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Japan's Strategy for Hydropower Development to the 2030 Target

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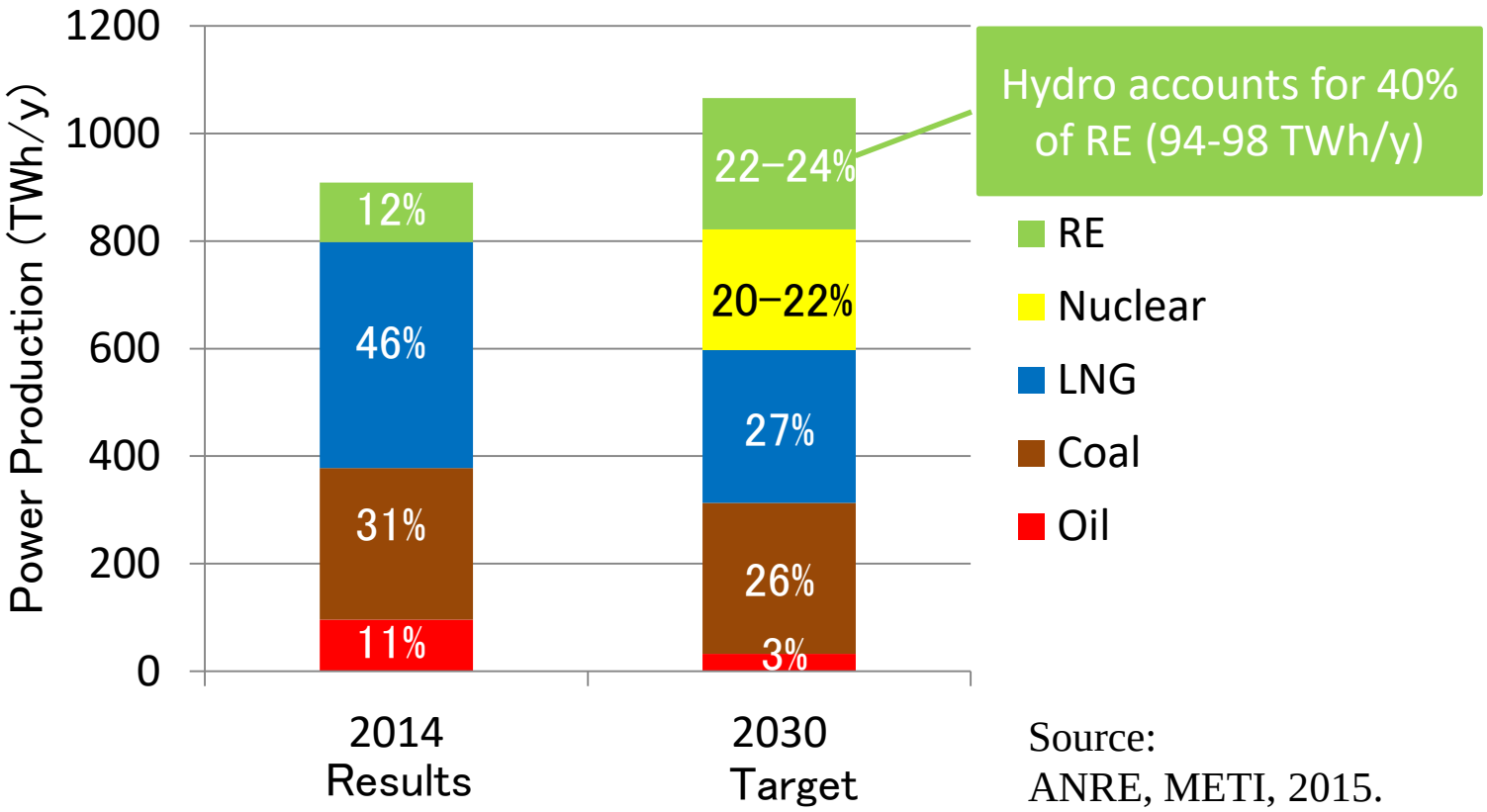
Strategic Energy Plan in Japan

- "Fourth Strategic Energy Plan" approved in April 2014 after the earthquake and the nuclear accident in 2011,
- 3E+S viewpoints in energy policy,
  - Energy security: improving self sufficiency,
  - Economic efficiency: reducing energy cost,
  - Environment: reducing GHG emission,
  - Safety: prioritizing safety assurance,
- Diversified and flexible energy supply-demand structure,
  - Various energy sources and players in the energy market,
  - Energy market reform,
  - Development of domestic energy sources

