PV Update in Japan

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Contents

• Market status
• Revision of National Target (underway)
• FIT Program
• Trends of ESS
2016 and 2017 Market (DC)

Installed capacity 1Q217: ~1.7GWdc

- FIT program for surplus power started (<500kW)
- FIT program Started in July 2012

National Discussion started for PV target: Current ta(July 2015)

Target renewable energy share by 2030: 22 - 24 %
Renewables > Nuclear (20- 22%)  
Former nuclear share before Fukushima: 50%

Source: METI “Long term energy supply-demand outlook” (July 2015)
Key issues for revision

Reconstruction of Fukushima Prefecture

Shifting from supporting evacuation to supporting reconstruction

Consistent implementation of decommissioning of Fukushima No.1 Nuclear Power Plant Start of reconstruction, etc.

Issues by each energy source

Renewable energy

Make RE a main power source

Nuclear power

- Reduction of dependence
- ‘Safety first’ restart
- Important power source

Energy conservation

Make Energy conservation the fourth energy source

Resources, thermal power

Enhancement of securing resources

Cross-sectional issues

- Electricity system reform and responses to the public interest issues
- Prospects of scenario for cost restrictions

- Management of economic measures
- Utilization of market functions

Source: Ministry of Economy, Trade and Industry (METI), compiled by RTS Corporation
JPEA’s long term outlook

JPEA PV Outlook – Cumulative capacity of commissioned PV systems in Japan

Source: JPEA PV OUTLOOK 2050 (July 2017)
FIT program

• Application of new approval procedures for formerly approved projects end in September

• Cancellation of formerly approved projects will be proceeded in case
  - Projects do not meet new criteria
  - Documents are not submitted by due date

• Discussion for FIT level for 10kW - <2MW started in this week
  - <10 kW : already announced

• First Tender for 2MW or more
Shifting from the former FIT program to the new FIT program

**Former FIT program**

(approval of facility)

- Close of application: January 20, 2017
- Blackout period: March 31, 2017
- Abolishment of former FIT program: March 31, 2017
- Deadline for deemed approval: By September 30, 2017
- Conclusion of grid connection contract: By July 31, 2016

**New FIT program**

(approval of project business plan)

- Submission of project business plan: By September 30, 2017
- Deemed approval: By September 30, 2017
- Approval: By September 30, 2017
- Conclusion of grid connection contract: By July 31, 2016

- Deadlines for starting operation:
  - 3-year deadline for starting operation is NOT applied
  - 3-year deadline for starting operation is applied

Projects in operation must also submit project plans, etc. to obtain approval under the new FIT program.

- Applications for changes, etc. under the new FIT program are accepted from April 1, 2017.
- Projects applied with transitional measures (6-month rule and 9-month rule) are not allowed to notify changes, etc. without acquisition of deemed approval.
- As for projects to which transitional measures (9-month rule) are applied, if the grid connection contract is signed on or after April 1, 2017, the FIT for FY 2017 will be applied.
Rate of commissioning of PV power generation facilities

It is necessary to sort out approved projects which have not started operation for a long time.

Reset of approved projects which have not started operation

As of the end of December 2016
<table>
<thead>
<tr>
<th></th>
<th>below 10 kW (residential)</th>
<th>10 kW or larger (non-residential)</th>
<th>2MW or more</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electricity to sell</strong></td>
<td>Surplus electricity</td>
<td>100% of electricity</td>
<td></td>
</tr>
<tr>
<td><strong>Purchase period</strong></td>
<td>10 years</td>
<td>20 years</td>
<td></td>
</tr>
<tr>
<td><strong>FIT for FY 2016</strong></td>
<td>31 or 33 Yen/kWh*</td>
<td>24 Yen/kWh (0.18€/kWh)</td>
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<tr>
<td><strong>FIT for FY 2017</strong></td>
<td>28 or 30 Yen/kWh*</td>
<td>21 Yen/kWh</td>
<td></td>
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<tr>
<td><strong>FIT for FY 2018</strong></td>
<td>26 or 28 Yen/kWh*</td>
<td>N.A. Discussion started</td>
<td></td>
</tr>
<tr>
<td><strong>FIT for FY 2019</strong></td>
<td>24 or 26 Yen/kWh*</td>
<td>N.A.</td>
<td></td>
</tr>
</tbody>
</table>

