KPMG Intro
KPMG has end-to-end capabilities in delivering solutions that help our clients address their needs and challenges across the renewable energy value chain and throughout the project lifecycle. KPMG can provide you with advisory, tax, audit, legal, accounting and compliance related assistance through the life of your projects and programs, or as a fundamental part of your business. Our professionals can bring you the benefits of their extensive local and global experience advising government organizations, contractors, operators and investors.

KPMG — The Clear Choice for Renewable Energy Support

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KPMG - A trusted financial advisor in the renewable energy space

We have a strong network with major solar players worldwide
Selected recent government and private sector clients in the energy sector

- CIP
- Ørsted
- ChinaSteel
- elementpower
- ABRAXA
- MITSUBISHI
- Solarig
- SWancor
- NaturEner
- ABENGOA
- SUNTECH
- Cathay Life Insurance
- TRERNOVA
- TEPCO
- renova
- HUDDSON
- GMR
- 丸紅株式会社
- Torresol Energy
- 9REN Group
- SKYPOWER

Challenger MBK Fund Management Pte Limited
## Clear OWF development plan

<table>
<thead>
<tr>
<th>Demo- Incentive Program (2012/7/3)</th>
<th>Directions of Zone Application for Planning (2015/7/2)</th>
<th>Zonal Development (early 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>237.2 MW 5.7 GW 2 Demonstration turbines 2 Demonstration wind farms</td>
<td>5.7 GW Potential site development</td>
<td>5.7GW+ 5-10GW Zonal development</td>
</tr>
</tbody>
</table>

- **COD 2020**
  - 2 Demonstration turbines
  - 2 Demonstration wind farms

- **2025**
  - Potential site development

- **2050**
  - Zonal development

### Phases

- **Phase 1 (Demo)**
- **Phase 2 (Potential Zone)**
- **Phase 3 (Zonal Development)**
Main Players
To kick-start Taiwan offshore wind power development, an incentive program was launched in 2012 to offer government subsidy of 250 million NTD per demonstration project.

3 awarded developers were selected to build 4 demonstration turbines (Phase I) by 2015 and 3 demonstration farms (Phase II) by 2020.

<table>
<thead>
<tr>
<th>Company</th>
<th>Shareholders</th>
<th>Location</th>
<th>Capacity (MW)</th>
<th>Turbines</th>
<th>COD Date</th>
<th>Investment Amount (NTD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formosa Wind Power Co., Ltd</td>
<td>Swancor Industry Co., Ltd, Ørsted, Macquire Capital</td>
<td>Zhunan Township, Miaoli</td>
<td>129.6</td>
<td>34</td>
<td>Phase I (2 pilot turbines, 8MW)</td>
<td>20 - 22 Billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Phase II (30 pilot turbines, 120MW)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Est. Dec 2019</td>
<td></td>
</tr>
<tr>
<td>Fuhai Wind Farm Corp., Ltd</td>
<td>Taiwan Generations Corporation, CSBC Corp, Century Iron Steel Industrial Co., Ltd</td>
<td>Fangyuan Township, Changhua</td>
<td>108</td>
<td>30</td>
<td>Phase I (2 pilot turbines)</td>
<td>15 - 16 Billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dec 2017</td>
<td></td>
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<tr>
<td></td>
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<td></td>
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<td></td>
<td>Phase II</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dec 2018</td>
<td></td>
</tr>
<tr>
<td>Taiwan Power Company</td>
<td>Government</td>
<td>Fangyuan Township, Changhua</td>
<td>108</td>
<td>22 - 36</td>
<td>June 2020</td>
<td>19.5 Billion</td>
</tr>
</tbody>
</table>

