

Energy policy transition in Japan

Current Status and Outlook of Japanese PV Market



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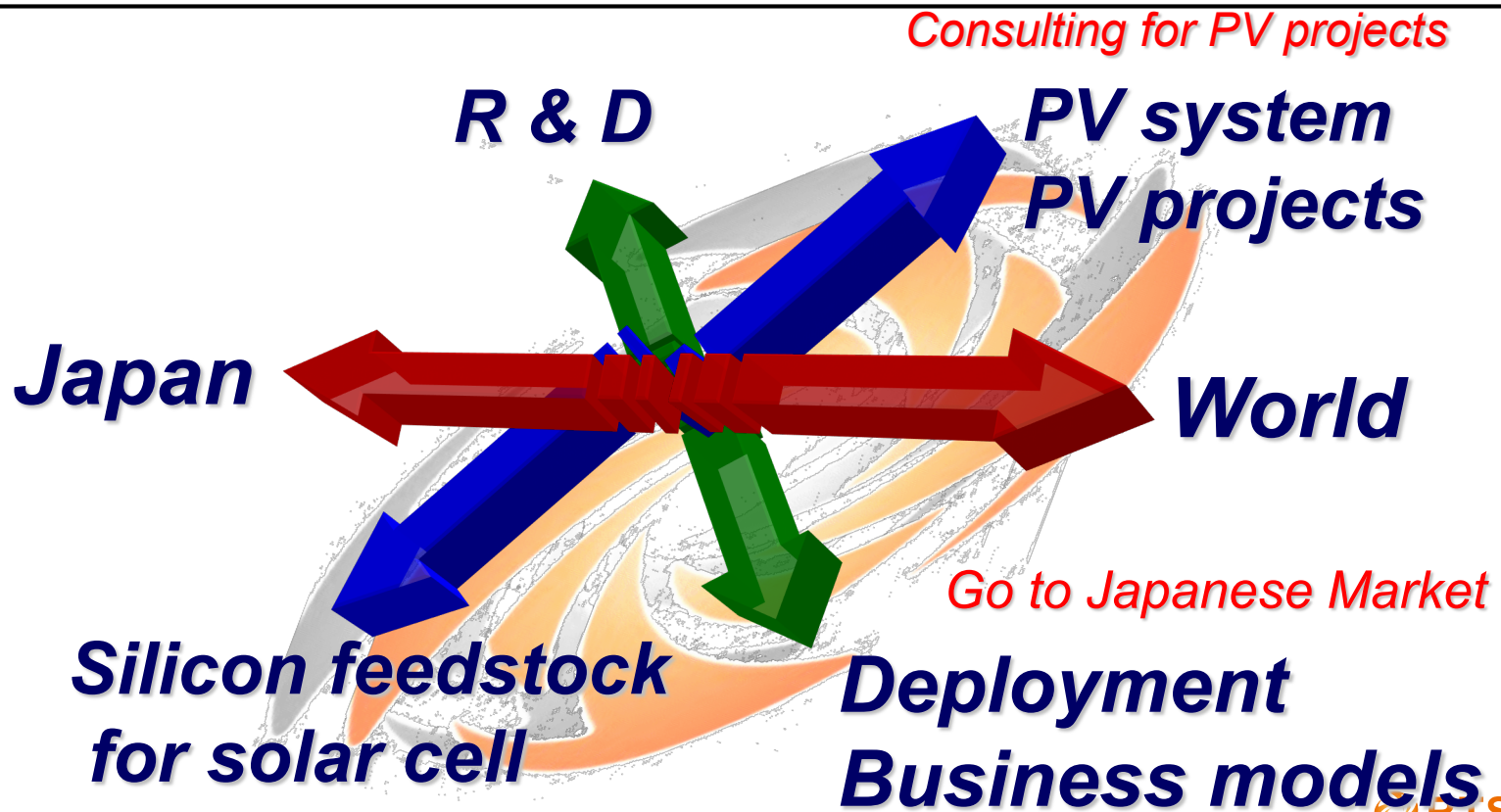
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RTS Corporation – founded in 1983, 35 year experience

Comprehensive Consultancy on Photovoltaic Power Generation (PV)

Business: Helping establish PV business strategy, **“Go to Japanese market ”**

Clients: Government agencies, utilities, manufacturers (entire value chain of PV) project developers, financial institutes, industry associations, etc.
in JP, US, DE, IT, FR, AT, NR, CHE, AUS, CHN, IND, KOR, Taiwan, Thailand, NORWAY, etc.

