations or changes are done early in the process: manufacturing (\$) -> pre-assembly (\$\$) -> offshore (\$\$\$)
- Technical – commercial playing field
- Large risk during construction on interfaces and project specific components or configuration
  - Balance potential lower cost of newer models (WTG) with risk of unproven technology
  - De-risk by mock-ups, testing and ROC



# Rehearsal of Concept (ROC)

Front loading and testing of concepts is essential to prevent unexpected issues surfacing during execution.

Rehearsal of Concept is a detailed physical rehearsal of a complex operation, resulting in:

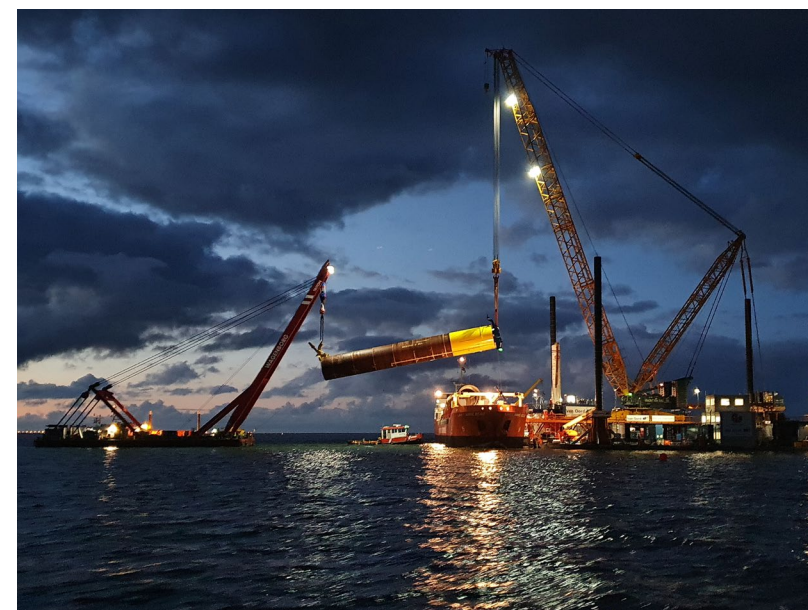
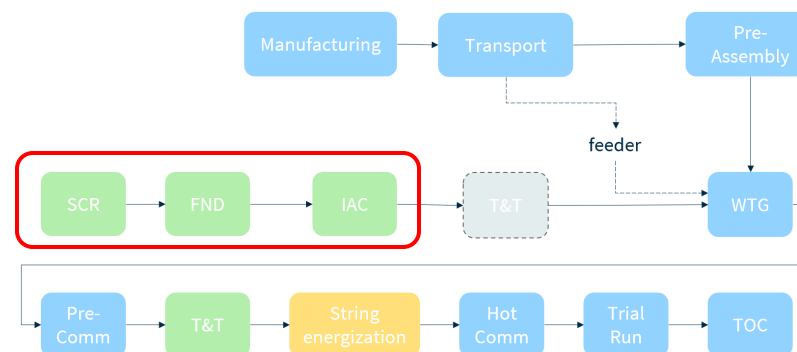
- **Shared understanding** – align assumptions
- **Risk detection** – reveal hidden hazards and issues
- **Visualization** – physical models
- **Detailed planning** – synchronize coordination



# SCR, FND and IAC

Typically installed by a BOP Contractor.

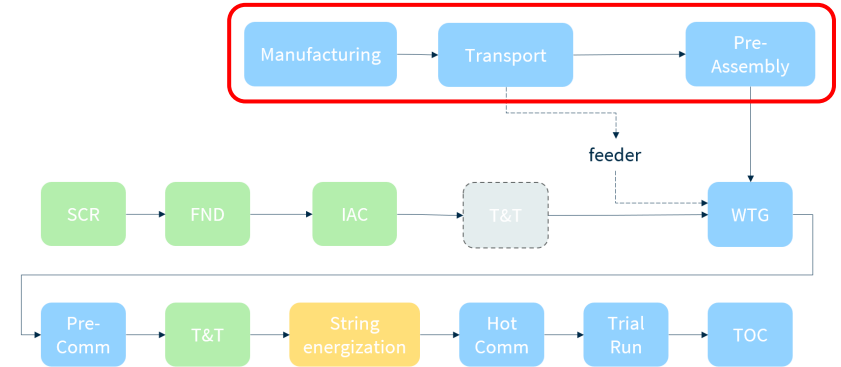
- **Scour protection**
  - Prevent local seabed erosion
  - Type and placement method depends on site conditions
  - Installed off the critical path
- **Foundations**
  - Type depends on water depth and soil condition
  - No transition piece -> split secondary steel from FND installation
- **Inter Array Cables**
  - Various sizes of cables
  - Laying of the cables, pulling in and burial
  - Burial is off the critical path