Target of Power Mix

- Target of power mix in 2030 determined in July 2015

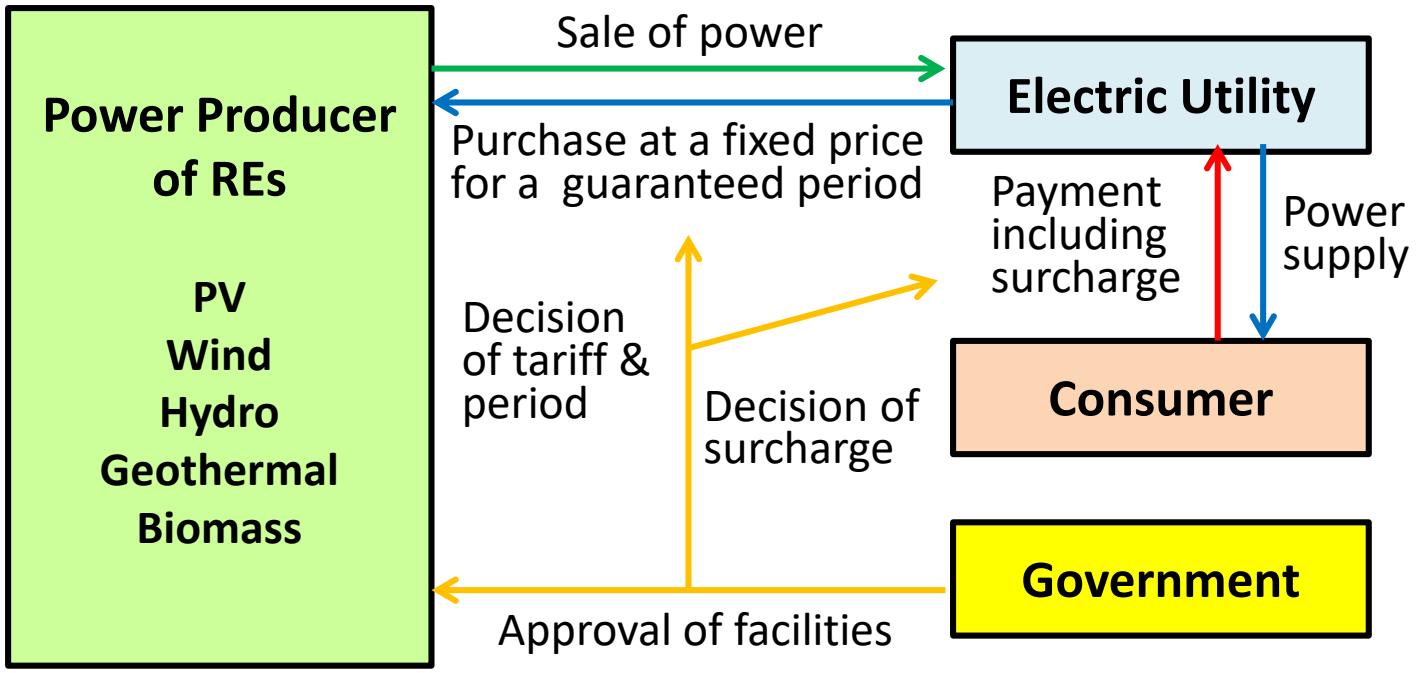


Source:
ANRE, METI, 2015.

Target of CO2 emission reduction estimated 22% of total GHG emissions in FY2013.

Renewable Energy Policy

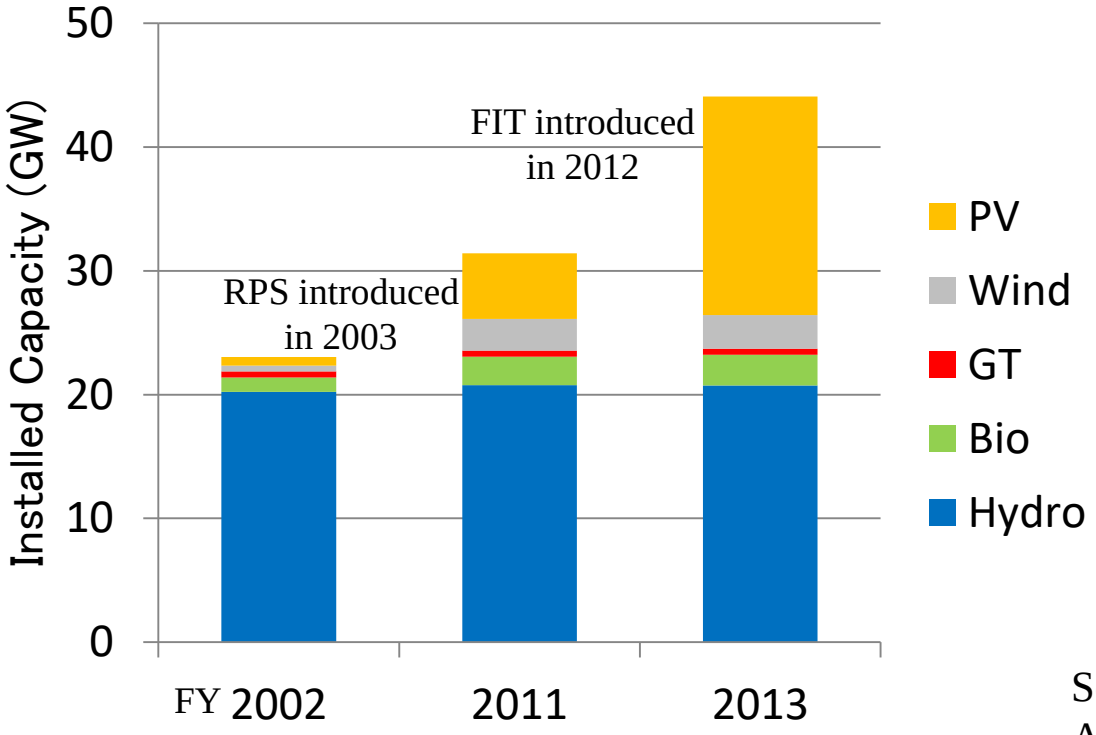
- Feed-in tariff system introduced in July 2012



