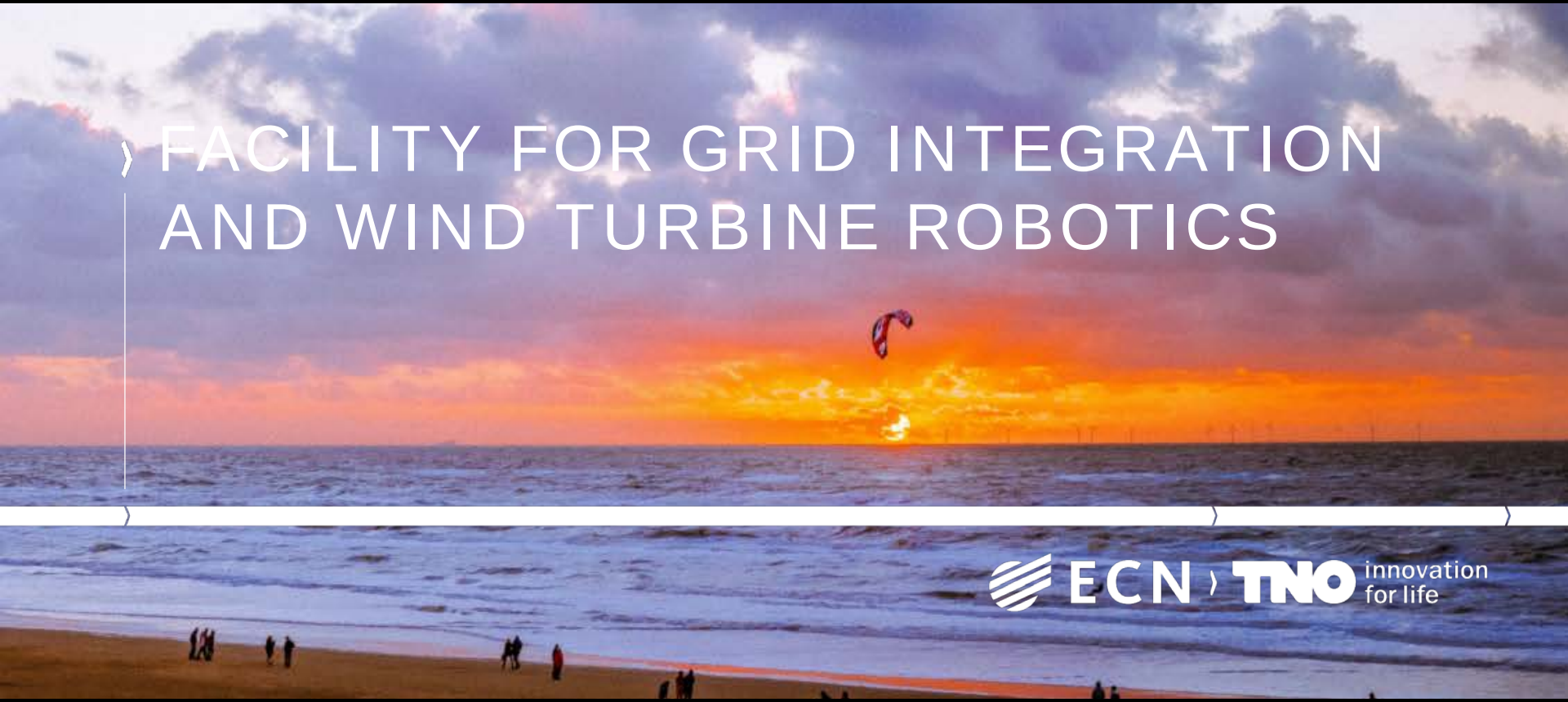
FACILITY FOR GRID INTEGRATION
AND WIND TURBINE ROBOTICS
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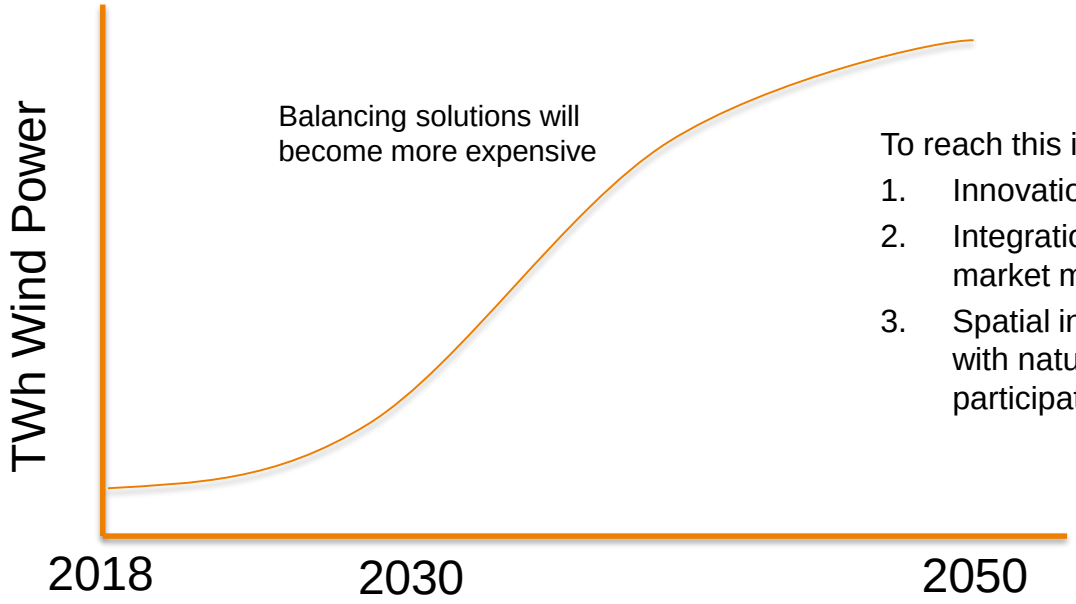
CONTEXT 1/2