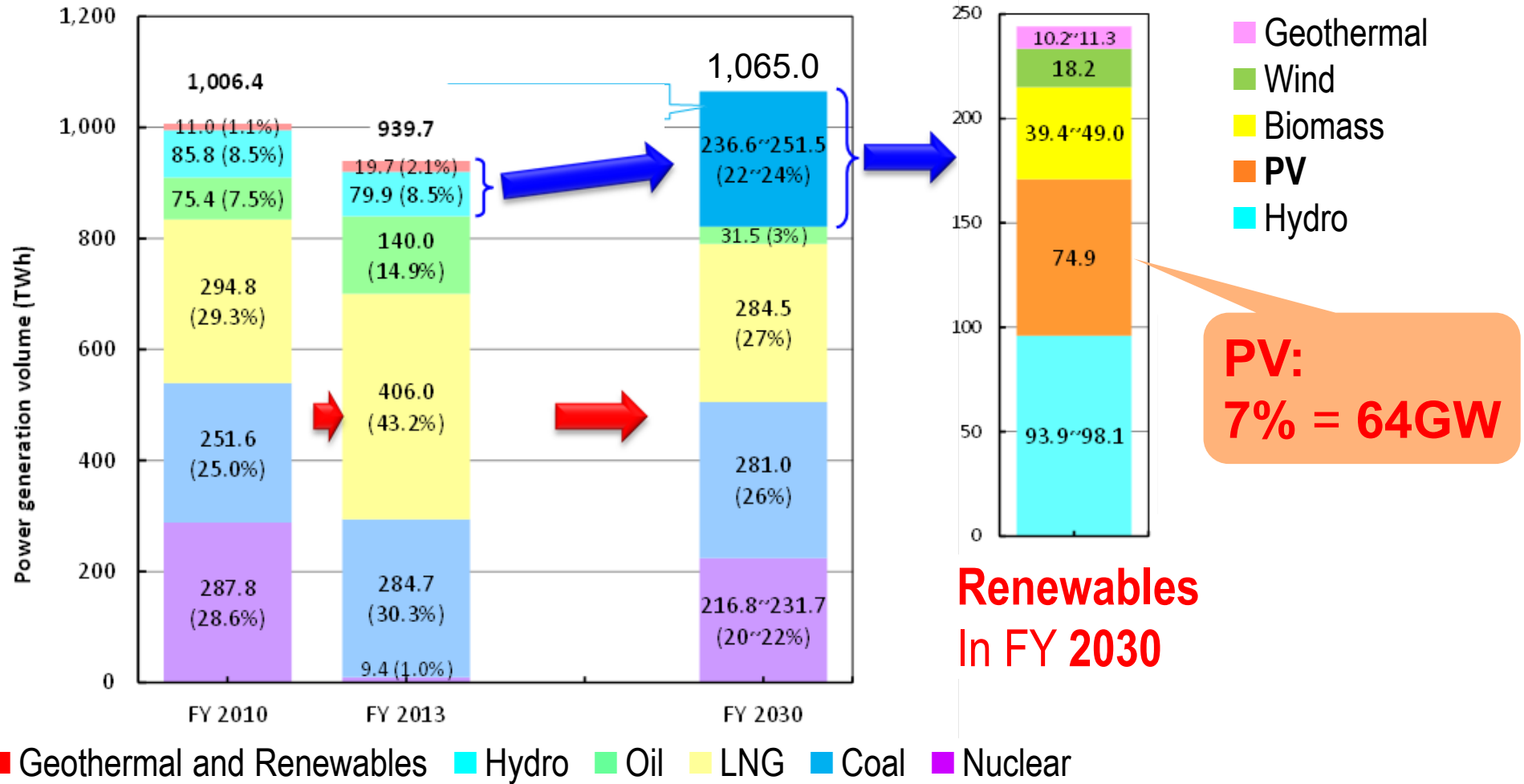


Contents

1. Japan's policy on renewable energy and PV power generation
2. Current status of market and FIT program
3. Emerged issues with the growth of PV market and solutions
4. Outlook of Japanese Market until FY 2030

RE Target set after Fukushima

METI "Long term energy supply-demand outlook" (July 2015)



The Fifth Strategic Energy Plan

Long-term stable sustainable/ independent energy supply

Improvement of citizens' living, contribution to sustainable development of the world

Further advanced 3E +S

Improvement of self-sufficiency rate of technology, challenge for decarbonization, enhancement of Japan's industrial competitiveness, etc.

Change in situation

Start of competitiveness among technology for decarbonization, geopolitical risks, competitiveness among nations/ businesses

Surely realize energy mix for FY 2030

Renewable Energy

Lay out foundations to become a mainstream power source

Reduce cost, overcome grid restrictions, secure power dispatching ability

Nuclear

Reduce dependency as much as possible

Continuous improvement of safety and resuming operation

Fossil fuel

Promotion, etc. of self-development of fossil fuel, etc.

