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• Strong Policy Support Continues For Renewable Energy
• Abundant Wind Resources in Taiwan
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• Proposed Projects and Market Status
• Challenges and Opportunities
• How Austrade Can Help
HIGHLY DEPENDENT ON IMPORTED ENERGY SOURCES

- Over 80% of Taiwan’s electricity generation comes from thermal sources. 94% were imported.
- Less than 1% came from wind and solar.

**Total Power Generation 2017**

- LNG 34.6%
- Coal 46.6%
- Nuclear 8.3%
- Oil 4.7%
- Renewables 4.6%
- Pumped Hydro 1.2%

**Renewables Generation 2017**

- Hydro 2.02%
- Wind 0.64%
- Solar 0.63%
- WTE 1.24%
- Biomass 0.07%

In January 2017, the Legislature passed an extensive amendment of the Electricity Act to reform the electricity market structure and promote renewable energy:

- **Nuclear-free by 2025**
  The policy goal of eliminating nuclear power by 2025 was legalized as an official obligation. Renewable energy is expected to fill the 8% gap due to decommissioning of nuclear power.

- **Electricity market liberalisation**
  The amendment will gradually unbundle the 70-year monopoly of the state-owned Taipower. Renewable energy will be the first allowed direct sell to end users.

- **Renewable energy prioritised**
  Feed-in-Tariff (FIT) scheme with 20-year PPA will continue. Other benefits given to renewable energy include priority right to grid access and discounted on-grid fee.
ABUNDANT OFFSHORE WIND POTENTIAL

- **Shallow Water (5-20 m)**
  - Area: 1,779.2 km\(^2\)
  - Potential: 9 GW
  - Feasible: 1.2 GW

- **Deep Water (20-50 m)**
  - Area: 6,547 km\(^2\)
  - Potential: 48 GW
  - Feasible: 10 GW

- **Deeper Water (> 50 m)**
  - Potential: 90 GW
  - Feasible: >10 GW

Source: Bureau of Energy

Contour simulated by NCAR WRF 3.0 model.
## POLICY TARGET AND FIT RATE

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Mid-term</th>
<th>Long-term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2017</td>
<td>2020</td>
<td>2025</td>
</tr>
<tr>
<td>MW Tturbines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onshore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MW</td>
<td>647</td>
<td>814</td>
<td>1,200</td>
</tr>
<tr>
<td>Turbines</td>
<td>311</td>
<td>305</td>
<td>450</td>
</tr>
<tr>
<td>Offshore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MW</td>
<td>8</td>
<td>520</td>
<td>3,000</td>
</tr>
<tr>
<td>Turbines</td>
<td>2</td>
<td>104</td>
<td>600</td>
</tr>
<tr>
<td>Total</td>
<td>655</td>
<td>1,334</td>
<td>4,200</td>
</tr>
</tbody>
</table>

- **Offshore wind Feed-in-Tariff** (2017): reviewed yearly, and expected to slightly decrease every year
  - **20-year fixed FIT**: TWD 5.8498 (~AUD 26.07 cents)
  - **Tiered Contract**: first 10 years TWD 7.1177 (~AUD 31.72 cents)
    next 10 years TWD 3.5685 (~AUD 15.90 cents)
STAGED DEVELOPMENT FOR OFFSHORE WIND

### Phase I

**Demonstration Incentive Programs (DIP):** with Government Subsidy
- **Formosa I** (128 MW) – by Swancor + Macquarie + Ørsted (Dong Energy)
- **Taipower** (110 MW) – by Taipower
- **Fuhai** (120 MW) – by Taiwan Generation Corporation (TGC)

### Phase II

**Zone Planning**
- 36 offshore wind zones were published in July 2015
- Self-defined zones (i.e. “outside” the 36 zones) may be proposed
- EIA approval by end of 2017
- Government Selection in April 2018 allocates current grid connection quota
- Reverse auction due on 19 June 2018

### Phase III

**Zonal Development**
- Government to release further zones by stages
- Commercial scale will reduce development cost
- Market moving towards maturity with supply chain gradually developed
## PHASE I – DEMONSTRATION PROJECTS