To reach this in 2050:

1. Innovations, Faster, More Efficient, Cheaper and Safer
2. Integration in energy system by flexibility, storage and market models
3. Spatial integration by mitigating ecological impact, building with nature, multi-use of space, social acceptance and participation

CONTEXT 2/2

- Experimentation is becoming more and more difficult.
- We must develop and derisk the interface between production sources and flexibility storage / conversion technologies.
- Companies need the opportunity to pass through the valley of death
- Industry and Governments need confidence in new solutions

VISION 1
SYSTEM INTEGRATION FACILITY

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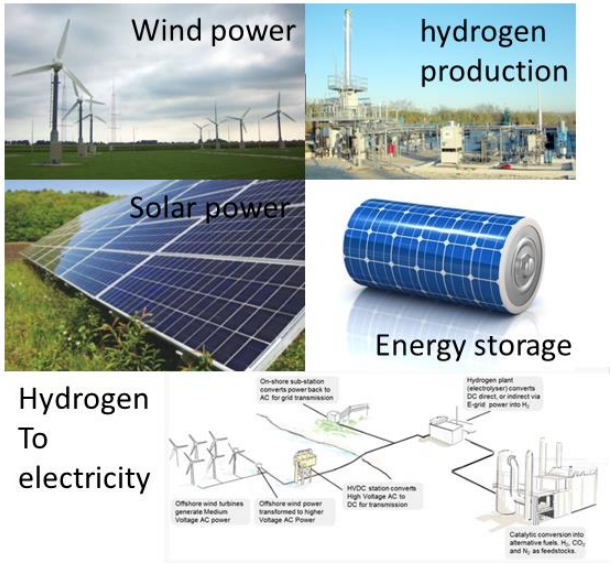
VISION 1 FOR NEW FACILITY

Vision: Establish and operate a joint Dutch infrastructure for the integration of wind energy in the energy system together with solar power, hydrogen production and energy storage.