EIA Failed
Phase 2 Selection Stage Award List

7 developers
10 projects

End of April
End of June

2020
2021-2025
Price Auction
5.5GW-3.836GW= 1.664GW

WPD
ACC
Swancor

Liwei #2
350 MW
13 MW

Chufeng #4
450 MW

Haineng #5.6
378 MW

Da-Changhua Northwest #12
598 MW

Da-Changhua Northeast #13
560.7 MW

Da-Changhua Southwest #14
294.8 MW

Da-Changhua Southeast #15
605.2 MW

Haiding One #11
475.1 MW

Haiding Two #16
558.5 MW

Haiding Three #17
516.8 MW

NPI

Hailong III #18
512 MW

Hailong II #19
300 MW

232 MW

Taipower
CIP
LEALEA
China steel

Taipower #26
300 MW

420 MW

Changfang #27
552 MW

Haixia #28
500 MW

Chongneng #29
300 MW

180 MW

WPD

Yunneng @Yunlin
708 MW

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### Phase 2 Auction Stage Award List

**Price Auction 1.664GW**

**End of April**
- Ørsted
  - Da-Changhua Northwest #12: 582.9 MW @2.5481NT$/kwh
  - Da-Changhua Northeast #13: 560.7 MW
  - Da-Changhua Southwest #14: 337.1 MW @2.5480NT$/kwh
- Swancor
  - Haiding One #11: 475.1 MW
  - Haiding Two #16: 558.5 MW
  - Haiding Three #17: 516.8 MW
- NPI
  - Hailing III #18: 512 MW @2.5025NT$/kwh
- Taipower
  - Taipower #26: 420 MW
- LEALEA
  - Haixia #28: 500 MW
- China steel
  - Chongneng #29: 180 MW

**End of June**
- Ørsted
  - Da-Changhua Southwest #14: 337.1 MW @2.5480NT$/kwh
- WPD
  - Liwei #2: 13 MW
  - Chufeng #4: 450 MW
- ACC
  - Chufeng #4: 450 MW

**After auction still have 4,041.2 MW left over**

**2 developers**
- 4 projects

---

**Source:** BOE,
Developers’ anticipated GC Capacity & Taipower’s Accumulated allowable GC Capacity

- **Swancor**
  - Haiyang Phase 1: 8 MW
  - Haiyang Phase 2: 120 MW

- **Taipower**
  - Taipower Demo: 109.2 MW
  - WPD: 294.8 MW
  - Yunneng: 360 MW

- **Ørsted**
  - #15 DC SE: 605.2 MW
  - #14 DC SW: 4510 MW
  - #14 DC NW: 5737.2 MW

- **CIP**
  - Changfang #27: 452 MW
  - Xidao: 48 MW

- **Taipower**
  - TPC #26: 300 MW

- **China Steel**
  - Chongneng #29: 300 MW

- **Hailong II**
  - #19: 232 MW
  - #18: 512 MW

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DEVELOPER’S ACCUMULATED GC CAPACITY ON A SHAREHOLDER’S PRO RATA BASIS

Note:  
1 Zhongneng Project hasn’t announced it’s shareholder ratio. In this bar chart, we assumed that the three developers which is China Steel, CIP, DGA would take 1/3 of the share ratio.
Key Issue - Distribution

Energy storage

Ørsted develops a pilot storage project in Changhua to test how a battery-based system can support the grid. The pilot will be at least 1MW — the first MW-size storage facility in Taiwan.

Smart Grid

Construction left behind the schedule.

Developer Coordination

Renewable energy developers to coordinate with each other creating a centralized center.
FiT Trend
The backbone policy for developing offshore wind

Renewable Energy Development Act (RED Act)

**20-year power**
Guaranteed 20-year power purchase agreement

**The feed-in tariff**
is reviewed by a dedicated committee annually

**20 Year fixed rate**

<table>
<thead>
<tr>
<th>Year</th>
<th>NTD / kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>5.85</td>
</tr>
</tbody>
</table>

**Step-down rate** (10 years / 10 years)

<table>
<thead>
<tr>
<th>Year</th>
<th>NTD / kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>7.12</td>
</tr>
<tr>
<td></td>
<td>3.57</td>
</tr>
</tbody>
</table>
## FiT Variations in recent years

### 2010 Feed-in-Tariff (NTD/kwh)

<table>
<thead>
<tr>
<th>Solar</th>
<th>Capacity</th>
<th>Y2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore Wind</td>
<td>1~10kw</td>
<td>7.2714</td>
</tr>
<tr>
<td>Onshore Wind</td>
<td>&gt;10kw</td>
<td>2.3834</td>
</tr>
<tr>
<td>Offshore Wind</td>
<td>-</td>
<td>4.1982</td>
</tr>
</tbody>
</table>

### Our observations

As the technology advances and the auction price of the offshore wind becomes lower, the FiT of offshore wind continues to go down.

