4TU.

Innovation in Offshore Energy

From challenges to solutions

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Innovation in Offshore Energy

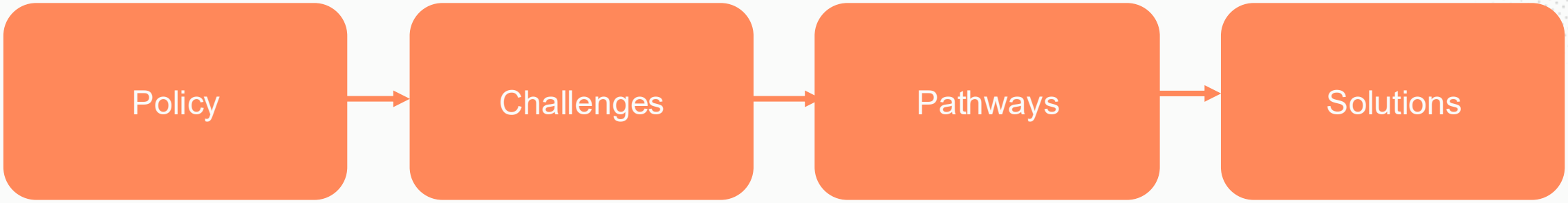
From challenges to solutions

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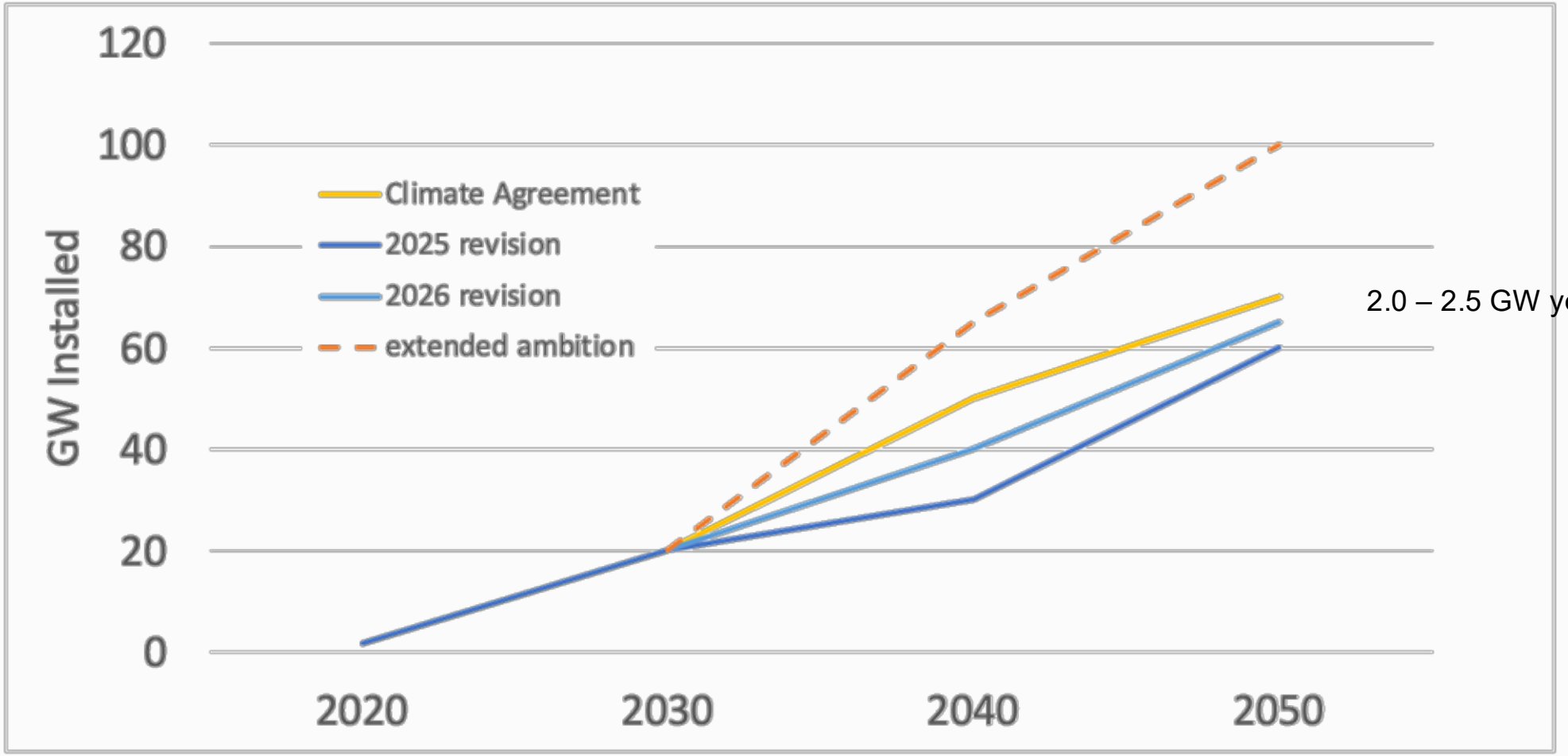
Start presentatie