- Demonstrate and accelerate:
  - System Controllable renewable sources (wind, solar)
  - Electricity storage systems
  - Production of energy carriers (H_2)
  - Use H_2 to produce electricity and/or other products

VISION 2
WIND ROBOTICS FACILITY

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WIND TURBINE ROBOTICS TEST FACILITY

- Zero subsidy can only be achieved with new ways of working.
- Sending people offshore is costly, risky and results in long turbine downtime before repair.
- Robotics can achieve repairs and inspections faster, cheaper and safer.
- **But**, it is difficult to prove new concepts quickly enough. A test facility will be established to get through the “Valley of Death” efficiently, delivering reliable, effective new technology onto wind farms.

ROBOTICS

DOWNTIME

+4,75 M€ /GW/year

-2 incidents /GW/year

SAFETY

+1,5 M€ /GW/year

COST

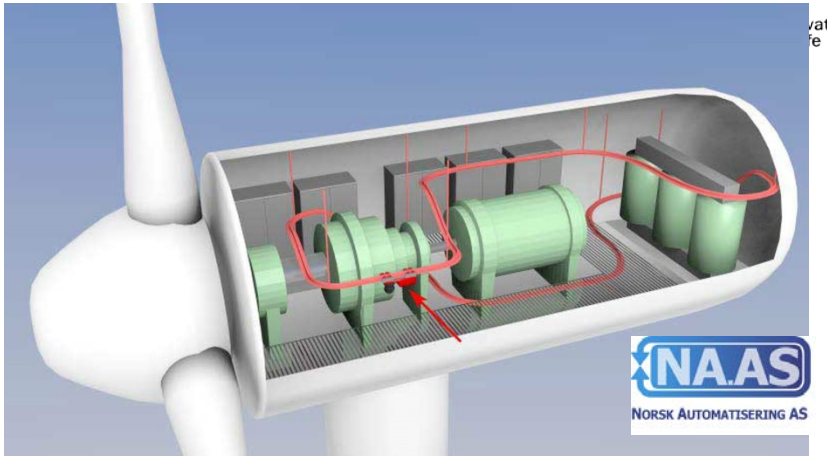
If robotics only save 1/5 of technician journeys, for minor work

Assuming 6 interventions per turbine per year.
One CTV carrying 12 technicians visits 6 turbines per day.
CTV costs €1,500/day to rent and technicians work 10 hours/day at €50/hour

Each incident costs 24 hours of production on average.
Each turbine is 5MW and operates at 40% capacity factor, earning 80€/MWh

G+ Global Offshore Wind Health & Safety Organisation “UK Offshore wind health and safety statistics


DUTCH DRONE COMPANY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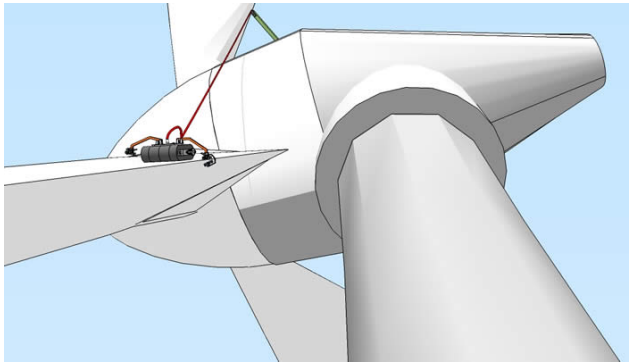

WHERE?


THANK YOU
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MANAGER OFFSHORE WIND BUSINESS DEVELOPMENT
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for life

OUR CONTRIBUTION

- INCREASE PRODUCTION
- LOWER OPEX
- LOWER CAPEX
- LOWER WACC / Risk
- EXTEND LIFE
- GRID INTEGRATION
- MEASURMENT AND VALIDATION
- NEW TECHNOLOGIES

- NEW VALUE CREATION
  - E.g. Synergy With Oil and Gas
  - E.g. Power to Gas