# WTG manufacturing, transport and pre-assembly



- Transport from manufacturing location to site
- Pre-assembly of components onshore is lower cost than offshore.
- Limits to pre-assembly:
  - Component size and weight
  - Jones act compliance



# Pre-assembly & harbours

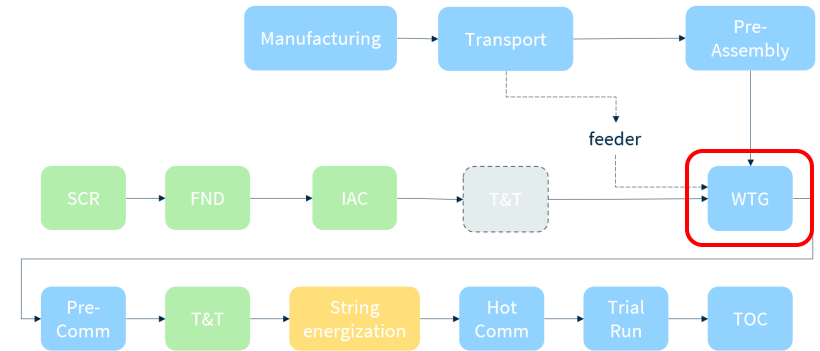
- Component weight and sizes limit pre-assembly setup
- Example tower assembly strategy: load out only stands vs assembly on quay.
- Location specific components limit flexibility

Source: ableuk



# WTG installation

- WTGs: responsibility of the WTG Contractor
- Installation vessel potentially sourced by the Employer
- Installation duration is heavily influenced by **Waiting-on-Weather (WOW)**
- **Single** vs **Multiple** installation vessels strategy
- Location specific components **reduce flexibility**

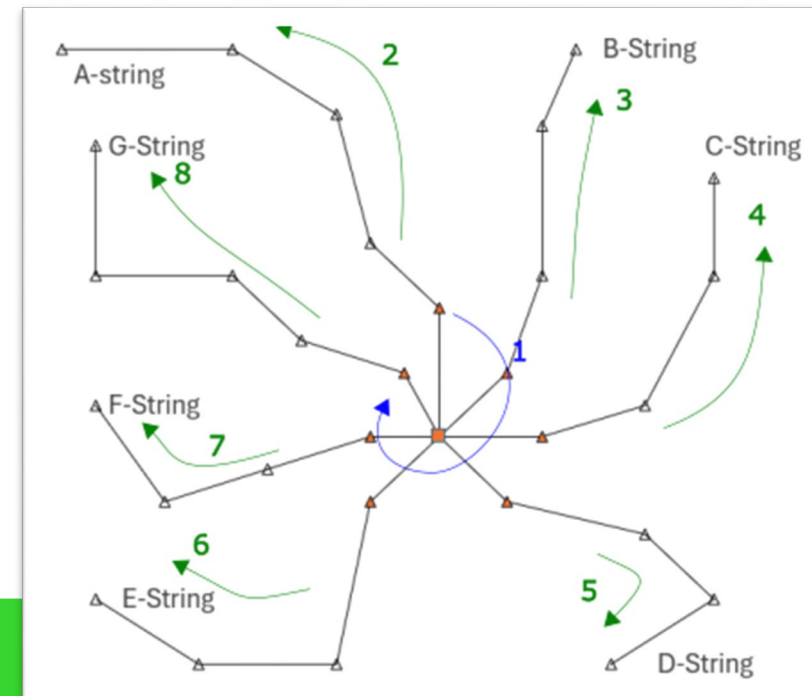
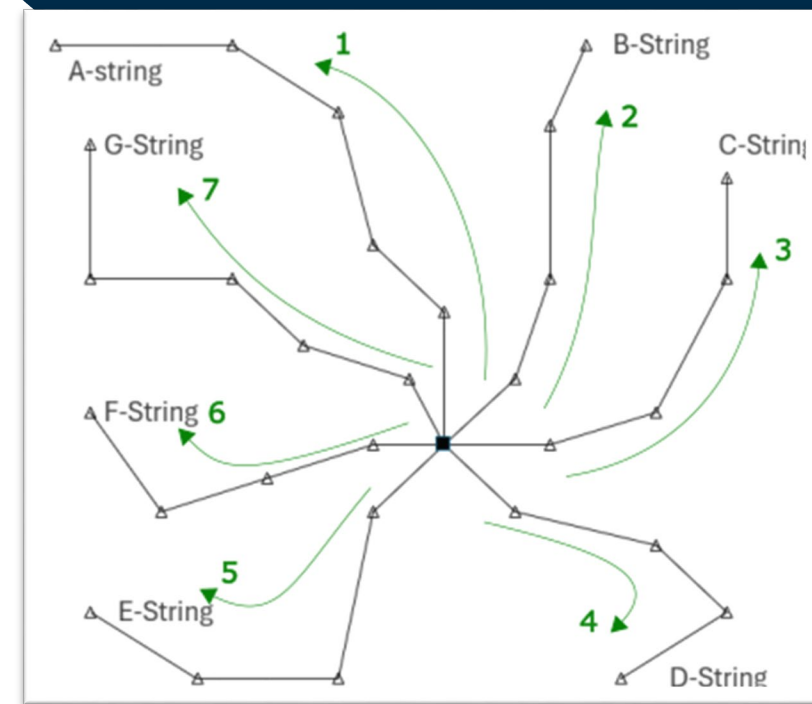