From Challenges to Solutions

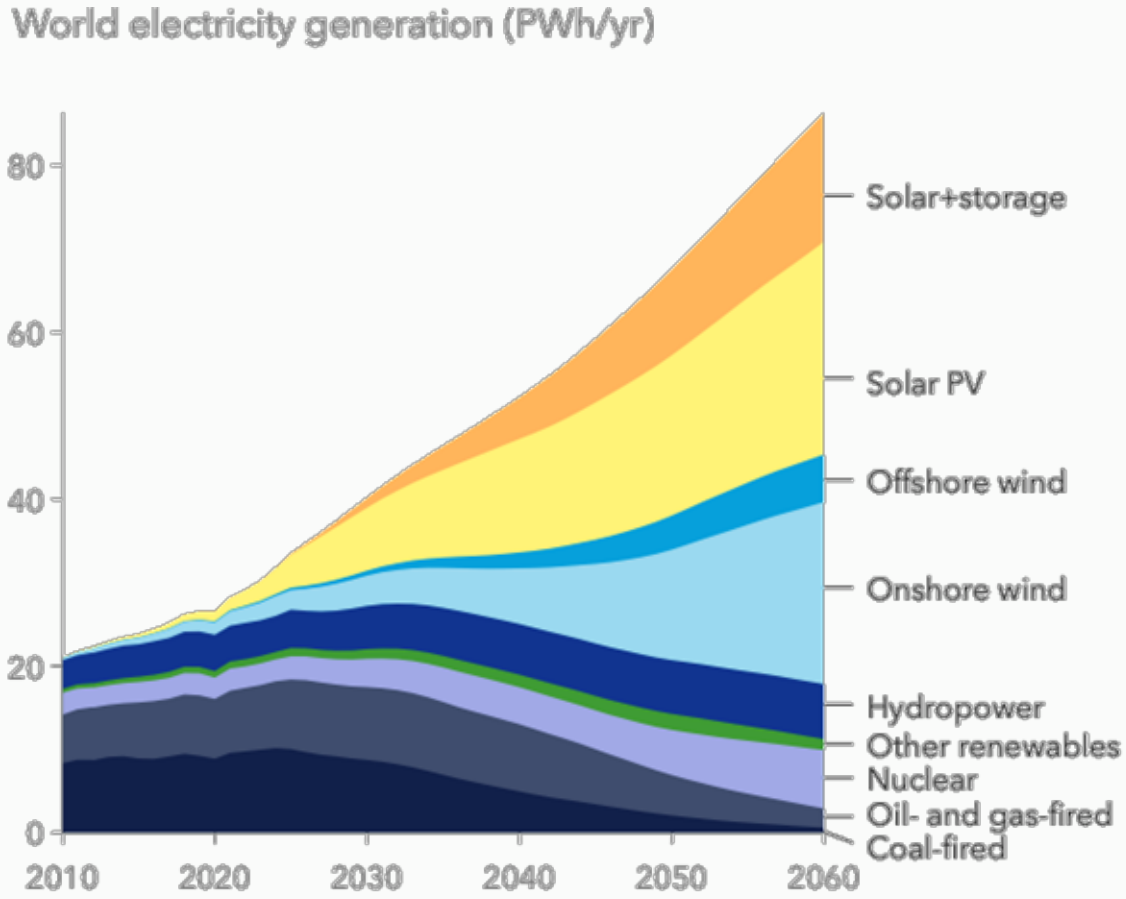


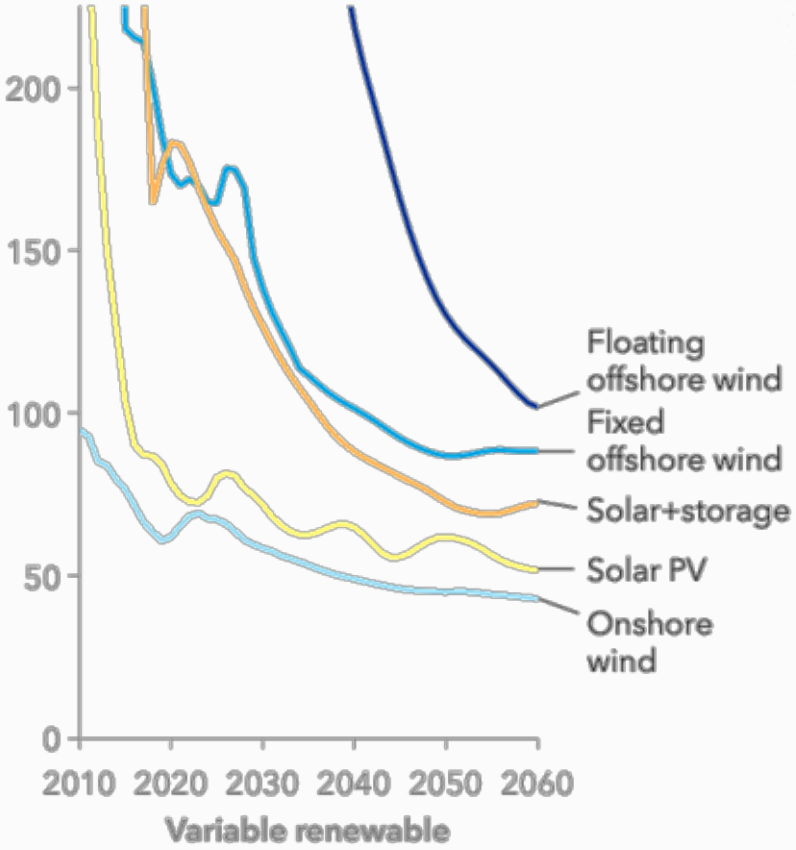
Roll out ambition towards 2050



2.0 – 2.5 GW yearly installations

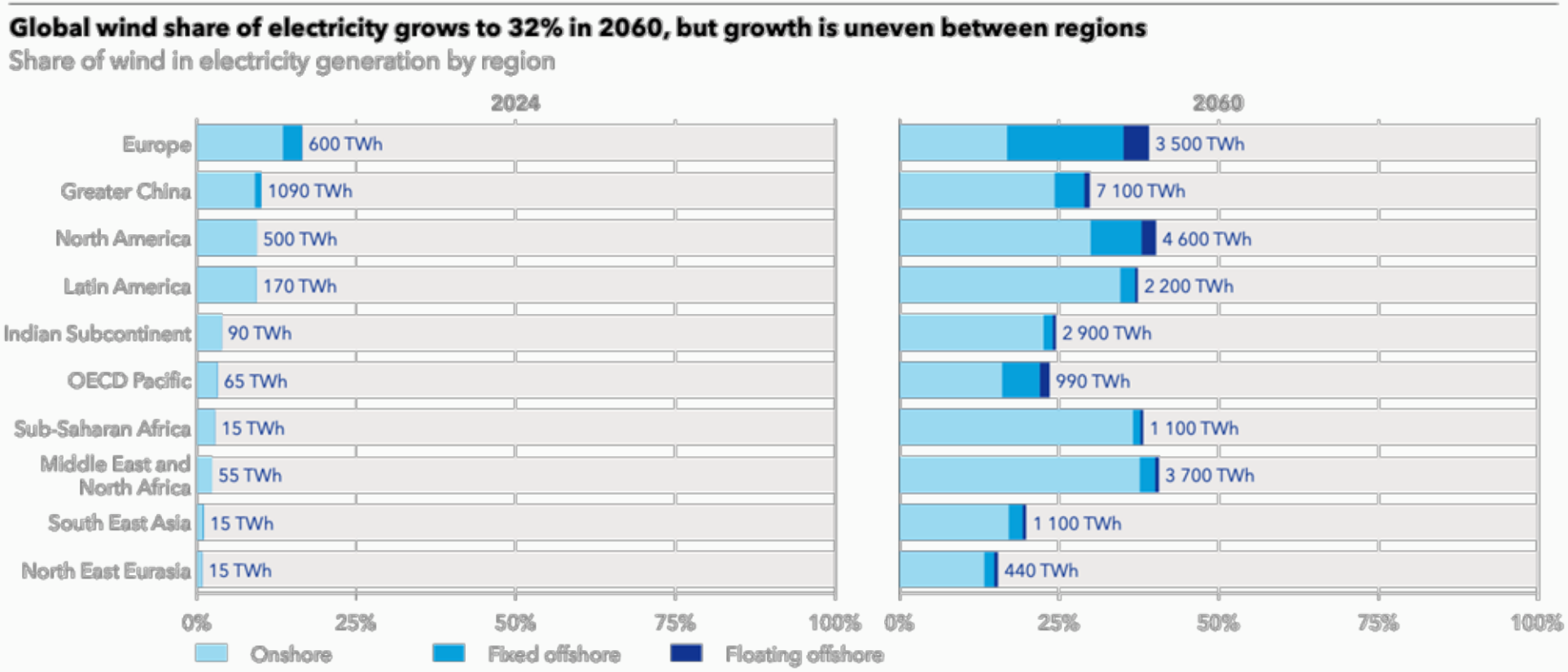
Roll out ambition towards 2060





Source: DNV Energy Transition Outlook 2025

Roll out ambition towards 2060



Source: DNV Energy Transition Outlook 2025

Challenges in upscaling offshore wind energy



The Innovation Program: From Challenges to Solutions

- Cost reduction and Value Optimisation
- System Integration
- Security
- Skilled Work Force
- Spatial, Environmental and Societal Integration

