Japan’s Policy on Energy Conservation

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Energy Conservation and Renewable Energy Dept.
Agency for Natural Resources and Energy
Energy Policy

MILESTONES

Within 3 Years

● Introduce renewable energy and enhance energy efficiency to the maximum extent for the next 3 years

● Restart nuclear power plants, once their safety is assured by the NRA (Nuclear Regulatory Agency)

Within 10 Years

● Establish the best long-term mix of power sources.
Energy Efficiency
Energy Conservation Efforts of Japan after Oil Crises

- Japan has been improved energy efficiency by about 40% after the oil crises since 1970s as a result of positive action by both public and private industrial sectors.
- Japan intensively introduced "Energy Management system based on Energy conservation law", then realized the lowest energy consumption per GDP.

**Primary energy use per real GDP of Japan**

Oil converted Mt /1 trillion yen

**Primary energy supply per GDP unit of each country (2009)**

Calculated according to IEA statistics
Japan’s Energy Efficiency Policy

1. Regulation
   Energy Conservation Law: Enacted in 1979
   → Upgraded and improved several times responding to social needs

2. Promotion
   - Tax incentives
   - Subsidies (including for R&D)
   - Preferential interest rate

3. Voluntary action (by private sector)
Historical Development of Energy Conservation Law

1947 Establishment of heat management

1979 Establishment
- Designated Energy Management Factories
- Guidance for Buildings and Appliances

1983 Amendment
- Licensed energy manager system

1993 Amendment
- Periodical reporting

1998 Amendment
- Expand coverage of factories

1998 Amendment
- Top Runner Program for automobiles and household electrical appliances

2002 Amendment
- Energy Management of Office Buildings

2005 Amendment
- Reporting System on Energy by Carriers

2005 Amendment
- Integration of Heat and Power Control

2008 Amendment
- Company based regulation include franchised chains

2012 Amendment
- Measures on demand side at peak demand hours
- Top Runner Program for Building Materials etc.
Japan’s Energy Efficiency Policy

<Regulations>

Automobiles/Electronic Appliances

- “Top Runner” Program
  Target products: 23 products

![Graph showing average electricity consumption of air conditioner from 1997 to 2009 with 30% improvement marker]

Average electricity consumption of air conditioner

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Consumption (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>1201</td>
</tr>
<tr>
<td>1998</td>
<td>1159</td>
</tr>
<tr>
<td>1999</td>
<td>1068</td>
</tr>
<tr>
<td>2000</td>
<td>1017</td>
</tr>
<tr>
<td>2001</td>
<td>990</td>
</tr>
<tr>
<td>2002</td>
<td>963</td>
</tr>
<tr>
<td>2003</td>
<td>945</td>
</tr>
<tr>
<td>2004</td>
<td>919</td>
</tr>
<tr>
<td>2005</td>
<td>882</td>
</tr>
<tr>
<td>2006</td>
<td>865</td>
</tr>
<tr>
<td>2007</td>
<td>858</td>
</tr>
<tr>
<td>2008</td>
<td>849</td>
</tr>
<tr>
<td>2009</td>
<td>845</td>
</tr>
</tbody>
</table>
(1) Large users (contract electricity > 500 kW)
   • Every large user to map out and implement their own plan
   • Mandatory demand restriction by the Electricity Business Act (Art 27)

(2) Small users (contract electricity < 500 kW)
   • To map out specific targets and voluntary plans according to the business type
   • The government conducted awareness campaigns and individual visits using “Standard Format for Action Plan of Electricity Saving”

(3) Households and individuals
   • Government provided “Menu of Electricity Saving Measures by Households”
   • “Electricity Saving Manifesto by Households” on the website prepared by the government
   • Promote energy saving through education

(4) Nation-wide activities
   • Providing electricity supply-demand forecast.
   • “Tight Supply-Demand Alert” and announcement of the possibility of rolling blackout – announce to individual cell-phone
SETSUDEN (power saving) Campaign, Summer 2011

- Electricity demand forecast
- Ad on newspaper
- Menu of Electricity Saving by Households
- Standard Format for Action Plan
- Electricity Saving Manifesto by Households
Summary of Electricity Supply-Demand Measures after the the Great East Japan Earthquake

1. Rolling Blackouts just after the Great East Japan Earthquake

- Because a possible 10 million kW shortfall (equivalent to 24% of demand supply capability) within the service area of TEPCO, we implemented a series of rolling blackouts during weekdays from March 14-28 days over ten days.