# Installation sequence

Installation sequence of WTGs, cables and MPs is primarily determined by the energization strategy and sequence.

Constraints/ considerations:

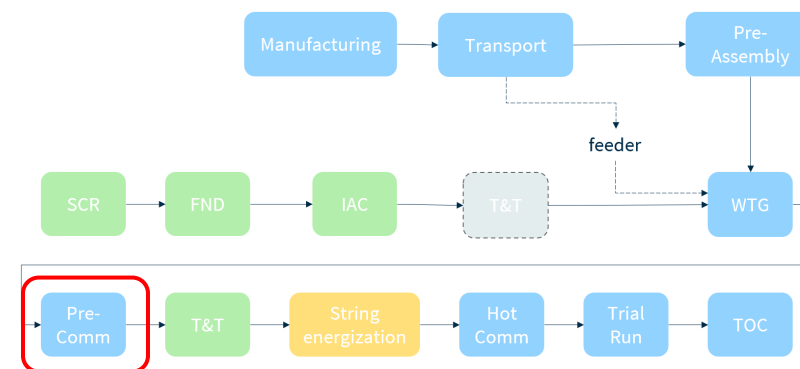
- **Difficult locations** for MP installation
- (Seasonal) **noise limits** on piling of MP
- Limitations due to **Seasonal Movement** of sand dunes
- **Timing** of cable **crossings**
- **Switchgear bay proximity** at the substation
- Keep **work fronts together**
- **Separate interfaces**, limit durations, organize in blocks



# Pre-commissioning

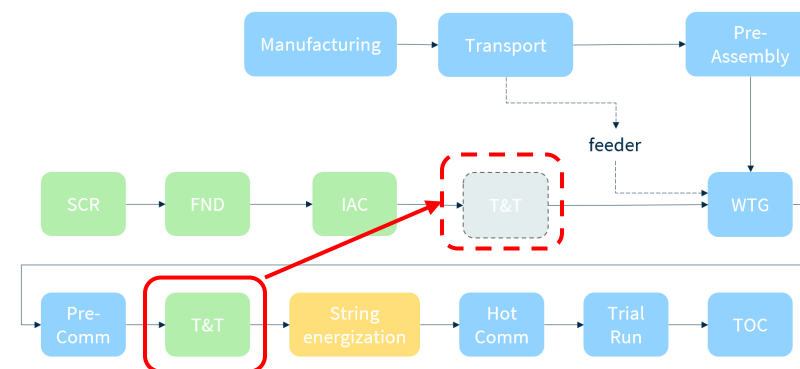


- Tasks comprise: finishing mechanical & electrical completion, plus additional round of torquing or tensioning of bolts
- To agree with WTG contractor on “safe state” during WTG installation
- Pre-commissioning conducted from smaller vessels, e.g. CTV (daughter craft) or SOV



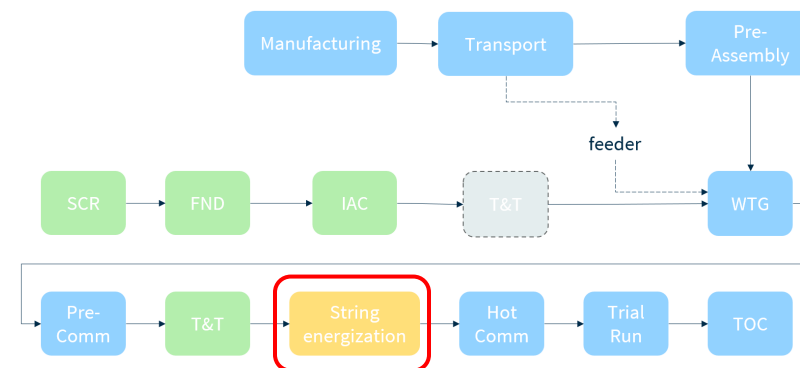
# Termination & Testing (T&T)