Energy conservation

- Continuation of thorough energy conservation
- Integrated conduction of Energy Conservation Act and supporting measures

Promotion of hydrogen/ power storage/ distributed energy

Challenge for energy transition of FY 2050 and decarbonization

Renewable Energy

Aim to **become an economically independent** and **carbon-free mainstream power source**

Work on development of hydrogen/ power storage/ digital technology

Nuclear

Alternative for decarbonization

Work on pursuing safe nuclear reactor/ developing backend technology

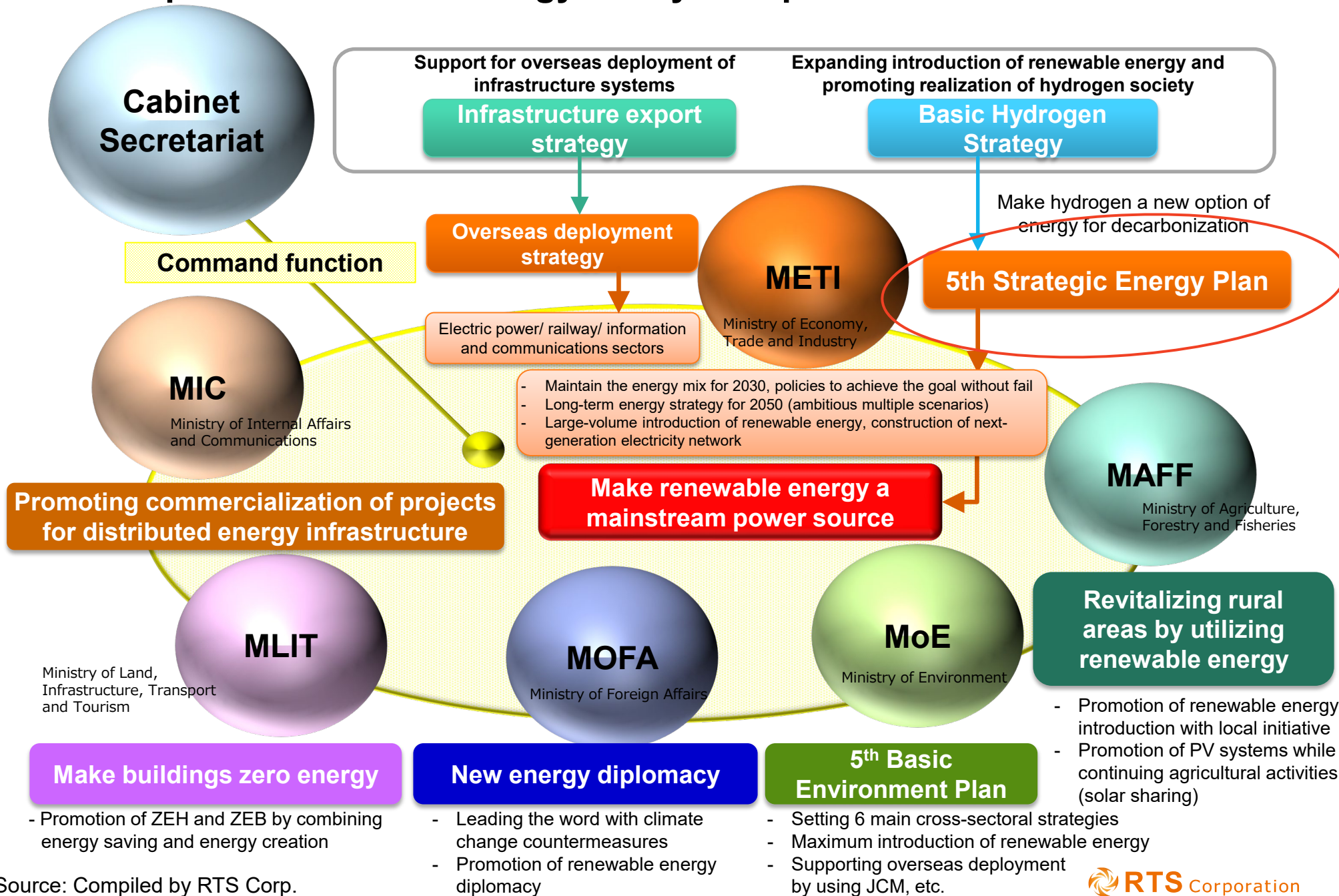
Fossil fuel

- Mainstream power source during transition period, enhance resource diplomacy
- Work on development of hydrogen for decarbonization

Heat/ transportation, distributed energy

• Challenge for decarbonization through hydrogen/ power storage
• Local development of distributed energy system
(Combination of next generation renewable energy/ power storage, EV, microgrid, etc.)