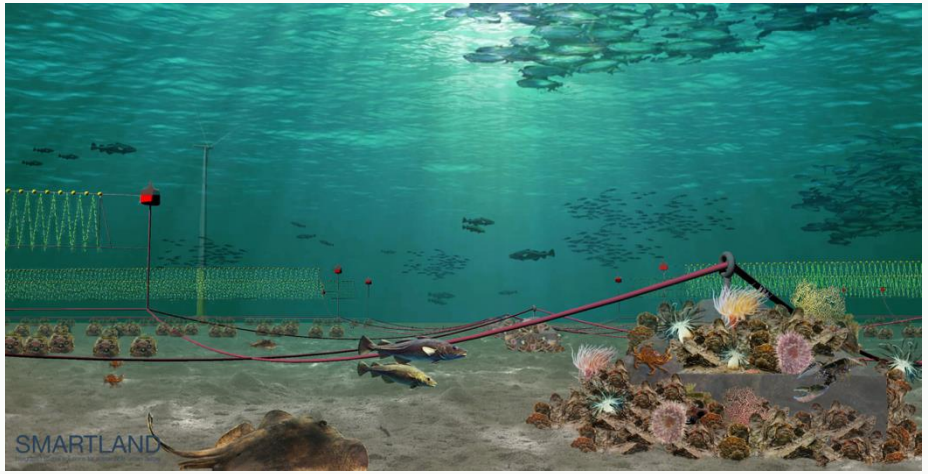


The next phase: Offshore Energy Farms (2030-2040)

- Now:
  - Upscaling offshore wind project to multi-GW scale
  - 15+ MW WTGs
  - HVAC and HVDC transmission
  - Focus on maximum output, not constant supply
- Transitions from power generation to energy provisioning
- New elements:
  - **Storage**: Short and medium term energy storage
  - **Hybrid generation**: Initial solar and wave energy pilots
  - **Conversion**: First offshore hydrogen production platforms
  - **Local use**: Offshore Data Centers
- **Goal**: More stable supply, better use of infrastructure.



From there to Multi Use and Integrated Offshore Clusters



Artist's Impression van een zeewierboerderij door Smartland Landscape Architecture.
Source: https://www.northseafarmers.org/projects/nsf1

- Aquaculture: Farming of mussels, oysters, seaweed, or fish within or around turbine arrays.
- Optimises use of offshore space for food production.
- Nature Restoration: Artificial reefs, marine habitat enhancement, or biodiversity corridors.
- Tourism & Recreation



- Production of other energy carriers (H_2, NH_3, MeOH, CH_3OCH_3)
- Production of hydrogen derivatives or sustainable fuels
- Offshore Data Centers
- Direct Sea or Air Capture