- Termination & Testing involves IAC and FO
  - Routing inside the substation/foundation
  - Stripping and plug in of the cables
  - IAC (full) string VLF test and OTDR test of FO
- Depending on switchgear configuration, the T&T works can be on the critical path between pre-commissioning and hot-commissioning
- Access to location with WTG installed might be limited for SOV's until communication is established due to risk of blades hitting the SOV gangway

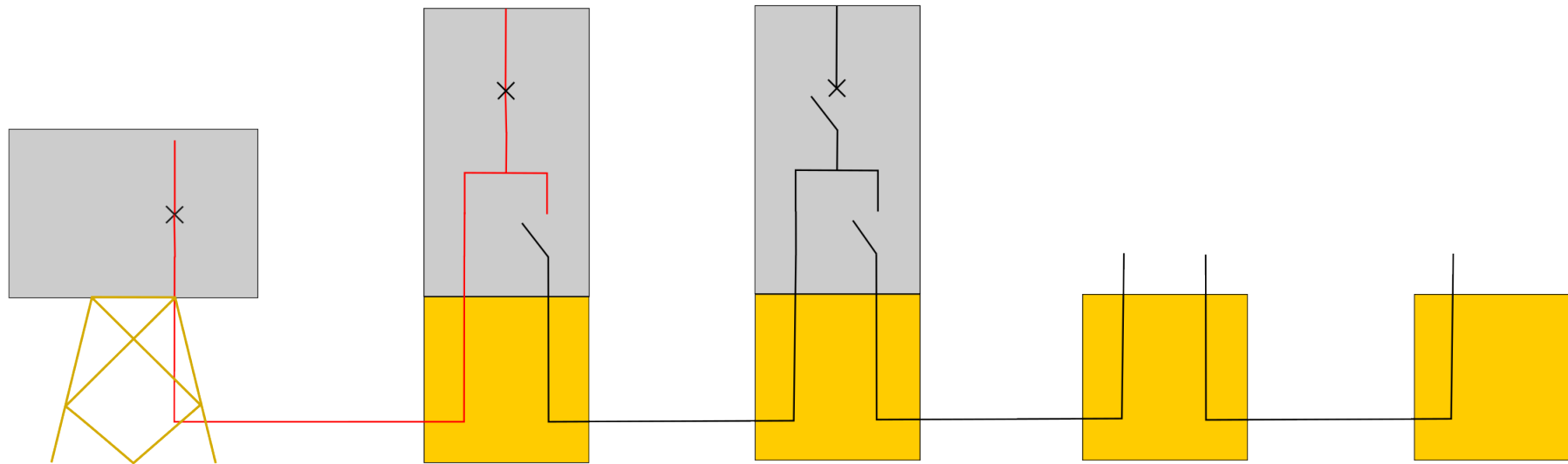


# Energization

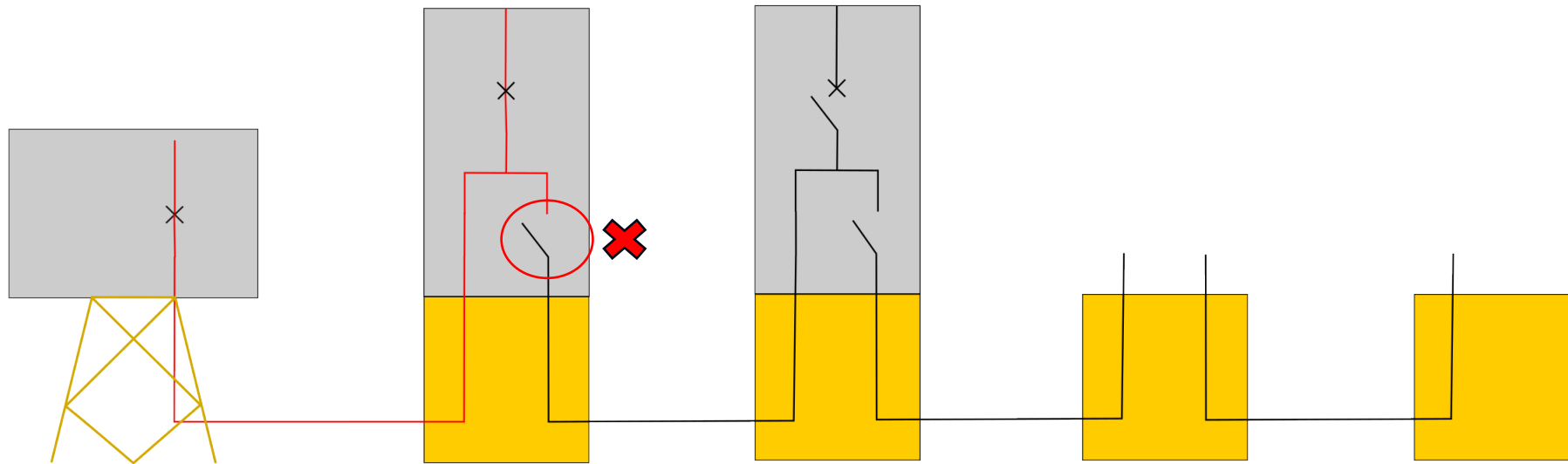
- In scope of Employer
- What is energization:
  - Substation energized?
  - IAC string energized?
  - WTG energized?