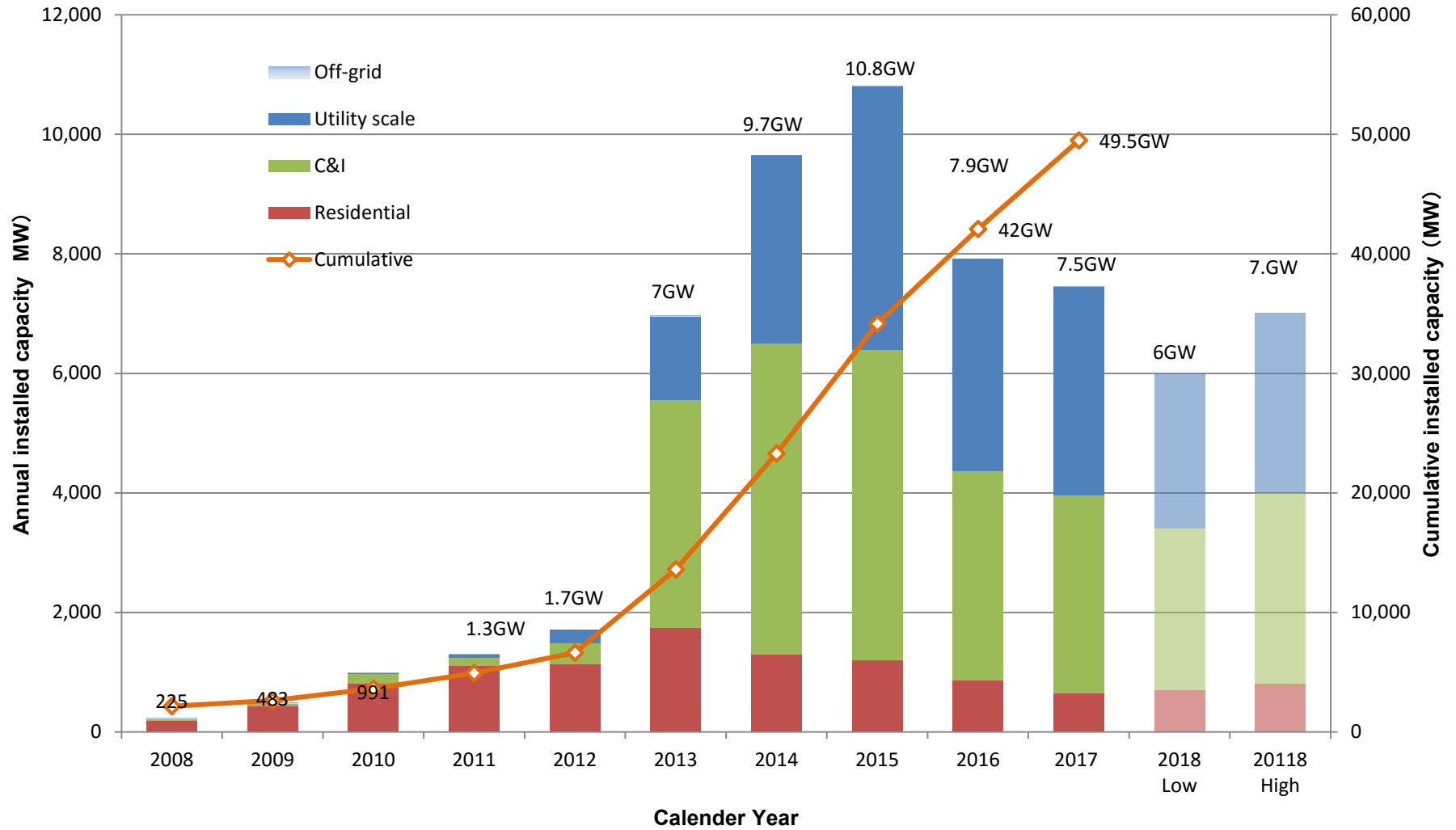
Landscape of Renewable Energy Policy in Japan