<table>
<thead>
<tr>
<th></th>
<th>Formosa I (Swancor) (Offshore Miaoli)</th>
<th>Taipower (Offshore Changhua)</th>
<th>Fuhai (TGC) (Offshore Changhua)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity (MW)</strong></td>
<td>128</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td><strong>No. Turbines</strong></td>
<td>32</td>
<td>22 - 36</td>
<td>30</td>
</tr>
<tr>
<td><strong>Distance from shore (km)</strong></td>
<td>2 – 6</td>
<td>6 - 8</td>
<td>8 - 12</td>
</tr>
<tr>
<td><strong>Water Depth (m)</strong></td>
<td>15 - 35</td>
<td>15 - 25</td>
<td>20 – 45</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>2 pilot turbines (8 MW) in operation. Project phase II of 120 MW already tendered, construction to start in 2019</td>
<td>Tender for a EPC contractor succeeded after 2 failed tender rounds. EPC contract awarded.</td>
<td>Failed to pass EIA. Government sponsorship revoked</td>
</tr>
</tbody>
</table>
Offshore wind zones

- Original 36 zones were reduced to 24 zones to avoid sea lanes
- Most zones congregates offshore the Changhua County
- Must submit and receive EIA approval by end of 2017 to secure exclusive development right
- 20 proposed projects received EIA approval by Dec 2017
- 18 projects proceeded to grid capacity allocation “Selection” process
- Selection concluded in April 2018

Source: Bureau of Energy
# PHASE II – SELECTION RESULTS BY RANKING

<table>
<thead>
<tr>
<th>Project</th>
<th>Zone</th>
<th>Proposed (MW)</th>
<th>Approved (MW)</th>
<th>COD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demonstration Projects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formosa I</td>
<td>-</td>
<td>120</td>
<td>120</td>
<td>2019</td>
</tr>
<tr>
<td>Taipower Phase I</td>
<td>-</td>
<td>110</td>
<td>110</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>230</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COD 2020</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Formosa II</td>
<td>5 + 6</td>
<td>378</td>
<td>378</td>
<td>2020</td>
</tr>
<tr>
<td>2 Yunang</td>
<td>outside</td>
<td>708</td>
<td>360</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>738</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COD 2021-2025</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Li-Wei</td>
<td>2</td>
<td>363</td>
<td>350</td>
<td>2021</td>
</tr>
<tr>
<td>2 Greater Changhua SE</td>
<td>15</td>
<td>605.2</td>
<td>605.2</td>
<td>2021</td>
</tr>
<tr>
<td>3 Yunang</td>
<td>outside</td>
<td>348</td>
<td>348</td>
<td>2021</td>
</tr>
<tr>
<td>4 Greater Changhua SW</td>
<td>14</td>
<td>631.9</td>
<td>294.8</td>
<td>2021</td>
</tr>
<tr>
<td>5 Changfang</td>
<td>27</td>
<td>552</td>
<td>100</td>
<td>2021</td>
</tr>
<tr>
<td>6 Chungnan</td>
<td>29</td>
<td>480</td>
<td>300</td>
<td>2024</td>
</tr>
<tr>
<td>7 Shidao</td>
<td>Outside</td>
<td>400</td>
<td>48</td>
<td>2024</td>
</tr>
<tr>
<td>8 Greater Changhua NW</td>
<td>12</td>
<td>560.7</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>9 Taipower Phase II</td>
<td>26</td>
<td>720</td>
<td>300</td>
<td>2024</td>
</tr>
<tr>
<td>10 Hai Long 2</td>
<td>19</td>
<td>532</td>
<td>300</td>
<td>2024</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>3,098</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Bureau of Energy

**TOTAL** 4,066
PHASE II – SELECTION RESULTS SUMMARY

<table>
<thead>
<tr>
<th>Completion by</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>968 MW</td>
</tr>
<tr>
<td>2021</td>
<td>1,698 MW</td>
</tr>
<tr>
<td>2023</td>
<td>452 MW</td>
</tr>
<tr>
<td>2024</td>
<td>948 MW</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,066 MW</strong></td>
</tr>
</tbody>
</table>

Another 1,664 MW grid connection capacity opens for reverse auction, submission deadline is 19 June 2018.