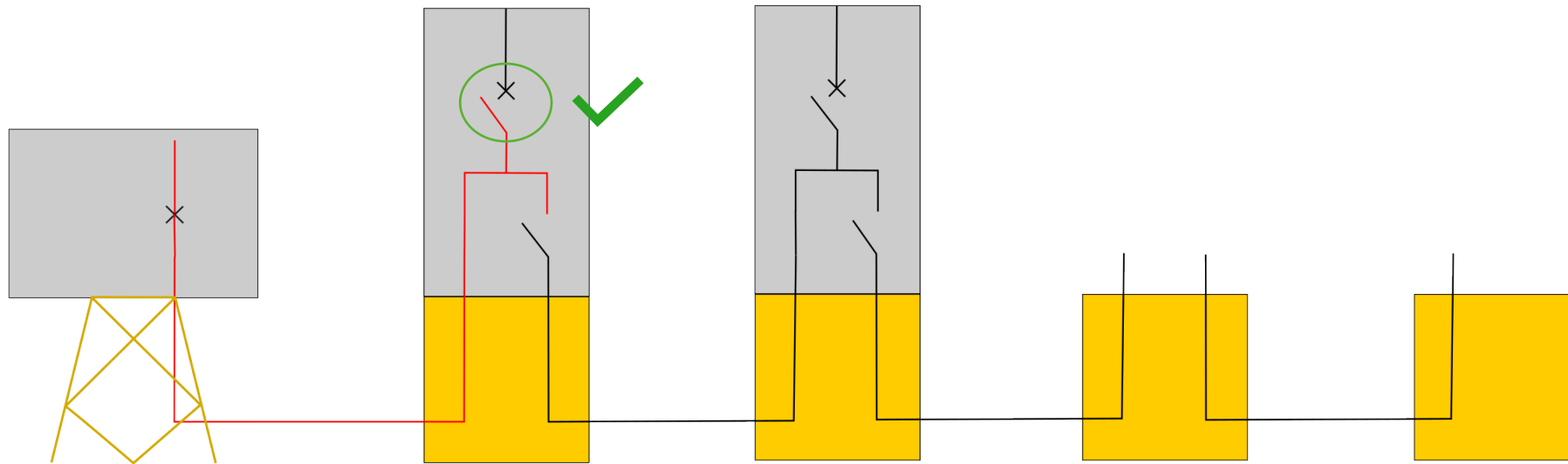
# Technical detail in the bigger picture