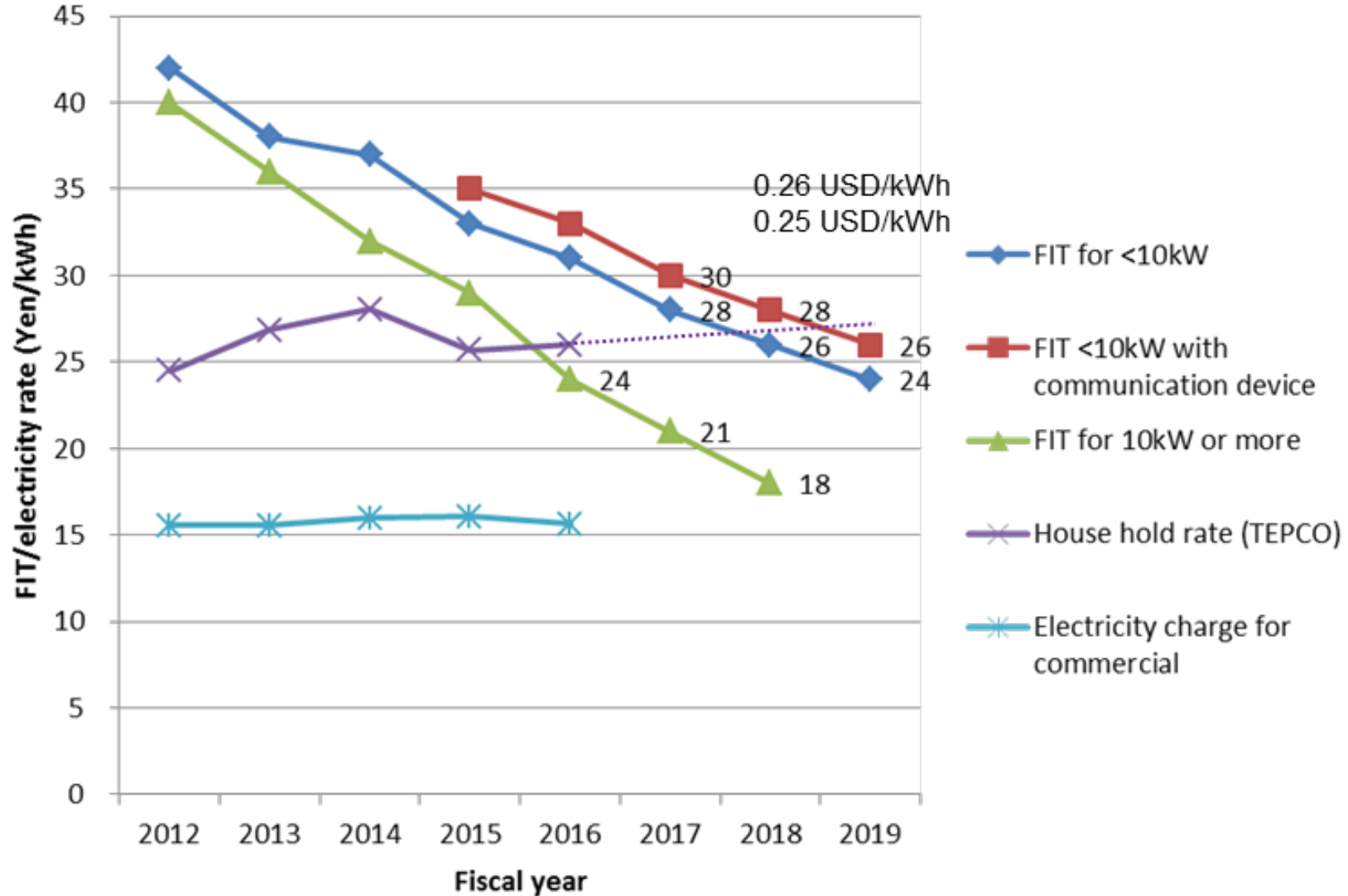
Contents

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4. Outlook of Japanese Market until FY 2030

