Asian Power Market & Renewable Energy Options

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Mt.Stonegate Green Asset Management Ltd.
Board Member of International REC Standard

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Outline

1. Asian Power Market Analysis
   • Market Structure
   • Renewable Energy Target
   • Primary Energy Mix & Outlook
   • Renewable Energy Latest Trends

2. Available Options
   • Suggested Solutions
   • Energy Attribute Certificates

3. International REC Standard
   • Introduction to I-REC
   • Authorized Countries
   • Corporate Users

4. Appendix
   • About Mt.Stonegate
   • Jules’ Self Introduction
Renewable Energy Development in Asia
Vertically integrated regulated utilities

Single buyer model with IPPs

Wholesale spot market

Retail competition

Electricity future market

Source: Based on KPMG, 2015

* Currently not applicable for renewable energy
** Only applicable for renewable energy retail company
2018 renewable percentage (%) situation

Progress / Remarks

- **20%**
  - By 2030
  - 9.2% Non-hydro renewable Consumption in 2018

- **20%**
  - By 2025
  - 5% Renewable Energy Production in 2018

- **13%**
  - By 2025
  - 7.2% Renewable Energy Production in 2018

- **23%**
  - By 2025
  - 12% of Renewable Energy Production in 2018

- **30%**
  - By 2036
  - 7.7% of Renewable Energy Production in 2018

**2018 renewable percentage (%) situation**

**Target year renewable percentage (%)**
Primary Energy Mix 2018 & Future Outlook

- **2030**
- **2025**
- **2036**
- **2025**
- **2025**

Legend:
- Others
- Hydro
- Oil
- Nuclear
- Natural Gas
- Renewable
- Coal

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Taiwan: Amendment to REDA 2019

- Taiwan power market is open to independent renewable power utility/retailer, where they can sign renewable PPA with corporate users.
- Amendments to the “Renewable Energy Development Act” published on May 1st, 2019
  - When power consumption exceeds a certain capacity, the user should install RE generating equipment or energy storage equipment, or purchase renewable energy and RECs (bundled PPA)
The challenges of China’s renewable energy market

1. Curtailment of wind and solar power in the “Three Norths” region of China (northwest, north, and northeast China) is severe

2. Heavy financial burden from Renewable Energy Development Fund:
   - Existing projects: the Renewable Energy Development Fund has seen widening deficits as renewable capacity grew and has delayed the payment of some subsidies;
   - New projects: no more governmental financial incentive for renewable energy installations.
China: Subsidy trend of solar and wind power

- By the end of 2018, the total financial shortage of renewable energy subsidy has reached 93.7 billion CNY, which is expected to be 300 billion in 2020.
Voluntary Green Energy Certificate


FiT price / On-grid price = Benchmark price + Subsidy

Source: http://www.nea.gov.cn/2017-02/06/c_136035626.htm
The Notice of non-subsidized projects

- On May 20, 2019, NDRC and NEA released the notice for the first batch of subsidy-free, with a total capacity of 20,760 MW.

- Over 200 wind and solar farms are listed in the Notice, these projects will not receive any subsidy while feeding their generation to the grid.

Source: http://zfxxgk.nea.gov.cn/auto87/201905/t20190522_3664.htm
## China Subsidy Free Renewables

<table>
<thead>
<tr>
<th>Grid Priority</th>
<th>Instead of giving subsidy, government ensure wind or PV generator priority dispatch and full purchase with a long-term contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market-based</td>
<td>Promote the non-subsidized development of wind and PV power generation through market-based trading</td>
</tr>
<tr>
<td>C-GEC</td>
<td>Promote C-GEC trading, which is currently high issuance amount, but low trading amount</td>
</tr>
</tbody>
</table>
Southeast Asia: Emerging RE Projects

- Fast becoming the "hot spot" for renewable energy development, as the demand for energy is increasing rapidly.
- Similar conditions shared by Vietnam, Thailand, and Indonesia (monopolized market)
- Open market for investor to invest on renewable energy projects
Available Options
Available Options

- Energy Attribute Certificates
- Power Purchase Agreement
- Green Electricity Tariff
- On-site Generation
How renewable energy certificates (REC) works