Source: ANRE, METI, 2012.

Renewable Energy Policy

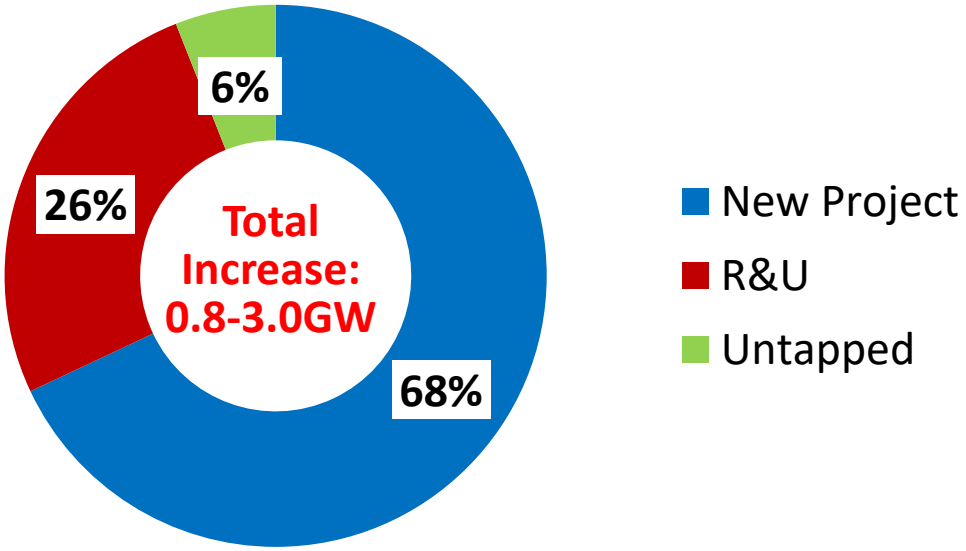
- Financial support, deregulation and power market reform,
- Improving FIT system for well-balanced introduction of REs,
- Expansion of transmission line required for more wind power,
- Prioritizing hydropower and geothermal as a base-load source.



Source:
ANRE, METI, 2015.

Scope of Hydropower Development

- Target of net increase from 2014 to 2030: 0.8-3.0 GW
- New projects depending on E/S barriers,
- Renewal & Upgrading depending on utility's strategy,
- Untapped potential for various types of facilities.

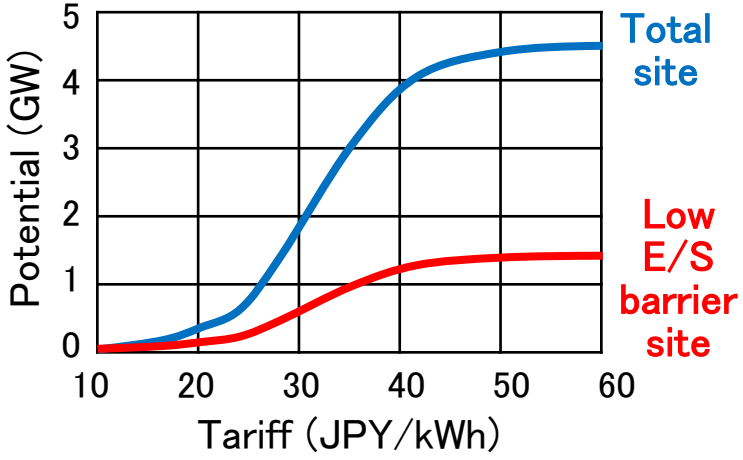


Breakdown of the 2030 target of capacity increase

Source: ANRE, METI, 2015.