Only projects received over 60% score at Selection can participate.

Source: Bureau of Energy
IN A NUTSHELL

- **Demonstration Projects**: 230 MW (2 Projects)
- **Zonal Projects EIA**
- **Selection for Grid Connection**: 10 GW (22 Projects)
- **Reverse Auction**: 738 MW (2 Projects) + 3.1 GW (9 Projects)
- **Future**
  - 1.6 GW
  - 4.5 GW??

Timeline:
- 2015/07
- 2017/12
- 2018/04
- 2018/06

Taiwan Offshore Wind: Status & Opportunities

Austrade Taipei
MARKET STATUS

- **Market has been moving fast**
  - Industry started gaining momentum and going through rapid development in the past 1-2 years

- **International developer dominate the market**
  - Current developers include 8 international and 5 domestic firms. 4 joint-ventures were formed.
  - Over 70% of proposed generation capacity by international developers

- **Preliminary design and project site investigation in 2018.**
  - Detailed pre-construction survey
  - Project timeline for fabrication and marine construction will become clear
  - Weather window is April – September
  - Construction starts in 2019 for 2020 projects
OPPORTUNITIES

- Lack of supply chain presents opportunities for international suppliers
- Localisation is viewed favourably by Government
  - Alliances or joint-venture with local suppliers
  - Technology and/or knowledge transfer
- Expertise Needed
  - Geotechnical and analysis
  - EPC Contractor
  - Marine engineering and construction
  - Marine Warranty Survey
  - Substation and subsea cable installation
  - Offshore installation & supporting vessels
  - Grid management & technology
  - Training and knowledge transfer
  - Project financing
Xingda Port: A Marine Engineering Hub

- Part of Taiwan government’s “Forward-Looking Infrastructure Development Program”
- TWD 6.4 billion (A$267 million) government budget allocated
- Develop and advance marine industries including offshore wind, marine engineering, marine communication, aquaculture and ROV/AUV
- Focus on marine engineering, marine technology training, R&D, innovation, skills training and certification
- Project under planning and tender opportunities will be released in 2018-19
CHALLENGES FOR THE INDUSTRY

- Related infrastructure lagged behind
  - Insufficient port facility and assembly base
  - Lack of installation and supporting vessels
  - Grid connection capacity limited
    - Current proposed capacity (10 GW) exceeds policy goal
    - April Selection awarded 3,836 MW; 1,664 MW opens for reverse auction
    - Still 4.5 GW proposed projects left pending grid connection
  - Localisation remains an important factor

- Local suppliers have difficulty catching up with demand

- Lack of coordination among government agencies
### Why You Should Consider Taiwan Offshore Wind Market

- Abundant wind resources presents huge market potential and attracted developers around the world to build busy project pipeline in Taiwan
- Strong government will with supporting policy and regulatory incentives
- Local industry recognises the knowledge gap and is keen to work with international suppliers to build up supply chain in Taiwan
- Certain Australian offshore oil & gas expertise could be transferred to support offshore wind
- Australia is closer to Taiwan and the region than Europe, a potential for lower mobilisation cost, hence more competitive pricing
- Reverse season in Taiwan means project opportunities during the winter time outside of summer weather window in Australia
- Taiwan is well positioned to become the Asia-pacific offshore wind centre, with opportunities to expand to Japan and Korea
Austrade provides services to Australian business towards their goals of developing international markets. We invite you to take advantage of Austrade’s extensive network and in-depth knowledge of the offshore wind industry in Taiwan.

- Market intelligence gathering: industry news, recent development, regulatory environment
- Introduction to key industry players, industry associations and government agencies
- Market entry advisory based on type of industry and domestic market status
- Market visit arrangements and meeting facilitation
- Identification of suitable local contacts and potential partners
- Assistance on follow-up and advisory on next steps
Australtrade journey since 2016:
- Scoping input
- VC seminar
- Individual company engagements

Australtrade services provided
- 9 market visits in less than 2 years
- 6 more clients in discussion

Accomplishments:
- 2 contracts
- 5 NDAs
- 4 pricing quotes
- 1 MOU
- 4 upcoming market visits scheduled
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