Status of Addressing the Medium-term Management Plan

Electric Power Development Co., Ltd.

April 26, 2019
I. Awareness of the Business Environment
Sustainable Development Goals (SDGs) have been adopted by UN in Sep. 2015
- The society has largely shifted toward the realization of "decarbonized society" as seen in energy conversion and decarbonization
- Industrial structure innovation is expected in the future with the advance of digital technology
- Make major changes in business environment a growth opportunity based on business philosophy

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### Climate change issues
- Movement toward “decarbonized society”
  - Paris Agreement (Dec. 2015)
  - Medium-term target of Japan (Reduce GHG by 26.0% in FY2030 compared with FY2013)
  - Expansion of ESG investment

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### Advance of digital technology
- Optimal operation and advanced maintenance of power plants using AI and IoT
- Decentralization using digital technology

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### Intensifying competition in the domestic power market
- Sluggish growth of domestic electricity demand
- Advance of deregulation and market competition through electricity system reform

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### Growth of electricity demand overseas
- Expected growth of overseas electricity demand mainly in developing countries
Ⅱ. Progress of the Medium-term Management Plan
Results and Forecasts of the Medium-term Management Plan

- J-POWER Group released Medium-term management plan in July 2015
- In April 2018, released a review of efforts undertaken and new forecasts for the next three years
- Earnings in FY2019 is estimated to decrease due to one-off factors including abolishment of Takehara Unit No.2, followed by expected earnings improvement in FY2020 due to commencement of operations of new power plants. Continue efforts toward realization of growth

### Medium-term Management Plan

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>J-POWER EBITDA* Increase to around 1.5x the level of FY2014 in FY2025 (FY2014 result : 181.8 billion yen)</td>
</tr>
<tr>
<td>Soundness</td>
<td>Interest-bearing debts/J-POWER EBITDA Improve from level at end of FY2014 by end of FY2025 (End of FY2014 result : 9.5x)</td>
</tr>
</tbody>
</table>

### Three-year forecasts and results

<table>
<thead>
<tr>
<th></th>
<th>Growth indicator</th>
<th>Soundness indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2015-2017</td>
<td>Forecast 185.0 billion yen/year (FY2015-2017 3-year average)</td>
<td>Maintain same level as results at end of FY2014 (9.5x) at end of FY2017</td>
</tr>
<tr>
<td></td>
<td>Result 186.7 billion yen/year (FY2015-2017 3-year average)</td>
<td>8.0x (FY2017 result)</td>
</tr>
<tr>
<td>FY2018-2020</td>
<td>Forecast ≥210.0 billion yen (FY2020)</td>
<td>Maintain same level as results at end of FY2017 (8.0x) at end of FY2020</td>
</tr>
</tbody>
</table>

* J-POWER EBITDA= Operating income + Depreciation and amortization + Equity in earnings of affiliates
III. Status of Addressing the Medium-term Management Plan
1. Further Expansion of Renewable Energy

- J-POWER Group owns 8,575MW of hydro and 443MW of wind (as of Mar. 31, 2019), a leader of renewable energy
- Steadily progressing toward FY2025 renewable energy targets “1GW scale new development”, ”0.3TWh/year increase in hydro and 2.5TWh/year increase in wind and others (compared with FY2017)”
- Established Renewable Energy Business Strategy Dept. in Apr. 2019 to expand business and optimize operation and maintenance while addressing various changes in business environment

### Efforts in FY2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Hydro** | - Commencement of construction work at Shinkatsurazawa hydro project (22MW)  
- Completion of overall renewal at Akiba No.1 and No.2 plants, which has increased capacity by 2MW  
- Commencement of construction work at Ashoro plant repowering project (2MW increase)  
- Improvement of water intake equipment at Hinoemata and Chinabora intake dams which lead to 27GWh increase |
| **Wind** | - Participation in Triton Knoll offshore wind project (860MW) in U.K.  
- Commencement of environmental impact assessment procedure at three sites (Wajima, Youra and Kunimiyama) totaling max. 250MW  
- Preparation for construction (commencement scheduled in May 2019) at Kaminokuni No.2 (42MW)  
- Promotion of construction work at Setana Osato (50MW), Nikaho No.2 (41MW) and Kuzumaki No.2 (44MW) which are scheduled to commence operation in Jan., Jan. and Dec. in 2020 respectively  
- Memorandum of understanding signed with ENGIE (France) for collaboration in domestically commercializing floating type offshore wind power, etc. |
| **Geothermal** | - Promotion of construction work at Wasabizawa geothermal (42MW) which is scheduled to commence operation in May 2019  
- Commencement of construction work at Onikobe geothermal replacement project (15MW) in April 2019  
- Promotion of commercialization of Appi geothermal (15MW) |
1. Further Expansion of Renewable Energy

