IEEE P2800 Perspective

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Introduction

IEEE Standard for Interconnection and Interoperability of Inverter-Based Resources (IBRs) Interconnecting with Associated Transmission Electric Power Systems.

- SGRE has been an active participant as a voting member throughout the initiation/evolution of P2800, including P2800-2.
- As such, SGRE welcomes/encourages the adaption of the standard.
  - Performance specific to the technology (DFIGs Vs Full converters)
  - Easier on OEMs (need to comply with one universal standard)
- Currently, requirement without guidance : Guidance to be addressed on 2800-2
- Applicable on the High Side of MPT/POI: How does that translate to the Generator Terminal?
- Some requirements are impossible to confirm with a regular testing set-up.

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Items to be clarified

- Precise testing requirements is essential
  - Ability to withstand multiple dips (Consecutive voltage deviation ride-through capabilities)
    - X numbers within X seconds ➔ Multiple possible combinations. Some are detrimental to the integrity of converters.
  - Transient Overvoltage ride through (V > 1.7 p.u. for 0.2 ms)
    - Typical reaction time < 10 ms

New WTGs Design/Production Cycle

- New WTGs typically have Four (4) years of design/production cycle.
  - New converter and/or rotor.
  - Typical lead time at around 2 yrs (for both new products and existing ones)
    - Turbines that are going to be commissioned in next two years would have been the ones that have already been sold/selling now.
    - For New Turbines not all the tests can be completed before commissioning.
    - Internal tests, Simulation etc before a certification from third party?

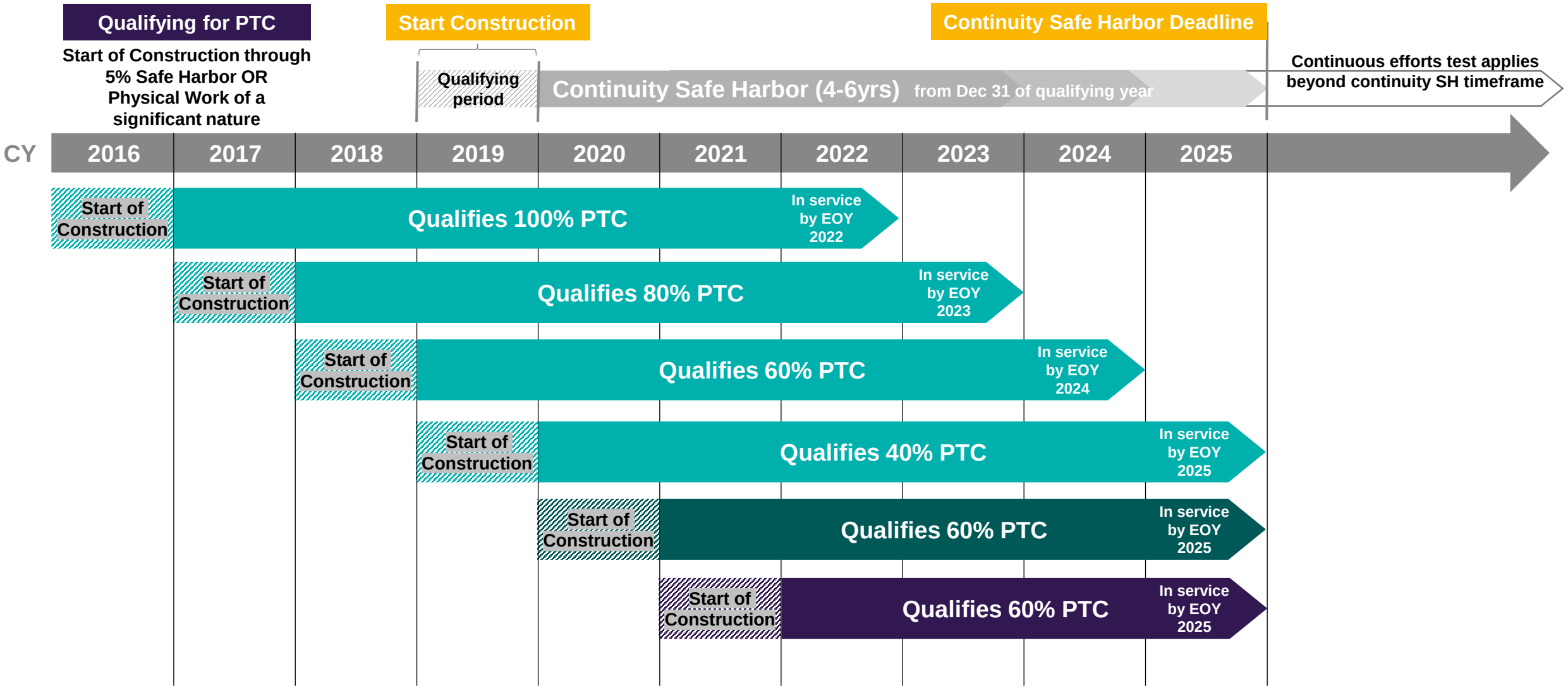
Status of the Turbine in the Market

- New WTGs
  - Getting energized in next two years.
    - Design, prototype, and major testing already completed/planned.
    - Extremely difficult to go back to the drawing board.
    - Gap analysis on-going.
    - Note that lots of projects come online towards the end of CY, due to the PTC
  - Getting energized after CY 2025
    - Design on-going. Will be able to meet/self certify the requirements as listed in the standard
- Existing/Mature WTGs
  - Actively being sold now and have been producing for a while.
    - Gap analysis on-going.

Status of the Turbine in the Market

- Safe Harbor Units
  - Sold couple of years ago with the technology that was available then.
  - We estimate that across all OEM's there are around 1.5 GW of non-energized SH turbines that were built between 2016-2021.
  - Will not be able to meet the new requirements.
  - Also, the PTC continuity windows are all running out Dec 31, 2025 - so if no changes are made in legislation, then majority SH should be used up not later than 2025.
- Repowering units
  - Majority of repowering projects retain the same original converter with slight modification to accommodate new rotors.
  - Cross-OEMs (one OEM repowering other OEM's original turbines)
    - Includes OEMs that are no longer active
    - Will not be able to meet new requirements.

PTC phases with continuity safe harbor window



Summary

SGRE welcomes/recommends implementation of P2800

- However, requirement without guidance creates a lot of confusion
- Entities should be aware of the testing limitation until P2800-2 is approved.
- Reference Point of Applicability (RPA) should be considered.

- SGREs new products will be fully compliant with P2800 performance requirement
- Gap analysis on-going for existing products.

- SGRE encourages RTO’s to consider the Safe Harbor units and Repowering units while adopting the requirements.

Thank you!

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