2. Power Saving Request and Mandatory Demand Restriction by the Electricity Business Act (Art 27) for summer 2011

- We requested to the service areas of Tohoku, Tokyo and Kansai to reduce consumption based on numerical targets.
- Furthermore, we announced Mandatory Demand Restriction by order of the Electricity Business Act (Art 27) for Tohoku and Tokyo because of the large gap between demand and supply.

<table>
<thead>
<tr>
<th>Request Power Saving</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(none)</td>
<td>▲15% + Art27</td>
<td>▲15% + Art27</td>
<td>—</td>
<td>▲10%※</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

※To preserve industrial production capacity

3. Power Saving Request for winter 2011

- We requested to the service areas of Tohoku, Tokyo and Kansai to reduce power consumption based on the following numerical targets.

<table>
<thead>
<tr>
<th>Request Power Saving</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>▲5%※</td>
</tr>
</tbody>
</table>

※To preserve industrial production capacity
Summary of the electricity supply-demand measures after the Great East Japan Earthquake

4. Request for electricity saving for summer in 2012

- Requested users in Hokkaido / Central and West Japan (in terms of regional allocation) to save electricity with targets
- Saving electricity target was mitigated after Oi Nuclear Power Plant, Units 3 and 4 were restarted.
- In Hokkaido, Kansai, Shikoku, Kyushu rolling blackouts were planned (but not implemented).

<table>
<thead>
<tr>
<th>Region</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>^7%</td>
<td>—</td>
<td>—</td>
<td>^5%</td>
<td>^15%</td>
<td>^5%</td>
<td>^5%</td>
<td>^7%</td>
<td>^10%</td>
</tr>
<tr>
<td>Unit 3 Restarted</td>
<td>^7%</td>
<td>—</td>
<td>—</td>
<td>^4%</td>
<td>^10%</td>
<td>^4%</td>
<td>^3%</td>
<td>^7%</td>
<td>^10%</td>
</tr>
<tr>
<td>Unit 4 Restarted</td>
<td>^7%</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>^10%※</td>
<td>—</td>
<td>—</td>
<td>^5%</td>
<td>^10%</td>
</tr>
</tbody>
</table>

※ ^5% in interference of production activity

5. Request for electricity saving for winter in 2012

- All electricity companies are expected to maintain their necessary reserve rate (3% at least)
- On the other hand, due to the limitation of allocation capacity in Hokkaido areas, a 7% electricity saving target was requested in Hokkaido to avoid rolling blackouts in winter.

<table>
<thead>
<tr>
<th>Region</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request power saving</td>
<td>^7%※</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

※ 「—」 means general request for electricity saving without targets
Electricity Supply and Demand Outlook for this Winter

Outlook for this winter (incorporating the actual decline this summer in the reasonably anticipated reduction in power consumption and presuming that this winter will be as severe as in FY2011)*

* For HEPCO service areas, as severe as the especially severe winter in FY2010

**January**

Supply capacity of Kyushu Electric Power Co., Inc. includes power interchange from other power utility companies (Chubu and Chugoku).

<table>
<thead>
<tr>
<th>(10,000kW)</th>
<th>East 3</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Central/ West 6</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
<th>Total of 9 companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply capacity</td>
<td>7,534</td>
<td>601</td>
<td>1,505</td>
<td>5,428</td>
<td>9,017</td>
<td>2,480</td>
<td>2,670</td>
<td>557</td>
<td>1,165</td>
<td>556</td>
<td>1,589</td>
<td>16,551</td>
</tr>
<tr>
<td>Peak demand</td>
<td>7,021</td>
<td>563</td>
<td>1,408</td>
<td>5,050</td>
<td>8,566</td>
<td>2,367</td>
<td>2,537</td>
<td>519</td>
<td>1,096</td>
<td>510</td>
<td>1,537</td>
<td>15,587</td>
</tr>
<tr>
<td>Supply – Demand (Reserve margin)</td>
<td>513 (7.3%)</td>
<td>38 (6.7%)</td>
<td>97 (6.9%)</td>
<td>378 (7.5%)</td>
<td>451 (5.3%)</td>
<td>113 (4.8%)</td>
<td>133 (5.2%)</td>
<td>38 (7.3%)</td>
<td>69 (6.3%)</td>
<td>46 (9.0%)</td>
<td>52 (3.4%)</td>
<td>964 (6.2%)</td>
</tr>
</tbody>
</table>

