Taiwan
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Offshore Wind in Taiwan

- Vulnerable energy supply to external disruption
- Public's confidence towards nuclear power is low
- Offshore wind power is most attractive renewable energy
  - Strong wind potential
  - European experience is successful
Taiwan offshore wind potential

- Excellent wind offshore
- High full-load hours
- Good conditions for building offshore wind farm
Strong government support

- Thousand Wind Turbines Project: present-2030
- Offshore wind demonstration incentive program
- Government buy-back mechanism: Feed in tariff (FIT)
Strong government support

- Thousand Wind Turbines Project: present-2030
  - 450 onshore + 600 offshore wind turbines
  - Stages for offshore wind:
    3 demonstration farms in 2016→
    520MW shallow water wind farm in 2020→
    4,000MW offshore wind farm in 2030
Strong government support

- Offshore wind demonstration incentive program (DIP)
  - 3 demonstration offshore wind farms in 2016:
    Complete Installation of 1 meteorological observation tower and 2 turbines in each farm
  - Incentive fees for installation of demonstration wind turbines: The upper limit shall be 50% of the installation expenditures
demonstration wind farm operations: The upper limit shall be 250 million New Taiwanese Dollars (7 million Euro)
Strong government support

- Government buy-back mechanism: Feed in tariff (FIT)
  - Renewable Energy Act (REA; 2009) provides the developers with a 20-year guaranteed Power Purchase Agreement together with the feed-in-tariff (FiT)

<table>
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<th>Item</th>
<th>Type</th>
<th>Capacity (kW)</th>
<th>period 1</th>
<th>period 2</th>
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<td>$\geq 10$</td>
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<td>8.7835 (with LVRT)</td>
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<td>Offshore</td>
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</table>

Unit: US ¢/kWh
Current status

- 3 offshore wind farm projects has awarded to three eligible developers
- 3 meteorological observation towers (Met Masts) are installed
- 6 turbines will be installed in 2016
Challenges

- Environmental consideration
- Limitation in offshore wind generation technology
- Environment impacts
- Lack of marine technology
- Bank financing and financial backing
Challenges - Technology Gaps

• Design Analysis
  - Turbine design resistant to typhoons
  - Foundation design resistant to earthquakes

• Environmental Impact Assessment
  - Migrating birds & ocean mammals
  - Local fishery, navigation and harbour development

• Project Management
  - Risk assessment and mitigation
  - Vessel coordination
  - Construction scheduling
Opportunities NL-TW

• Dutch Experiences of Wind Farm Development
  - **Strategy**: demonstration vs commercial
  - **EIA solutions**: navigation, fishery, environmental activists
  - **Onshore Infrastructure**: design of onshore base for offshore wind farm industry
  - **Future**: plans for floating turbines or deeper sea

• Taiwan Offshore Demonstration Wind Farm
  - **Developer**: general consulting, project management and risk management
  - **Equipment**: typhoon-proof design technology
  - **Service**: marine construction and O&M

• Offshore Test Wind Farm
  - **Offshore test site** for new turbine technology
Interaction / Collaboration NL-Taiwan

• 2 MOUs signed between NL and Taiwan
  - Energy MOU signed RVO – Bureau of Energy TW (Sep 2015)
    BOE visit to NL in 2016 incl. roundtable meeting with Dutch offshore wind
  - Technology MOU signed RVO – Department of Industry Technology TW in
    Energy, HTSM and LSH (Extended 2013 until 2017)

• Current Collaborations (pre/ongoing stage)
  - ECN: Offshore test site, O&M
  - IHE: Design and marine technology
  - Darwin: Turbine

(above are few examples)
Thank you!