Barriers to Hydropower Development

- Shift to small-scale development since 1970s.
- Undeveloped economically feasible potential estimated 4.5GW,
- Some of economic potential is not easy to develop because of environmental regulation and social acceptance,
- Decrease of skilled engineers and limited production ability of small hydro equipment will be barriers in the near future.



Economically feasible potential by tariff

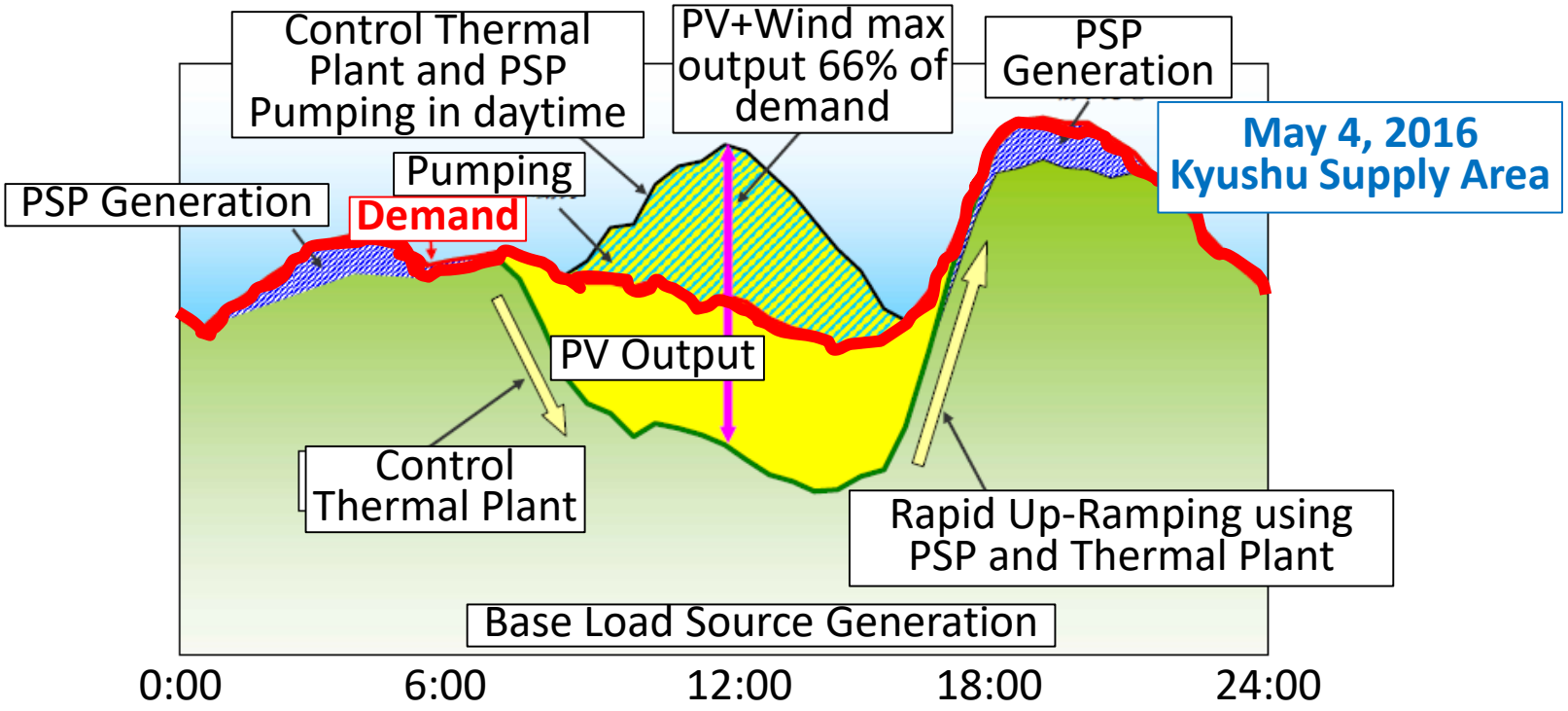
Source: ANRE, METI, 2015.

Renewal & Upgrading / Facilitation Measures

- Benefits of R&U
  - Life extension, safety improvement and cost reduction,
  - Increase of power with low cost and less environmental impacts,
  - Optimized asset management.
- Facilitation measures by the government since 2016
  - Survey on hydropower potential of existing dams,
  - Support for feasibility study of R&U project,
  - Enhancing innovative technologies in R&U project,
  - Support for public acceptance activities,
  - Education and training of hydropower experts.

Role of Hydropower in Energy Services

- Integration of VREs in power system
  - Mass introduction of PV has been affecting grid system stability,
  - Hydropower plays an important role in integration of VREs.



Thank you for attention!