PV installed capacity in Japan

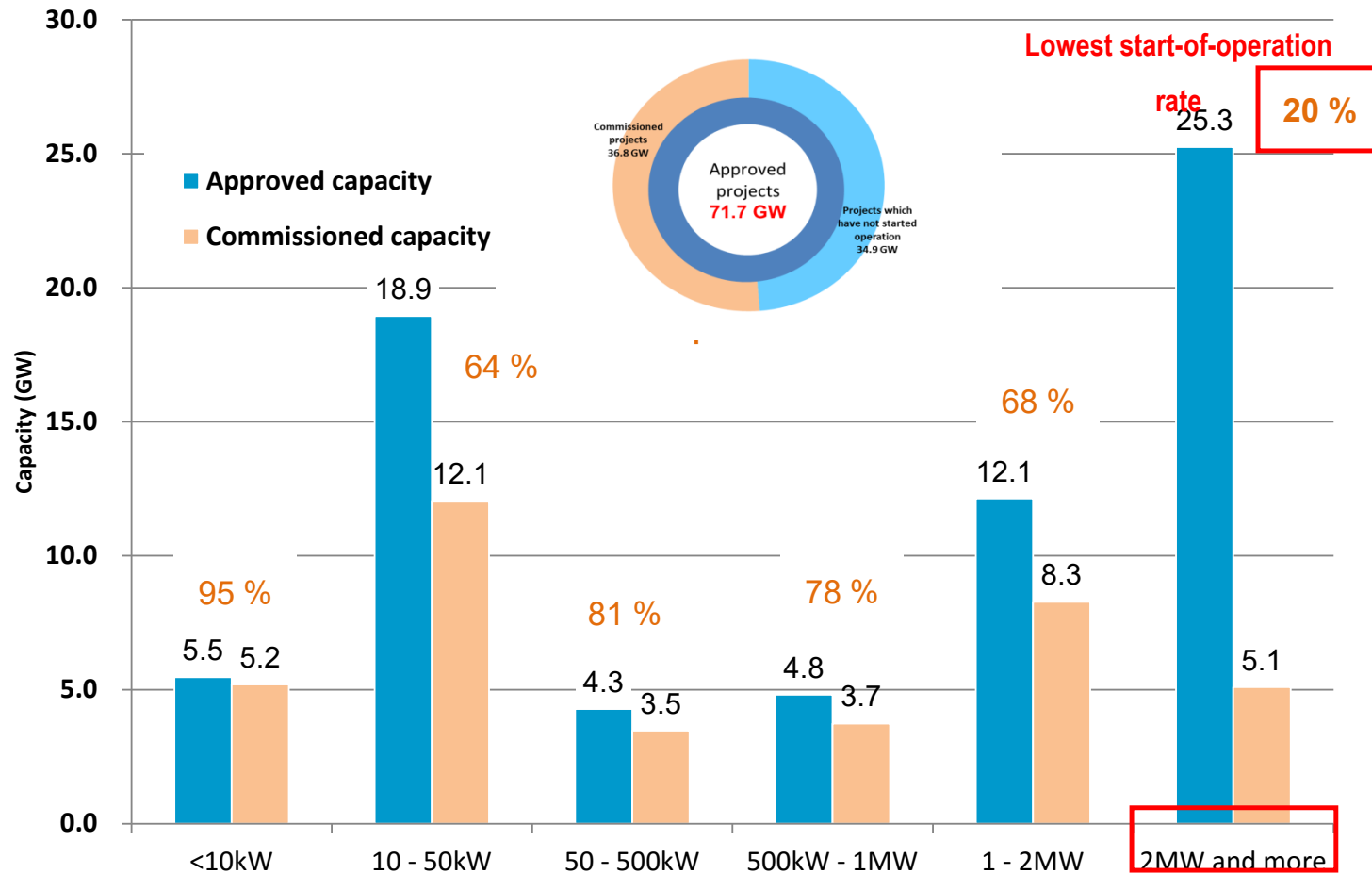


FIT for <10 kW application: FIT for surplus power (10 years)



Source: METI, TEPCO compiled by RTS Corporation

Approved & commissioned capacity under the FIT program



Source: Materials from METI, compiled by RTS Corporation

- The cumulative approved capacity: 70.9 GW as of Dec. 2017
- The cumulative capacity starting operation : 37.8GW
- ~32GW of pipeline exists as of Dec. 2017

Contents

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4. PV industry status in Japan
5. Outlook of Japanese Market until FY 2030

2 Issues raised with the growth of PV market

2.1 Explosive growth of approved PV projects under the FIT program

- Concerns for the future burden of surcharges
 - Change of FIT level setting
 - Auction program started
 - Change of approved process (to cancel paper projects)

2.2 Concerns for installation quality and environmental damages and accidents caused by natural disasters

- Requirement of O&M
- Guideline issued
- Local government reactions
- Ministry of Environment started discuss “Environment assessment”