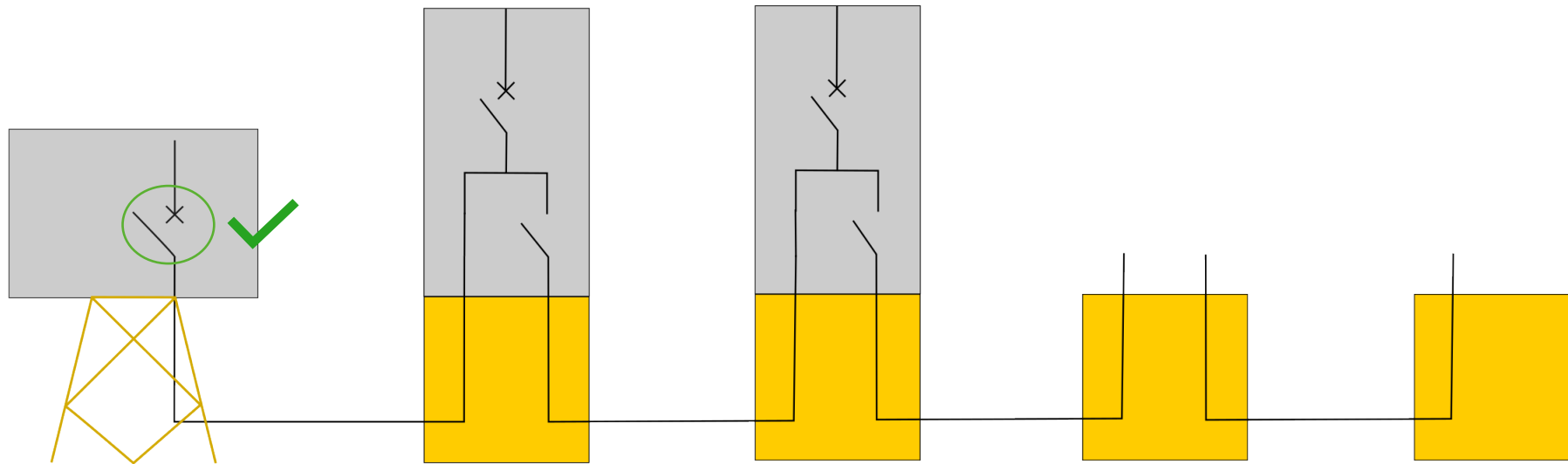
# Technical detail in the bigger picture



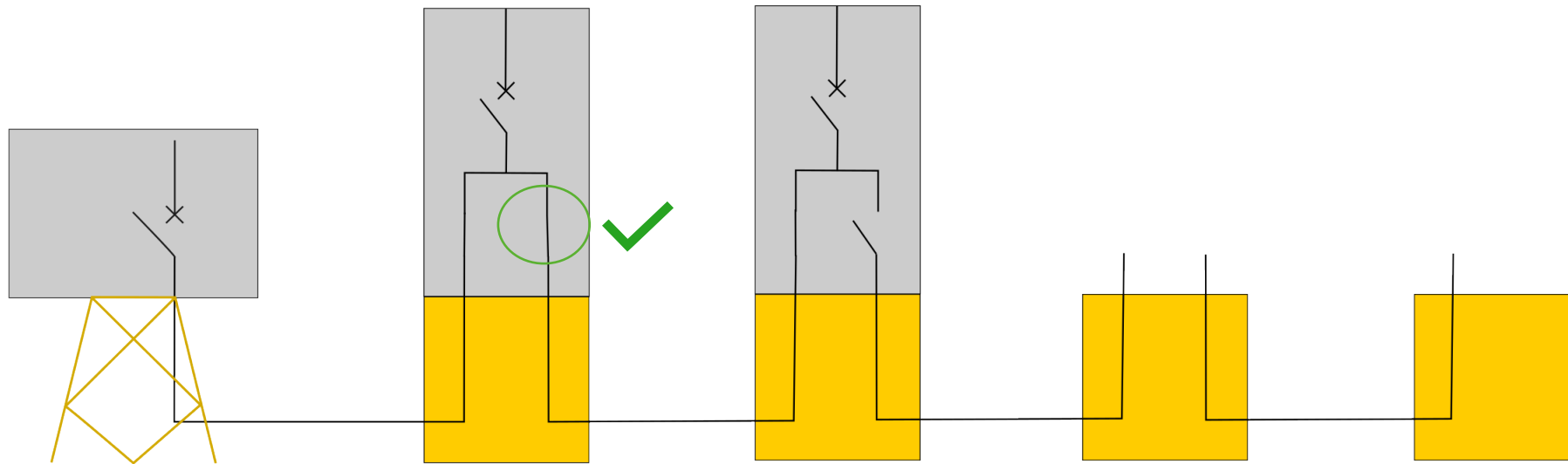
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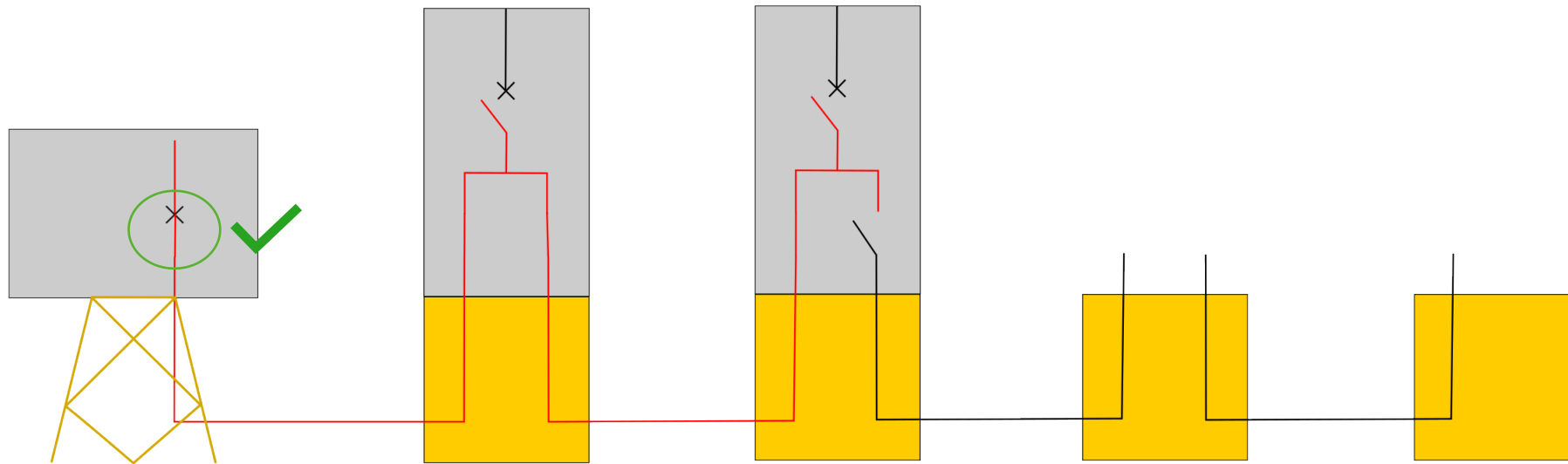
# Technical detail in the bigger picture