- **Effort expanding renewable energy**
  - Check: Sea area surveys outside port area for offshore wind power
  - Check: Geothermal resource surveys at Takahinatayama site (Osaki city, Miyagi prefecture)

- 1 GW scale new development*

- Effort expanding renewable energy

*Owned capacity
2. Strive toward Zero Emission in Coal Use

- Basic Energy Plan estimates 26% share for coal-fired thermal power in FY2030 in Japan
- Afterward, stream from carbon reduction to decarbonization in fossil fuel use may get larger due to significant increase in renewable energy and further progress of decentralization caused by utilization of digital technology
- In such an environment, coal, which is cheap and has excellent procurement stability, is essential for Japan's energy security, so it is necessary to continue using it while making it compatible with the climate change issues
- As a leading company in coal use technology, J-POWER Group will strive to achieve zero emission in coal use through such as carbon recycling based on its technology, and contribute to the realization of a “decarbonized society"

Initiatives toward zero emission in coal use

Features of oxygen-blown IGCC*¹ under demonstration at Osaki CoolGen

- Highly efficient
- Best suitable to CO₂ separation and capture
- Available for multi purpose other than power generation
- High load tracking ability
- Technological verification completed at Osaki CoolGen

Carbon recycling

- Use and storage of CO₂ separated and captured (CCUS)

Contribution to hydrogen society

- Demonstration tests of IGFC*² which utilize fuel cell at Osaki CoolGen

Manufacture of diverse products

- Development of products using recovered CO₂

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*¹ IGCC (Integrated coal gasification combined cycle) *² IGFC (Integrated coal gasification fuel cell combined cycle)
2. Strive toward Zero Emission in Coal Use

- **Initiatives for carbon recycling**
  - Demonstration tests of IGCC with CO₂ capture is scheduled to commence around Dec. 2019 at Osaki CoolGen
  - Examine the use of captured CO₂ while grasping its properties as gas

- **Osaki CoolGen**
  (Demonstration plant of IGCC with CO₂ capture)

- **Example of using captured CO₂ to be examined**
  (Agricultural use)

- **Participation in Australian brown coal hydrogen pilot test project**
  - Aiming to build and commercialize a CO2-free hydrogen supply chain, J-POWER is participating in a pilot test project to produce hydrogen by gasifying Australian brown coal, an abundant, underutilized resource, and transport it to Japan.
  - When this supply chain is commercialized, plans call for utilizing CCS to store the CO₂ produced during the manufacture of hydrogen from brown coal, avoiding its release to the atmosphere and thus achieving CO2-free operations.
3. Promotion of the Ohma Nuclear Power Plant Project, with safety as the major prerequisite

- Through the use of MOX fuel, play a central role in the nuclear fuel cycle and contribute to energy security
- Contribute to realizing “decarbonized society” as a CO₂-free energy source

(Details of initiatives)
- Pursue further improvements in safety continuously
- Sincerely and appropriately respond to compliance reviews and aim to restart full scale construction work quickly
- Strive for more polite information communication and mutual communication so that we can gain the understanding and trust of the community

### Overview of the Ohma Nuclear Power Project

<table>
<thead>
<tr>
<th>Location</th>
<th>Ohma-machi, Shimokita-gun, Aomori Prefecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>1,383MW</td>
</tr>
<tr>
<td>Type of nuclear reactor</td>
<td>Advanced Boiling Water Reactor (ABWR)</td>
</tr>
<tr>
<td>Fuel</td>
<td>Enriched uranium and uranium-plutonium mixed oxide (MOX)</td>
</tr>
<tr>
<td>Start of construction</td>
<td>May, 2008</td>
</tr>
<tr>
<td>Start of operation</td>
<td>To be determined</td>
</tr>
<tr>
<td>Status</td>
<td>In December 2014, J-POWER submitted to NRA an application for permission for alteration of reactor installment license and an application for construction plan approval in order to undertake review of compliance with the new safety standards</td>
</tr>
</tbody>
</table>
4. Expansion of Overseas Business