2.3 Lack of hosting capacity

- Changes of grid management
- Grid storage

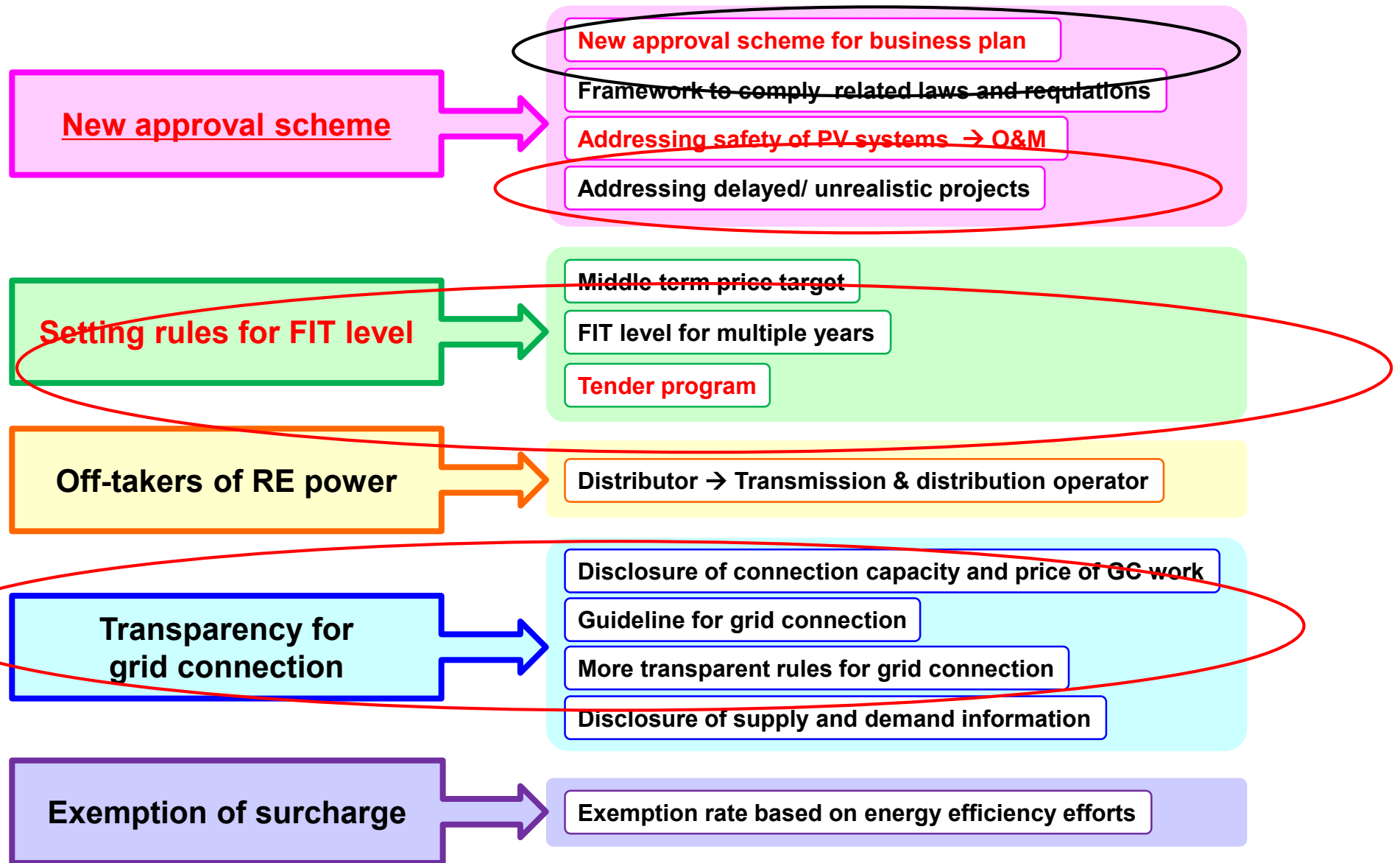
2.4 Risk of curtailment

- Clear rules for curtailment

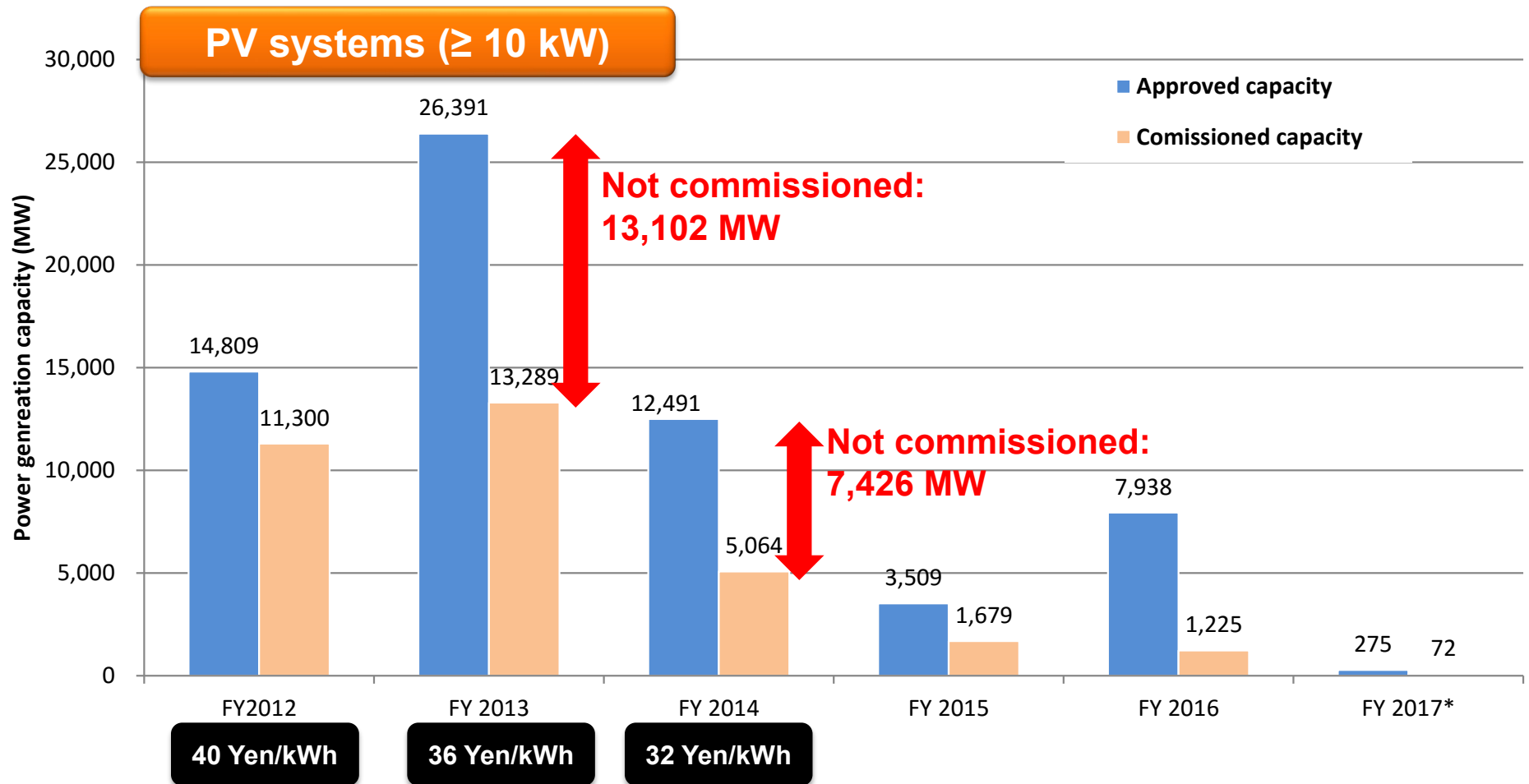
2.5 Recycling of PV modules

- Action plan established

Actions taken by the government with revision of the FIT program



Status of commissioning of FIT-approved PV systems (as of the end of December 2017)