Source: BOE Website

### 2016-2018 Feed-in-Tariff

<table>
<thead>
<tr>
<th>Solar</th>
<th>Capacity</th>
<th>Y2016</th>
<th>Y2017</th>
<th>Y2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore Wind</td>
<td>1~20kw</td>
<td>8.5098</td>
<td>8.9716</td>
<td>8.6685</td>
</tr>
<tr>
<td>Onshore Wind</td>
<td>&gt;20kw</td>
<td>2.7763</td>
<td>2.8395</td>
<td>2.7315</td>
</tr>
<tr>
<td>Offshore Wind</td>
<td>Fixed rate</td>
<td>5.7405</td>
<td>6.0437</td>
<td>5.8498</td>
</tr>
</tbody>
</table>

Source: BOE Website
Off-Shore Wind - FiT Trend

Step Down FiT

Fixed FiT for 20 years
FiT Calculation Element - (2018) 1/4

**Formula**

\[
\text{FiT} = \frac{\text{Initial Cost} \times \text{Capital Recovery} + \text{O&M/per year}}{\text{Sales of electricity per year}}
\]

**Capital Recovery**

\[
\text{Capital Recovery} = \frac{\text{WACC} \times (1 + \text{WACC})^{20}}{(1 + \text{WACC})^{20} - 1}
\]

**O&M/per year**

\[
\text{O&M/per year} = \frac{\text{Initial Cost} \times \text{O&M/per year}}{\text{Initial Cost}}
\]

**Note:**

1. [FiT period: For off shore wind, the FiT period is 20 years.]

**Source:**

[BOE FIT validation meeting 2017/12/24]
FiT Calculation Element - (2018) 2/4
Initial & Annual O&M Cost

Initial Cost
173,500 NTD/kW

Domestic input
- Customs Import data 64,050 NTD/kW
- Fishing Compensation 1,407 NTD/kW

Foreign Input
- Proportion of wind turbine in initial cost 37.09%
- 2010 ~ 2017 England data of initial cost 175,324 NTD/kW
- Decommissioning cost 4,000 NTD/kW
- Cost Decrease rate per year: 1.79%

Annual O&M Cost
5,735 NTD/kW

Foreign Input
2014 ~ 2016

Foreign input
5,735 NTD/kW

Initial cost
3.31%
Sales of electricity

Penghu

Sales of electricity per year
3,600 kW/year

Domestic input

2002 ~ 2016
Average Annual Energy Production
## FiT Calculation Element-(2018) 4/4

### WACC

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Final ratio</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity ratio</strong></td>
<td>30%</td>
<td><strong>Domestic Inputs</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Demo phase developer’s financial section in bidding document.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Confirmation letter from financial institution.</td>
</tr>
<tr>
<td><strong>Debt Ratio</strong></td>
<td>70%</td>
<td><strong>Foreign Inputs</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Green Giraffe (2017)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• TKI Wind op Zee (2015)</td>
</tr>
<tr>
<td><strong>Risk-free rate of interest</strong></td>
<td>1.12%</td>
<td><strong>Domestic Inputs</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2015-2017 Average 10-Years Government Bonds Interest Rate</td>
</tr>
<tr>
<td><strong>α risk</strong></td>
<td>2.75%</td>
<td><strong>Foreign Inputs</strong></td>
</tr>
<tr>
<td><strong>β risk</strong></td>
<td>7.27%</td>
<td><strong>Foreign Inputs</strong></td>
</tr>
</tbody>
</table>
How do developers deal with decreasing FiT?

As the technology advances and the price of the offshore wind becomes lower, the FiT of offshore wind continues to shrink. If the developer has exclusively customer with TPC, the developer can only accept the decreasing FiT that will cause huge profit lost.