**February**

<table>
<thead>
<tr>
<th>(10,000kW)</th>
<th>East 3</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Central/ West 6</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
<th>Total of 9 companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply capacity</td>
<td>7,597</td>
<td>596</td>
<td>1,477</td>
<td>5,524</td>
<td>9,050</td>
<td>2,524</td>
<td>2,642</td>
<td>562</td>
<td>1,181</td>
<td>557</td>
<td>1,584</td>
<td>16,647</td>
</tr>
<tr>
<td>Peak demand</td>
<td>7,005</td>
<td>563</td>
<td>1,392</td>
<td>5,050</td>
<td>8,566</td>
<td>2,367</td>
<td>2,537</td>
<td>519</td>
<td>1,096</td>
<td>510</td>
<td>1,537</td>
<td>15,571</td>
</tr>
<tr>
<td>Supply – Demand (Reserve margin)</td>
<td>592 (8.5%)</td>
<td>33 (6.1%)</td>
<td>85 (9.4%)</td>
<td>474 (9.4%)</td>
<td>484 (5.7%)</td>
<td>157 (6.6%)</td>
<td>105 (4.1%)</td>
<td>43 (8.3%)</td>
<td>85 (7.7%)</td>
<td>47 (9.1%)</td>
<td>47 (3.1%)</td>
<td>1,076 (6.9%)</td>
</tr>
</tbody>
</table>

Risks of unexpected shutdowns of power plants in HEPCO service areas

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Largest shutdown</th>
<th>Annual average</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2011</td>
<td>0.96 million kW</td>
<td>0.31 million kW</td>
</tr>
<tr>
<td>FY2010</td>
<td>1.37 million kW*</td>
<td>0.36 million kW</td>
</tr>
<tr>
<td>FY2009</td>
<td>1.32 million kW</td>
<td>0.27 million kW</td>
</tr>
<tr>
<td>FY2008</td>
<td>1.15 million kW</td>
<td>0.35 million kW</td>
</tr>
<tr>
<td>FY2007</td>
<td>1.28 million kW</td>
<td>0.38 million kW</td>
</tr>
</tbody>
</table>

*Maximum value in the last 15 years
Electricity Supply and Demand Measures for this Winter

<table>
<thead>
<tr>
<th>Request for general power conservation (ensuring reasonably anticipated reduction)</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 3 – Mar. 29 (9:00 – 21:00) (8:00 – 21:00 in the service areas of HEPCO and of Kyushu Electric Power Co., Inc.)</td>
<td>3.3%</td>
<td>2.2%</td>
<td>5.0%</td>
<td>2.8%</td>
<td>5.6%</td>
<td>3.4%</td>
<td>1.5%</td>
<td>5.2%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

* Due consideration should be given to vulnerable people, such as elderly people and those in earthquake-stricken areas.

<table>
<thead>
<tr>
<th>Reasonably anticipated reduction for this winter (compared to FY2010)</th>
<th>Hokkaido</th>
<th>Tohoku</th>
<th>Tokyo</th>
<th>Chubu</th>
<th>Kansai</th>
<th>Hokuriku</th>
<th>Chugoku</th>
<th>Shikoku</th>
<th>Kyushu</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.2%</td>
<td>-5.0%</td>
<td>-2.8%</td>
<td>-5.6%</td>
<td>-3.4%</td>
<td>-1.5%</td>
<td>-5.2%</td>
<td>-4.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Due consideration should be given to vulnerable people, such as elderly people and those in earthquake-stricken areas, as well as to ensuring functions of lifelines, such as hospitals and railways. Furthermore, effects on production activities (including farming and tourism) should also be taken into consideration. A reduction of 7% or more will be requested when the power supply becomes tight.