- Westmoreland thermal power station (926MW) in U.S. has commenced operation in Dec. 2018
- Steadily promote construction work at Central Java coal-fired thermal power (2,000MW) in Indonesia and Triton Knoll offshore wind power (860MW) in U.K.
- Promote the introduction of high-efficiency thermal power and renewable energy to support sustainable growth in countries and regions overseas where power demand is expected to grow, especially in emerging countries

**Overseas business current asset**

- **Generation type**
  - Coal, Gas, Hydro
- **Country/region**
  - U.S., Thailand, Indonesia, China, Taiwan
- **Sales**
  - PPA*

**Further growth of generating asset**

**FY2025**

- **Coal, Gas, Renewables**
- **U.S., Asia, Europe**
- **PPA, Deregulated market**

**Overseas owned capacity 10GW**

6,898MW as of Mar. 31, 2019

*Power Purchase Agreement: Contract parties determine price, volume and other conditions of electricity delivered*
5. Value Maximization of Current Assets

- In the midst of intensified competition as a result of deregulation, J-POWER Group maximizes its corporate value through enhancing competitiveness of its generating assets, making advantage of newly established markets and diversifying ways of sales.

| Strengthening production function | • With stable supply and ensuring safety as the major prerequisite, strengthen cost competitiveness by utilizing digital technologies and other ways  
• Improve flexibility of operation and optimize maintenance to meet market needs |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversifying ways of sales</td>
<td>• Adapt to market competition brought about by deregulation and maximize corporate value through diversifying ways of sales such as investment in ENERES Co., Ltd. and Suzuyo-Power Co., Ltd., and making advantage of newly established markets including baseload market and capacity market</td>
</tr>
</tbody>
</table>
| Enhancing reliability and nationwide improvement of power grid | • Enhance reliability of interconnecting lines such as Hokkaido-Honshu HVDC Interconnection Line and major transmission and transformation facilities which J-POWER owns  
• While expanding Sakuma frequency conversion facilities* and related facilities, contribute to stable supply, enhanced resilience, and furthermore, nationwide improvement of power network |

*Frequency converter station which links east Japan (50Hz) with west Japan (60Hz)
In anticipation of future changes in the business environment and industrial structure, we will continuously challenge new efforts to make change an opportunity for growth.

6. Strive toward Further Growth

- Efforts in VPP business
  - Investment in Suzuyo-Power Co., Ltd.
  - Investment in ENERES Co., Ltd.
  - Capital and business partnership agreement with VPP Japan

- Advanced use of digital technology
  - Installation of digital network throughout power plants
  - Advancement of maintenance using remote images such as drones
  - Reduction of paperwork by introducing RPA*

- Decentralization
  ⇒ Challenge new initiatives to make new business areas created by decentralization as growth opportunities

- Digitalization
  ⇒ Use digital technology to strengthen production function and effectively utilize human resources

- Expanding networks with startups
  - Partnership agreement with Plug and Play
  - Investment in Green Earth Institute Co., Ltd.
  - Investment in Coral Capital II, L.P

Ⅳ. Contribution to SDGs based on Corporate Philosophy
  - ESG Initiatives -
We will continue to contribute to sustainable development while making the corporate philosophy the foundation of our business activities.

Corporate Philosophy of J-POWER Group

We will meet people’s needs for energy without fail, and play our part for the sustainable development of Japan and the rest of the world

Established in September 1998

Adopted in September 2015
Contribution to SDGs based on Corporate Philosophy
- ESG Initiatives -

- Take actual steps toward “harmonizing energy supply and the environment”

**Environment**

- Contribution to realizing “decarbonized society”
  - Stable operation and expansion of renewable energy
  - Strive toward zero emission in coal use
  - Promotion of the Ohma Nuclear Power Plant Project, with safety as the major prerequisite

- Addressing local environmental issues
  - Efforts for protecting water, forests and biodiversity

**Social**

- Contribution to realizing the Energy Mix in Japan
- Power supply in developing countries which face strong energy demand
- Respect for human resources
  - Efforts toward enhanced diversity; Develop working environment where diversified human resources including women and seniors can be more active
  - Continuous improvement of work style named “JPOWR Challenge 30” and promotion of flexible working including working at home and hourly vacation

- Contribution to society
  - Cooperation to local community, support for volunteer activities

