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De-risking Innovation

Technology Qualification in Offshore Wind

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BACKGROUND

Developing and implementing new technologies in offshore wind is a challenge with competing objectives. On the one hand, the potential benefits of novel or innovative solutions can be significant. On the other hand, the imperative to manage risk on projects at the scale of an offshore wind farm is a major barrier. Given the ever-increasing pace of innovation and the trend towards ever-larger projects, this balancing act between performance and risk is a major factor in the continued success of offshore wind. Despite the challenges, innovation remains a core function of our industry.

The need for innovation is clear from the extensive funding and support opportunities in the US and globally, for example:

- DOE NOWRDC
- FLOWIN prize
- BOEM/BSEE TAP Program
- UK Offshore Wind Innovation Hub…

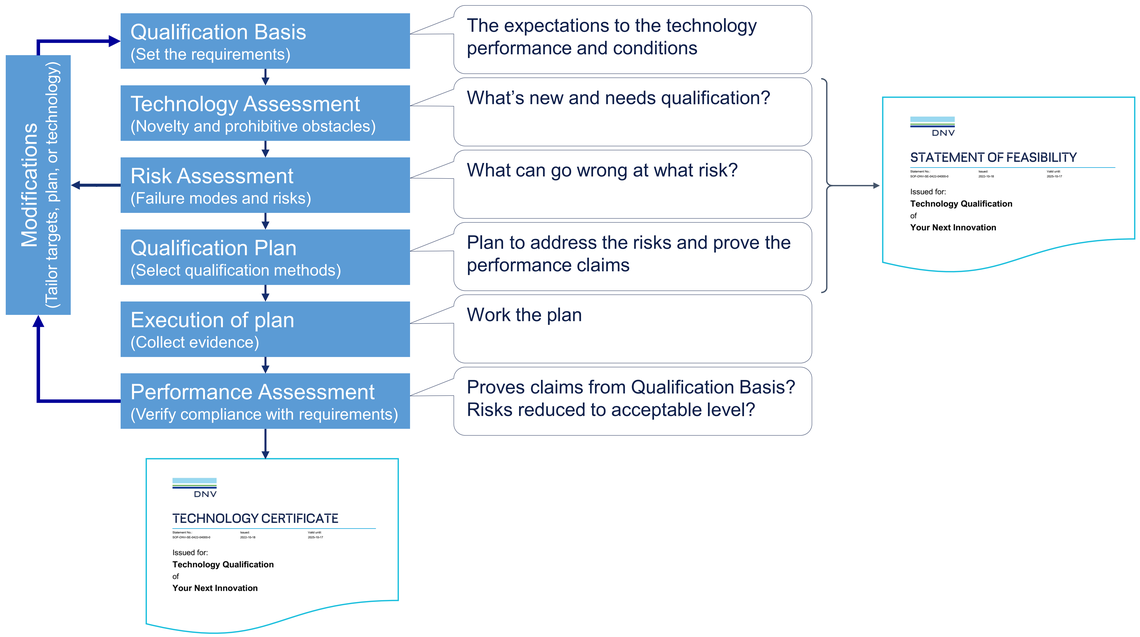
TECHNOLOGY READINESS LEVELS

Uncertainties

Technology Readiness

	TRL	Development Stage Completed
Concept	0	**Unproven Concept** (Basic R&D, paper concept)
Proof of Concept	1	**Proven Concept** (Proof of concept as a paper study or R&D experiments)
	2	**Validated Concept** Experimental proof of concept using physical model tests
Prototype	3	**Prototype Tested** (System function, performance and reliability tested)
	4	**Environment Tested** (Pre-production system environment tested)
	5	**System Tested** (Production system interface tested)
Field Qualified	6	**System Installed** (Production system installed and tested)
	7	**Field Proven** (Production system field proven)

TECHNOLOGY QUALIFICATION PROCESS



MATURITY AND EXPERIENCE

Application Area (operation limits known)	Technology Maturity (performance criteria available)		
	Proven	Limited field history	New or unproven
Previous experience	**1**	**2**	**3**
No experience in Company	**2**	**3**	**4**
No industry experience	**3**	**4**	**4**

The explanation of the different Technological Categories is given below:

1. No new technical uncertainties
2. New technical uncertainties
3. New technical challenges
4. Demanding new technical challenges

Elements in category 2 to 4 require technology qualification and have an increasing degree of technical uncertainty. The defined categorization makes it possible to distinguish between the novelties of the technology itself and its application areas, and focus on the areas of most concern in an iterative manner.

TECHNOLOGY QUALIFICATION AND PROJECT CERTIFICATION

Certification is fundamental to a project's risk management strategy. But for new technologies without a long track record of performance in a particular application, certification on a project-by-project basis can be a significant burden. In these cases, Technology Qualification provides a systematic approach to define the performance targets, operating conditions, applied standards, and reliability of novel technologies, processes, or applications. The TQ process follows alongside the innovation process to identify potential failure modes and quantify uncertainties, informing the technology development in a way that reduces technical risk and increases the likelihood of its commercialization.

REFERENCES

Det Norske Veritas. DNV-RP-A203 Edition September 2019, Amended September 2021. Recommended Practice: Technology qualification. Høvik, Norway: DNV; 2021.

Det Norske Veritas. DNV-SE-0160 Edition December 2015, Amended September 2021. Service Specification: Technology qualification management and verification. Høvik, Norway: DNV; 2021.

Det Norske Veritas. DNV-SE-0422 Edition July 2018, Amended September 2021. Service Specification: Certification of floating wind turbines. Høvik, Norway: DNV; 2021.

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