In preparation for the possibility of power supply failure equal to or exceeding the largest-ever level

(2) Program for Emergency Adjustments to Prevent Rolling Blackouts (Appendix)

If a 0.33 million kW reduction of power demand can be ensured effectively, power supply-demand will be stable even in the event of power supply failure equal to the largest-ever level (-1.37 million kW).

(3) Bidding for Negawatts during emergencies, etc.

Response to any risks larger than the above
### Program for Emergency Adjustments to Prevent Rolling Blackouts

(i) If any power failures, including rolling blackouts occur in Hokkaido during severe winter weather, it may pose a direct danger to the lives and safety of Hokkaido residents, and any possibility of rolling blackouts may itself have a negative influence on tourism and other economic activities in Hokkaido.

(ii) Therefore, in preparation even for less frequent risks, the Program for Emergency Adjustments to Prevent Rolling Blackouts should be prepared in order to avoid power failures, including rolling blackouts.

(iii) The national government, the Hokkaido prefectural government, and HEPCO should request that large consumers in HEPCO service areas conclude contracts to join the Program for Emergency Adjustments to Prevent Rolling Blackouts.

#### Program content

1. **Outline**
   - In order to prevent rolling blackouts that may pose a danger to people’s lives, HEPCO requests a significant reduction of demand by way of temporary suspension of production and economic activities or temporary closing of business, etc. in case of a less frequent emergency due to such causes as a large-scale shutdown of power plants.

2. **Coverage**
   - Large consumers (whose contract power consumption is 500kW or more for industry or business use)

   *HEPCO will visit all relevant consumers (around 1,100) to ask for cooperation*

3. **Period**
   - From December 10, 2012 to March 22, 2013 (all day)

4. **Goal**
   - To ensure that demand is reduced by at least 0.33 million kW on effective basis

#### Scheme

- Request for cooperation from the national government, the prefectural government and HEPCO
- Contract between cooperative companies and HEPCO
  - (In a less frequent emergency)
  - Power supply becomes tight (presuming the reserve margin of 1%)
  - HEPCO requests companies to reduce power demand
    - *Separately request general households, etc. to refrain from unnecessary power use*
  - Companies reduce power demand
- Discount of electricity rates
Renewable Energies
Among the total electricity generated in fiscal 2010, renewable energy, etc. accounted for approximately 10%; approximately 9% of which is hydraulic power generation.

Other renewable energy is still cost prohibitive.

Composition of annual electricity generated in Japan

Note: “Etc.” of “Renewable energy, etc.” includes the recovery of energy derived from waste, refuse derived fuel (RDF) products, heat supply utilizing waste heat, industrial steam recovery, and industrial electricity recovery.

Source: Prepared based on the Agency for Natural Resources and Energy’s “Outline of Electric Power Development in FY 2010”
Basic Mechanism of the Feed-in Tariff Scheme

- Under the feed-in tariff scheme, if a renewable energy producer requests an electric utility to sign a contract to purchase electricity at a fixed price and for a long-term period guaranteed by the government, the electric utility is obligated to accept this request.
Estimating based on officially announced projects and recent trend, approximately 2.5GW renewable energy facilities would be installed in this fiscal year. (Current renewable energy generation capacity approx. 19.45GW, expected to increase to approx. 22GW.)