**Governance**

- Respect for shareholders’ rights; Timely disclosure
- Effort for enhanced effectiveness of board of directors; Annual analysis and valuation of effectiveness
## Status of Major Projects under Development (1)

<table>
<thead>
<tr>
<th>Project</th>
<th>Output capacity</th>
<th>Construction status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setana Osato*1</td>
<td>50MW</td>
<td>In preparation</td>
<td>Start of operation: FY2019 (planned)</td>
</tr>
<tr>
<td>Nikaho No.2</td>
<td>41.4MW</td>
<td>In preparation</td>
<td>Start of operation: FY2019 (planned)</td>
</tr>
<tr>
<td>Kuzumaki No.2</td>
<td>44.6MW</td>
<td>In preparation</td>
<td>Start of operation: FY2020 (planned)</td>
</tr>
<tr>
<td>Minami Ehime No.2</td>
<td>Max. 40.8MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>Kaminokuni No.2</td>
<td>Phase I 41.5MW</td>
<td>In preparation</td>
<td>Start of construction work: May 2019 (planned)</td>
</tr>
<tr>
<td></td>
<td>(Max. 120.4MW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hibikinada Offshore*2</td>
<td>Max. 220MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>Seiyo Yusuhara</td>
<td>Max. 180MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>Kita-Kagoshima</td>
<td>Max. 215MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>Wajima</td>
<td>Max. 90.3MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>Youra</td>
<td>Max. 64.5MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>Kunimiyama</td>
<td>Max. 94.6MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>New Tomamae Replacement</td>
<td>30.6MW</td>
<td>In preparation</td>
<td>Start of construction work: FY2020 (planned)</td>
</tr>
<tr>
<td>New Sarakitomanai Replacement</td>
<td>14.9MW</td>
<td>In preparation</td>
<td>Under environmental impact assessment</td>
</tr>
<tr>
<td>New Shimamaki Replacement</td>
<td>4.3MW</td>
<td>In preparation</td>
<td>Start of construction work: FY2020 (planned)</td>
</tr>
</tbody>
</table>

*1 J-POWER’s equity ratio: 90% Joint venture with Hokutaku

*2 J-POWER’s equity ratio: 40% Joint venture with Kyuden Mirai Energy Company, Hokutaku, Saibu Gas, and Kyudenko Corporation
<table>
<thead>
<tr>
<th>Project</th>
<th>Output capacity</th>
<th>Construction status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shinkatsurazawa/Kumaoi</td>
<td>21.9MW</td>
<td>In preparation</td>
<td>Start of operation: FY2022 (planned)</td>
</tr>
<tr>
<td>Ashoro Repowering</td>
<td>40.0→42.3MW</td>
<td>Underway</td>
<td>Completion of repowering: FY2022 (planned)</td>
</tr>
<tr>
<td>Wasabizawa*3</td>
<td>42MW</td>
<td>Underway</td>
<td>Start of operation: FY2019 (planned)</td>
</tr>
<tr>
<td>Onikobe Replacement</td>
<td>14.9MW</td>
<td>Underway</td>
<td>Start of operation: FY2023 (planned)</td>
</tr>
<tr>
<td>Appi*4</td>
<td>14.9MW</td>
<td></td>
<td>Start of operation: Around spring in 2024 (planned)</td>
</tr>
<tr>
<td>Takehara New Unit No.1</td>
<td>600MW</td>
<td>Underway</td>
<td>Start of operation: FY2020 (planned)</td>
</tr>
<tr>
<td>Kashima Power (Coal-fired)*5</td>
<td>645MW</td>
<td>Underway</td>
<td>Start of operation: FY2020 (planned)</td>
</tr>
<tr>
<td>Yamaguchi Ube Power</td>
<td>-</td>
<td></td>
<td>Plan under review</td>
</tr>
<tr>
<td>Ohma</td>
<td>1,383MW</td>
<td>Underway</td>
<td>Under review of compliance with the new safety standards</td>
</tr>
<tr>
<td>Sakuma Frequency Converter Station and relevant facilities</td>
<td>300MW</td>
<td>Underway</td>
<td>Increase of capacity: 300MW→600MW</td>
</tr>
<tr>
<td>Central Java IPP (Indonesia, coal-fired)*6</td>
<td>2,000MW</td>
<td>Underway</td>
<td>Start of operation: FY2020 (planned)</td>
</tr>
<tr>
<td>Triton Knoll (U.K., offshore wind)*6</td>
<td>860MW</td>
<td>Underway</td>
<td>Start of operation: FY2021 (planned)</td>
</tr>
</tbody>
</table>