- Subjects of national bidding program
- Maximum selling price: 21 Yen/kWh (15.67 Euro cent/kWh)
Summary of tender scheme (2MW or more)

- First tender (application 27th October – 10th November
- Total capacity : 500MW
- Tender for the right to apply for FIT approval
- The ceiling bidding price is limited to the FIT for 10 kW - < 2 MW capacity range (the ceiling bidding price for FY 2017 is 21 Yen/kWh = 16.8 Eurocent/kWh)
- A uniform tender throughout Japan (not by region)
- The guidance for implementing tenders was to be published in February 2017. Not yet published as of June 1st.
- ≥ 2 MW extra high voltage projects are subject
- Methodology to decide FITs: Pay as Bid
- After winning the bid, application for FIT approval shall be submitted within 1 month and approval shall be acquired within 3 months
- Grid connection agreement with utility required for submission
Opportunities for storages

• DG Storage
  – Subsidy is available for home storage from national and local governments
  – FY 2018: Ministry of Environment allocate budget for subsidy
  – ZEH promotion subsidy: 10 billion JPY
    Subsidy: 50,000Yen/W (442 USD/kWh)
    Typical price: 1500 – 1750 USD/KWh
  – 2019 opportunities for residential storage
  – ZHE/ZEB promotion

• Storages for Grid
  - FIT projects with storages are ongoing to address grid connection issues
2019 Opportunity (storage for residential house)

- Termination of 10-year period of FIT for the first recipients of FIT program started in 2009

- Options for individuals
  - Selling to conventional electric power companies at lower price (avoided cost, wholesale price?)
  - Self consumption with storage batteries
    - PV system providers targeting former customers
  - Selling to PPSs (power producer & supplier)
    - Licensed companies entered into electricity retail market under the electricity market reform
    - Some companies started to buy PV power at higher price than FIT

First recipients of former FIT program (~FY 2009):
> 559,438 Houses = ~ 1.7GW (Avg size: 3kW)
## Utility scale PV power plant with storage batteries

<table>
<thead>
<tr>
<th>IPP</th>
<th>Green Power Development Corporation</th>
<th>Edge Enersol Japan</th>
<th>Energy Product/ KEPCO</th>
<th>Mifune Tokunoshima</th>
<th>Hoosiers Holdings</th>
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</thead>
<tbody>
<tr>
<td>Electric company</td>
<td>Hokkaido Electric</td>
<td>Hokkaido Electric</td>
<td>Hokkaido Electric</td>
<td>Kyushu Electric</td>
<td>Kyushu</td>
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<tr>
<td>Selling price</td>
<td>40 JPY/kWh</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Location Project name</td>
<td>Misawa, Tomakomai</td>
<td>Akkeshi-cho</td>
<td>Obihiro</td>
<td>Chitose</td>
<td>Mifune Tokunoshima</td>
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<td></td>
</tr>
<tr>
<td>DC capacity</td>
<td>38.1MW</td>
<td>27MW</td>
<td>28MW</td>
<td></td>
<td>~ 10.2MW</td>
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<tr>
<td>AC capacity</td>
<td>25MW</td>
<td>20MW</td>
<td>4MW</td>
<td>1.99MW</td>
<td>9MW</td>
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<tr>
<td>PV module</td>
<td>Jinko</td>
<td>Jinko</td>
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<td></td>
<td>Yinling</td>
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<td>Storage batteries</td>
<td>LG Chem</td>
<td>LG Chem</td>
<td>SK Innovation</td>
<td>Samsung SDI</td>
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<tr>
<td>Type of batteries</td>
<td>Li-ion</td>
<td>Li-ion</td>
<td>Li-ion</td>
<td>Li-ion</td>
<td>Lithium ion capacitors</td>
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<tr>
<td>Battery capacity</td>
<td>~25MWh</td>
<td>20MW</td>
<td>4.4MWh</td>
<td>17MW</td>
<td>780kWh</td>
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<tr>
<td>Project cost</td>
<td>12 bn – 14 bn JPY</td>
<td></td>
<td></td>
<td>3.6MWh</td>
<td></td>
</tr>
<tr>
<td>Start of work/ completion</td>
<td>June 2016</td>
<td></td>
<td></td>
<td>Completed in April 2015</td>
<td></td>
</tr>
</tbody>
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Source: RTS Corporation
Acknowledgement for the support of PVPS activities

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