Fossil Fuel

Renewable Energy

Electricity Grid

Corporate Users

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REC (Renewable Energy Certificate)
GO (Guarantee of Origin)
I-REC (International Renewable Energy Certificate)
Domestic Systems
<table>
<thead>
<tr>
<th>Renewable Energy Target</th>
<th>China</th>
<th>Taiwan</th>
<th>Vietnam</th>
<th>Indonesia</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20% RE Consumption in 2025</td>
<td>20% RE Generation in 2025</td>
<td>13% RE Generation in 2025</td>
<td>23% RE Generation in 2025</td>
<td>30% RE Consumption in 2036</td>
</tr>
<tr>
<td>Energy Attribute Certificates</td>
<td>1. I-REC</td>
<td>1. I-REC</td>
<td>1. I-REC</td>
<td>1. I-REC</td>
<td>1. I-REC</td>
</tr>
<tr>
<td>Renewable Power Purchase Agreement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Self Generation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Small Scale (&lt;1MW)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Large Scale (ex. Investment in power plant)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>I-REC</td>
<td>C-GEC</td>
<td>T-REC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
<td></td>
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<tr>
<td><strong>Established</strong></td>
<td>2015</td>
<td>2018</td>
<td>2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Regulator</strong></td>
<td>I-REC Standard</td>
<td>China National Energy Administration</td>
<td>Bureau of Standards, Metrology &amp; Inspection, Ministry of Economic Affairs</td>
<td></td>
<td></td>
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<tr>
<td><strong>Scope</strong></td>
<td>International</td>
<td>P.R. China</td>
<td>Taiwan</td>
<td></td>
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<tr>
<td><strong>Purchaser</strong></td>
<td>Corporate User</td>
<td>Corporate/Personal User</td>
<td>Corporate User</td>
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<td></td>
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<tr>
<td><strong>Market</strong></td>
<td>Voluntary</td>
<td>Voluntary</td>
<td>Voluntary</td>
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<tr>
<td><strong>Energy Source</strong></td>
<td>Wind, Hydro, Solar, Biomass</td>
<td>Onshore Wind, Solar</td>
<td>Wind, Hydro, Solar, Biomass, Geothermal</td>
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</tr>
<tr>
<td><strong>Price</strong></td>
<td>Market Price</td>
<td>JP¥ 2,787 - 10,490/MWH</td>
<td>JP¥ 5,155 – 10,704/MWh</td>
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<td></td>
</tr>
<tr>
<td><strong>Generation</strong></td>
<td>18,706,000 MWh</td>
<td>26,918,591 MWh</td>
<td>59,973 MWh</td>
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<tr>
<td><strong>Traded Amount</strong></td>
<td>11,214,000 MWh</td>
<td>34,691 MWh</td>
<td>2,757 MWh</td>
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<tr>
<td><strong>Recognized by CDP</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
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<tr>
<td><strong>Recognized as Tool</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
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<tr>
<td><strong>for Scope 2 Market-</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Based</strong></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* As of Nov 2019
Introduction to I-REC Standard
International REC Standard (I-REC)

- An international tracking system
- Each I-REC is unique to a specified 1 MWh of production and exclusive having one owner at any time.
- 1 I-REC = 1 MWh = 1,000 kWh
- Each I-REC must be redeemed as proof of its use
- Recognized by international initiatives, such as RE100, CDP, WRI (GHG Protocol Scope 2 Guidance)
Top 15 I-REC Issuance area

I-REC statistics period from September 2018 to August 2019.

No.1 China

8.3 TWh

Source: I-REC Statistics 2019 issued by International REC
## I-REC Corporate User (1/2)

<table>
<thead>
<tr>
<th>Buyer</th>
<th>Apple</th>
<th>H&amp;M</th>
<th>Unilever</th>
<th>SGS</th>
<th>Microsoft</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector</strong></td>
<td>IT</td>
<td>Apparel Retail</td>
<td>Personal Products</td>
<td>Professional Services</td>
<td>Software</td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td>BR, TW and TR</td>
<td>CN, TW, MY, TH</td>
<td>TW, TH, VN, and MY</td>
<td>CN, TW, TH, TR, etc. CN, TW, PH, VN, etc.</td>
<td></td>
</tr>
<tr>
<td><strong>CDP Score 2018</strong></td>
<td>A</td>
<td>A-</td>
<td>A</td>
<td>B</td>
<td>A</td>
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<tr>
<td><strong>Ref</strong></td>
<td>CDP Report</td>
<td>CSR Report</td>
<td>CDP Report</td>
<td>Official Website</td>
<td>CDP Report</td>
</tr>
</tbody>
</table>
I-REC Corporate User (2/2)

<table>
<thead>
<tr>
<th>Buyer</th>
<th>KONICA MINOLTA</th>
<th>RICOH</th>
<th>Lenovo</th>
<th>KERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector</td>
<td>Camera equipment</td>
<td>Imaging and electronics</td>
<td>Technology Hardware &amp; Equipment</td>
<td>Luxury goods</td>
</tr>
<tr>
<td>Region</td>
<td>CN</td>
<td>CN, TH</td>
<td>CN</td>
<td>CN (incl. HK and MO)</td>
</tr>
<tr>
<td>CDP Score 2018</td>
<td>A-</td>
<td>A-</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>Ref</td>
<td>Official Website</td>
<td>Official website</td>
<td>Sustainability Report</td>
<td>CSR Report</td>
</tr>
</tbody>
</table>

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Thank You!
Appendix
About Mt. Stonegate
About Mt. Stonegate

Mt. Stonegate is established in 2013, we hit the ground running with our direct approach to bring change in the society and environment.

Consulting operations, innovative project management, advising leading market players in the conventional and renewable energy sectors for their green asset and investment across east Asia are among many of the service that we offer to our thriving corporate and business customers.
Our Services

Mt.Stonegate is committed to providing institutional and corporate clients worldwide with superior carbon asset advice and solutions while generating attractive and sustainable green effects for clients.

- Environment Attribute Certificate (EACs) management and sales
- Energy Report
- Training Workshop
- Renewable Power Purchase Agreement (PPA)
Our Projects & Achievements

- First I-REC Trader based in Asia
- Has contributed over 2,500,000 MWh of electricity to corporate buyers
- Projects scatter through major countries in Asia
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Employment and Professional Experience

2019-ongoing  Arbon Capital, Taiwan, Managing Director
2019-ongoing  Mt.Stonegate Japan, Managing Director
2014-ongoing  Mt.Stonegate Green Asset Management Ltd, Taiwan, Managing Director
2014-ongoing  International REC Standard, Co-Founder and Member of the Board
2007-ongoing  Nanjitan Asset Management Ltd, Principle
2007-2011      South Pole Carbon Asset Management, East Asia, Principal

Education

2018       PhD. in Environmental Science and Engineering, Tunghai University, Taichung, Taiwan
1996-1997  Master of Science in Systems Engineering, University of Pennsylvania, Philadelphia, USA
1993-1994  MSc and "Diplôme d'Ingénieur" in Energy Management & Policy, Ecole Nationale Supérieure du Pétrole et des Moteurs, Paris, France