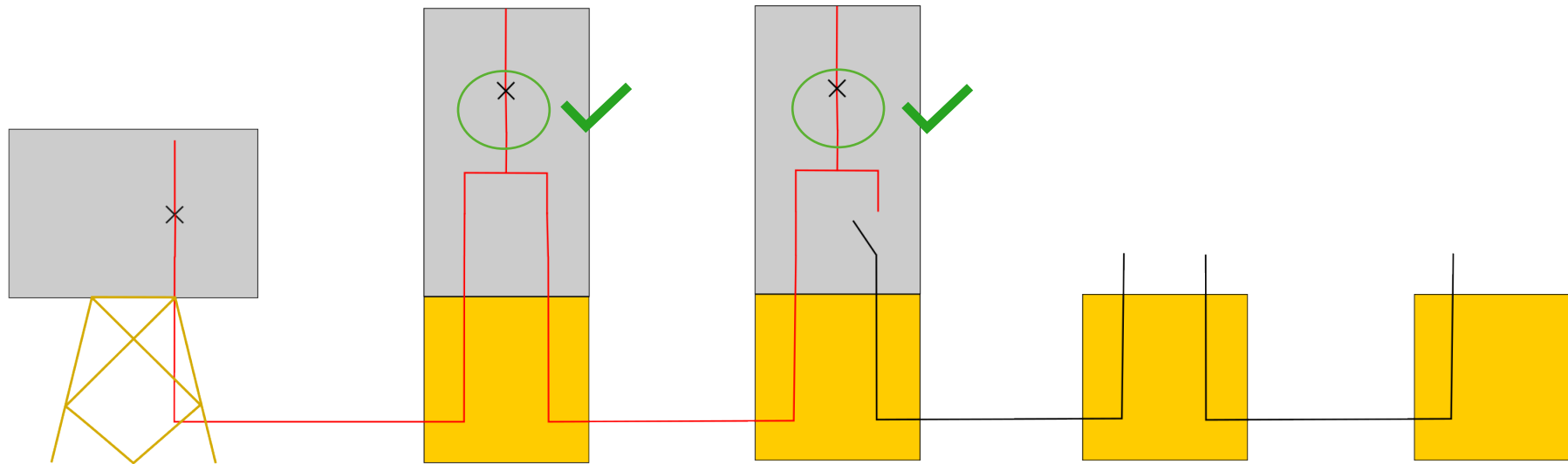
# Technical detail in the bigger picture