The supply of green energy directly to consumers and the restructure of the state-owned Taiwan Power Company (TPC). The Act requires that non-renewable energy generators only sell electricity to retailers or the grid operator, not directly to users; Renewable energy generators are not bound by this limit.

• Potential Buyer: RE 100 and RE 100’s suppliers.
• Revenue Structure:
  ① Bundle
  ② Unbundle
Pricing Scheme

Feed-in Tariff, FIT
- Off-taker TPC
- Electricity Price

Contract Years 20

NTD 2.2~2.5*/kWh

*reference from auction price

Capacity Contract/ Demand Contract

- Off-taker corporates

**Basic Fare : Capacity Contract**

<table>
<thead>
<tr>
<th>Capacity Contract</th>
<th>Off-taker corporates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household / month</td>
<td></td>
</tr>
<tr>
<td>Summer Period (6~9)</td>
<td>137.50</td>
</tr>
<tr>
<td>Off-Summer Period (10~5)</td>
<td>137.50</td>
</tr>
<tr>
<td>105.00</td>
<td>105.00</td>
</tr>
</tbody>
</table>

**Basic Fare : Demand Contract**

<table>
<thead>
<tr>
<th>Summer Period (6~9)</th>
<th>Off-Summer Period (10~5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Household</td>
<td></td>
</tr>
<tr>
<td>Saturday Semi-peak period</td>
<td></td>
</tr>
<tr>
<td>Off peak period</td>
<td>47.20</td>
</tr>
<tr>
<td>N/A</td>
<td>34.60</td>
</tr>
<tr>
<td>Off Summer Contract</td>
<td>236.20</td>
</tr>
<tr>
<td>Demand Contract</td>
<td>173.20</td>
</tr>
<tr>
<td>262.50</td>
<td>262.50</td>
</tr>
</tbody>
</table>
Policy for REC & Carbon Credit
Applicable Laws and Statutes

Background: Taiwan is heavily dependent on imported energy. In 2016, the government has announced to phase out nuclear power plants completely before 2025 and to reach its target of 20% renewable energy supply by 2025.

**Sustainable Energy Policy Convention**

- The Electricity Act
- Greenhouse Gas Reduction Act
- Renewable Energy Development Act
- Energy Management Act
- Energy Tax (Draft)

**Bureaus:**
- Bureau of Energy
- Environmental Protection Administration
- Bureau of Energy
- Bureau of Energy
- Ministry of Finance
Unbundling Electricity market

Electricity Act (the “Amendment”, 2017 )

- The Electricity Transmission and Distribution Enterprise may not engage in the generation or retailing of electricity. Cross holdings of shares of the Electricity Generation and Retailing Enterprises is prohibited.

- The first paragraph of this Article is effective in 6 years after the amended articles of the Act were promulgated on January 11, 2017.

- However, the electricity industry regulatory authority may submit to the Executive Yuan a request for a postponement (max 3 years in total) of the effect date based on its assessment of the development and condition of the electricity market.
General Principle of REC-Mechanism & Voluntary Market

**Bundled Program**
- Global brands / enterprises preferred (RECs+RE)
- Users negotiate / sign PPAs with RE developers
- No price info on Tracking System, and PPAs will need matchmaking / negotiating process

**Unbundled Program**
- More attractive to small business and users
- Utility as general electricity while RECs enter into trading market.
- Price info on trading platform and available for trading or booking (by aggregators / users)
Global Trend

1. More than 100 influential businesses committed to 100% renewable electricity
2. Companies joining RE100 set a public goal to source 100% of their global electricity consumption from renewable sources by a specified year. They disclose their electricity data annually, and RE100 reports on their progress.

Domestic Trend

Apple urges the suppliers to use renewable energy 100%

23 out of more than 200 suppliers are already committed to 100% renewable energy usage.

----- 20180411 - Chinatimes

Google energy manager, Marsden Hanna, claims that 100% renewable energy goal should be achieved by purchasing local energy.

REC could avoid double counting issue and can certify the energy is 100% green. Google hopes that it could sign long-term PPA with newly established RE power plant, with capacity more than 50 MW.