### Renewable Energy Forecast (FY2012)

<table>
<thead>
<tr>
<th></th>
<th>Already installed capacity by FY2011</th>
<th>Installed capacity already operational at the end of November</th>
<th>Installed capacity already authorized by the end of November</th>
<th>Forecast of newly installed capacity in FY2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential PV</strong></td>
<td>Approx. 4GW</td>
<td>1.02GW</td>
<td>0.73GW</td>
<td>+ Approx 1.5GW (40% increase from new installation in 2011)</td>
</tr>
<tr>
<td><strong>Non-Residential PV</strong></td>
<td>Approx. 0.8GW</td>
<td>0.37GW</td>
<td>2.54GW</td>
<td>+ Approx 0.5GW (Estimate by METI)</td>
</tr>
<tr>
<td><strong>Wind</strong></td>
<td>Approx. 2.5GW</td>
<td>0.01GW</td>
<td>0.34GW</td>
<td>+ Approx 0.38GW (50% increase from recent annual installation)</td>
</tr>
<tr>
<td><strong>Small and Medium scaled hydro (1MW to 3MW)</strong></td>
<td>Approx. 9.35GW</td>
<td>0.001GW</td>
<td>0GW</td>
<td>+ Approx 0.02GW (Estimate by METI)</td>
</tr>
<tr>
<td><strong>Small and Medium scaled hydro (Less than 1MW)</strong></td>
<td>Approx. 0.2GW</td>
<td>0.002GW</td>
<td>0.002GW</td>
<td>+ Approx 0.01GW (50% increase from recent annual installation)</td>
</tr>
<tr>
<td><strong>Biomass</strong></td>
<td>Approx. 2.1GW</td>
<td>0.03GW</td>
<td>0.04GW</td>
<td>+ Approx 0.09GW (50% increase from recent annual installation)</td>
</tr>
<tr>
<td><strong>Geothermal</strong></td>
<td>Approx. 0.5GW</td>
<td>0GW</td>
<td>0.001GW</td>
<td>+ 0GW</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Approx. 19.45GW</td>
<td>1.44GW</td>
<td>3.65GW</td>
<td>+ Approx 2.5GW</td>
</tr>
</tbody>
</table>
International Cooperation
Cooperation on energy conservation

Purpose

To share with other countries Japan’s experience of overcoming the “oil-crisis” with advanced energy efficiency (EE) policies and technologies, through:

1. **Cooperation on EE policies**
   To assist other countries in designing their EE policies and measures through such activities as capacity building and joint policy research, on the basis of Japanese policies and measures

2. **Cooperation on EE technologies**
   To assist other countries in developing and utilizing EE technologies through such activities as joint demonstration projects, on the basis of Japanese technologies

Example of policy cooperation:
**Assistance for establishment of EE measures**

Cooperation with Malaysia
- EE measures being discussed with energy authority staff from Malaysia
- Japanese legislation, regulations, measures, etc. being introduced and studied

Example of technology cooperation
**Waste heat power generation at a cement plant**

Demonstration at a cement plant in China
- Waste heat power generation technology was demonstrated in 1995 - 1997
- The technology has been widespread in the country after the completion of the demonstration
Cooperation on renewable energies

Purpose

To assist introduction of renewable energies (RE) worldwide, taking advantage of Japan’s strength on the energy demand-supply management, through:

1. **Cooperation on RE policies**
   To establish environments to facilitate introduction of RE worldwide through such activities as capacity building

2. **Cooperation on RE technologies**
   To assist other countries in developing and utilizing RE technologies through such activities as joint demonstration projects, on the basis of Japanese technologies on, *inter alia*, PV and energy management

Example of policy cooperation

Assistance for establishment of RE measures

- Cooperation with the Philippines
  - RE measures being discussed with energy authority staff from the Philippines
  - Japanese measures to promote RE being introduced and studies

Example of technology cooperation

Large scale PV system

- Demonstration at an industrial park in India
  - A stable power supply system using PVs is being demonstrated for the period 2012 – 2014
  - The agreement to start the project was signed in front of ministers from India and Japan, which highlighted commitments of the two Gov’ts.
Multilateral cooperation (IPEEC and IRENA)

Purpose

To promote energy efficiency improvements and use of renewable energies at a global scale through active contribution to multilateral initiatives, such as IPEEC (International Partnership for Energy Efficiency Cooperation) and IRENA (International Renewable Energy Agency).

Multilateral initiative for energy efficiency

IPEEC (International Partnership for Energy Efficiency Cooperation)

- To facilitate participating countries’ voluntary efforts on energy efficiency improvements through information sharing
- Established in 2009, with participation of Japan, the US, China, India and others, headquartered in Paris
- 8 WGs are established and in active operation

Multilateral initiative for renewable energies

IRENA (International Renewable Energy Agency)

- To facilitate the use of renewable energies through policy analysis, establishment of research network, etc.
- Established in 2011 with participation of 98 countries, headquartered in Abu Dhabi
- Japan has been acting as one of the Executive Members
Thank you very much!
ありがとうございます！

Questions?