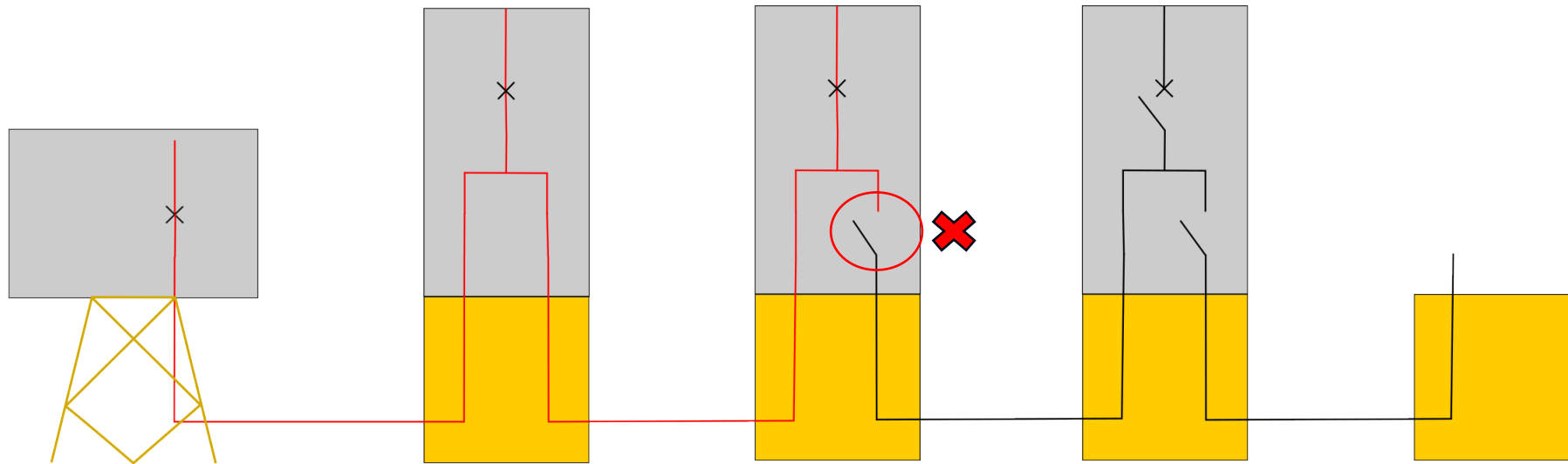
# Technical detail in the bigger picture



# Technical detail in the bigger picture



# Technical detail in the bigger picture



# Hot-Comm, trial run, TOC



## Hot-commissioning

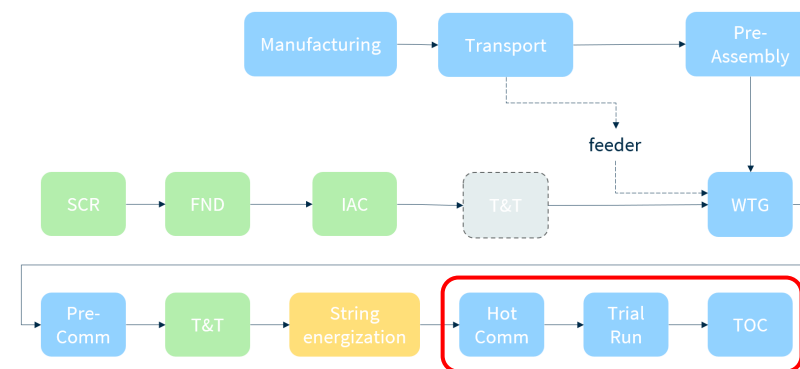
- Starts with Energization of the WTG
- Will take 3-4 days (including float)

## Trial run

- Monitored remotely
- 5-10 days duration
- Final walk down to be done after trial run

## Take-over

- WTG is performing what it should
- WTG is safe to operate



# Summary

- Full construction will take over 2 years with specialized vessels requiring early reservation. With many steps, parties and interfaces
- Technical-commercial playing field
- Unproven technology, first time usage of equipment and project specifics are to be derisked as much as possible – as early as possible

Q&A



# Abbreviations

SCR	Scour protection
FND	Foundation
IAC	Inter array cable
T&T	Termination & Testing
WTG	Wind turbine generator
Hot Comm	Hot commissioning
TOC	Take over certificate
SOV	Service operations vessel
CTV	Crew transfer vessel
BoP	Balance of Plant
FO	Fibre optics
VLF test	Very Low Frequency
OTDR test	Optical Time-Domain Reflectometer

*Please refer to presentation slides for further details on these items and activities*

## Presenters



Anna Ritzen  
– Sr. Project Manager

- 15+ years of experience
- Deputy Director Windpark Fryslan
- Offshore wind early-stage developments: Netherlands, Estonia/Latvia; Australia
- Several offshore wind studies and project evaluations for NYSERDA



Stefan Hartman  
– Sr. Project Manager

- 15+ years of experience
- Oil & gas: Wells Technology
- WTG Project Engineer Blauwwind (731 MW) - Netherlands offshore
- WTG Package Manager Crosswind (759 MW) – Netherlands offshore
- OFW tenders, cost manual and benchmark, Rehearsal of Concept lead



# Coming Soon

## Logistics of Operations and Maintenance

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