----- 20170413 - TEIA
RED Act - Central Government

Related Article ------ Article 12.1

The electricity contract signed by users when the contract capacity is above a certain amount. The place should set up a certain capacity of renewable energy power generation equipment, energy storage equipment or an amount of Renewable Energy Certificate (REC). If users failed to follow regulations have mentioned, one shall pay the deposit to authority for the purpose of renewable energy development.

The authority shall determine contract capacity, equipment capacity, amount, the type of renewable energy power generation equipment, the type of energy storage equipment, the payment and calculation method of the deposit, the processing period and other related topics.

Local governments enact stricter self-governance regulations about types of renewable energy power generation equipment, construction schedules and deposit payment standards.

Legislative Procedure

Jan.11.2018
Cabinet passed Renewable Energy Development Act draft amendments

Pending in Legislative Yuan
Legislators pass the third reading procedure

After passing enabling statute. The law will complete and announce within 6 months.
Minister of Economy legislate sub-law (About Contract capacity, green energy device capacity, Amount, Power Generation Type, Deposit)

Depends on county’s schedule
Local Government ➢ Self-governance articles adjustment

Source: https://www.ey.gov.tw/News_Content2.aspx?n=F8BAEBE9491FC830&s=3025B4143B2955E9
Taiwan T-REC Affect

Supply Side
- Government policy and goals
- FiT
- TPC Demand Side
- Regulatory amendment
  - Electricity Act
  - RED Act
  - Self-governance articles
- Construction cost

Private Owned power plant
- Large-scale Users
  - General business & public

Demand Side
- international firms
  - Ex: RE100 member
  - Large-scale Users
  - General business & public

- Respond to International initiatives and evaluations
- Customer request
- Regulatory amendment
  - RED Act
  - Self-governance articles

T-REC Price
1T-REC=MWh=1,000-2,200 NTD

Source: [National Renewable Energy Certification Center]
https://www.trec.org.tw/%E6%9C%80%E6%96%B0%E6%B6%88%E6%81%AF%E5%9C%8B%E5%85%A7%E5%86%8D%E7%94%9F%E8%83%BD%E6%BA%90%E6%86%91%E8%AD%89%E5%8B%82%E5%A0%B4%E4%BA%A4%E6%98%93%E8%BC%94%E5%B0%8E%E7%A4%BA%E7%AF%84%E8%A8%88%E7%95%AB

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## Taiwan GHG Regulations

### GHG Reduction and Management Act

<table>
<thead>
<tr>
<th></th>
<th>Now</th>
<th>Stage 1</th>
<th>Future</th>
<th>Stage 2</th>
<th>Future</th>
<th>Stage 3</th>
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<tbody>
<tr>
<td><strong>Legal Basis</strong></td>
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<td>Mandatory reporting</td>
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<td>Voluntary reduction</td>
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<td>Specified industries</td>
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<td>Emissions over 25,000tons CO2e</td>
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<td><strong>Management measures</strong></td>
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<td><strong>Performance standards rewards</strong></td>
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<td>Promulgated Emission Sources</td>
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<td><strong>CAP &amp; Trade</strong></td>
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<td>Reduction responsibilities for emission sources</td>
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<td>Gradual transition from free allocation to sales</td>
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<tr>
<td>Emission credits auction and trading system</td>
<td></td>
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</tr>
</tbody>
</table>

2050

At zonal development phase, a prediction of 5-10 GW growth will reach accumulated capacity to 10-15GW by 2050.

Distribution problems rely on developers’ coordination and assistance on energy storage technology.

Face a step-down Feed in Tariff (FiT) strategy: Carbon credit, T-REC
Contact

**Steven Chen**  
**Partner**  
Government and Infrastructure Advisory  
Direct +886-2-8758-9782  
Fax +886-2-8101-6667 ext. 02819  
stevenchen@kpmg.com.tw

**Angela**  
**Senior Consultant**  
Government and Infrastructure Advisory  
Direct +886-2-8101-6666 ext. 17408  
Fax +886-2-8101-6667 ext. 17408  
angelaku@kpmg.com.tw

KPMG Advisory Services Co., Ltd.  
68F, Taipei 101 Tower, No. 7, Sec. 5, Xinyi Road, Taipei, 11049, Taiwan, R.O.C.