*3 J-POWER’s equity ratio: 50% Joint venture with Mitsubishi Materials Corporation and Mitsubishi Gas Chemical Company
*4 J-POWER’s equity ratio: 15% Joint venture with Mitsubishi Materials Corporation and Mitsubishi Gas Chemical Company
*5 J-POWER’s equity ratio: 50% Joint venture with Nippon Steel Corporation
*6 J-POWER’s equity ratio: 34% Joint venture with PT. ADARO POWER and ITOCHU Corporation
*7 J-POWER’s equity ratio: 25% Joint venture with innogy SE and Kansai Electric Power
✓ Our hydroelectric generation capacity of approx. 8.57GW (61 plants) stands among the top in Japan
✓ We possess many dams and large capacity reservoirs with life of 100 years or more, which enables
stable generation by CO$_2$-free energy for a long time to come

Nukabira Dam
(Hokkaido prefecture)

Okutadami Dam
(Fukushima prefecture, Niigata prefecture)

Sakuma Dam
(Shizuoka prefecture, Aichi prefecture)

✓ We will continue to contribute to the stable power supply through continuous efforts to operate
power plants, making use of the experience and technology we have built up over the past 60 years
### Renewable projects (Output capacity)

<table>
<thead>
<tr>
<th>In operation</th>
<th>Wind</th>
<th>Geothermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 0.44GW</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Under construction</th>
<th>Wind</th>
<th>Geothermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 0.14GW</td>
<td>Approx. 57MW</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparing for construction</th>
<th>Wind</th>
<th>Geothermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. 1.07GW</td>
<td>Approx. 15MW</td>
<td></td>
</tr>
</tbody>
</table>

- **Tomamae Winvilla** (Preparing for replacement 30.6MW)
- **Shimamaki** (Preparing for replacement 4.5MW)
- **Setana Osato** (Under construction 50MW)
- **Setana Seaside** (12MW)
- **Kaminokuni** (28MW)
- **Kaminokuni No.2** (Preparing for construction Phase I 41.5MW /Max. 120.4MW)
- **Yurihonjou Seaside** (16.1MW)
- **Nikaho Kogen** (24.75MW)
- **Nikaho No.2** (Under construction 41.4MW)
- **Wajima** (Preparing for construction Max. 90.3MW)
- **Yokihi-no Sato** (4.5MW)
- **Awara-Kitagata** (20MW)
- **Hibikinada Offshore** (Preparing for construction Max. 220MW)
- **Offshore wind power system demonstration research** (1.98MW)
- **Nagasaki-Shikamachi** (15MW)
- **Aso-Oguni** (8.5MW)
- **Aso-Nishihara** (17.5MW)
- **Kita-Kagoshima** (Preparing for construction Max. 215MW)
- **Minami Oosumi** (24.7MW)
- **Kunimiya** (Preparing for construction Max. 94.6MW)
- **Seiyo Yusuhara** (Preparing for construction Max. 180MW)
- **Minami Ehime** (28.5MW)
- **Minami Ehime No.2** (Preparing for construction Max. 40.8MW)
- **Hiyama Kogen** (28MW)
- **Tokyo Bayside** (1.7MW)
- **Irouzaki** (34MW)
- **Tahara Bayside** (22MW)
- **Tahara** (1.98MW)
- **Okinobe Geothermal** (Under construction 42MW)
- **Wasabizawa Geothermal** (Under construction 44.6MW)
- **Green Power Kuzumaki** (21MW)
- **Kuzumaki No.2** (Under construction 44.6MW)
- **Onikobe Geothermal** (Under construction 14.9MW)
- **Koriyama-Nunobiki** (65.98MW)
- **Hiyama Kogen** (28MW)
- **Tokyo Bayside** (1.7MW)
- **Irouzaki** (34MW)
- **Tahara Bayside** (22MW)
- **Tahara** (1.98MW)
- **Kunimiya** (Preparing for construction Max. 94.6MW)
- **Seiyo Yusuhara** (Preparing for construction Max. 180MW)
- **Minami Ehime** (28.5MW)
- **Minami Ehime No.2** (Preparing for construction Max. 40.8MW)

(As of March 31, 2019)