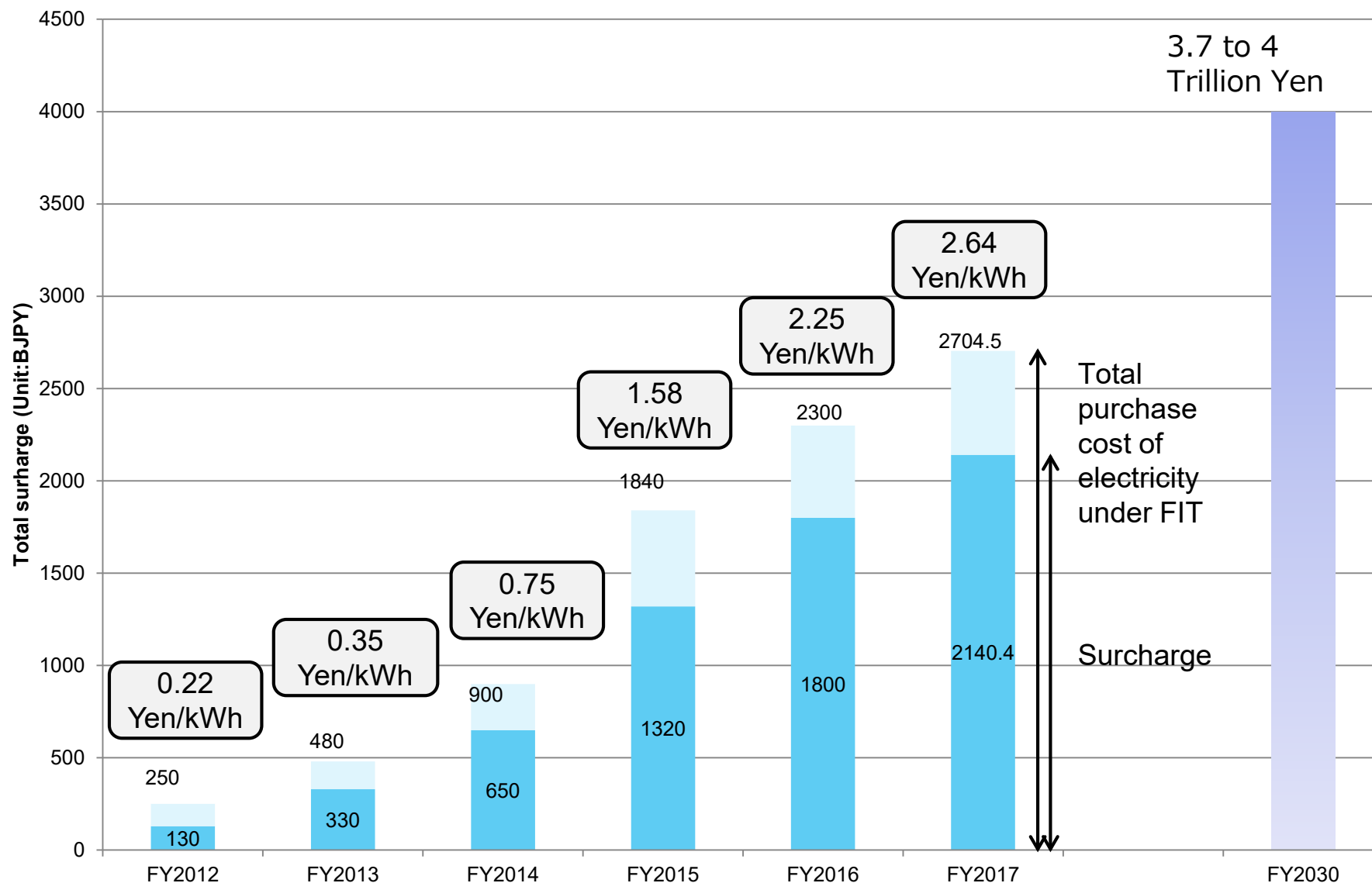


* For the projects approved in FY 2017, figures are total of Apr. to Dec. 2017. Last-minute applications for approval toward the end of the fiscal year (ended March) are not included.

Note: Capacity of revoked approval until March 2017 is reflected. From April 2017 onwards, 45 projects (≥ 2 MW) totaling 1.26 GW lost approval.

Over 20 GW of approved 36 Yen/kWh and 32 Yen/kWh PV projects have NOT started operation.

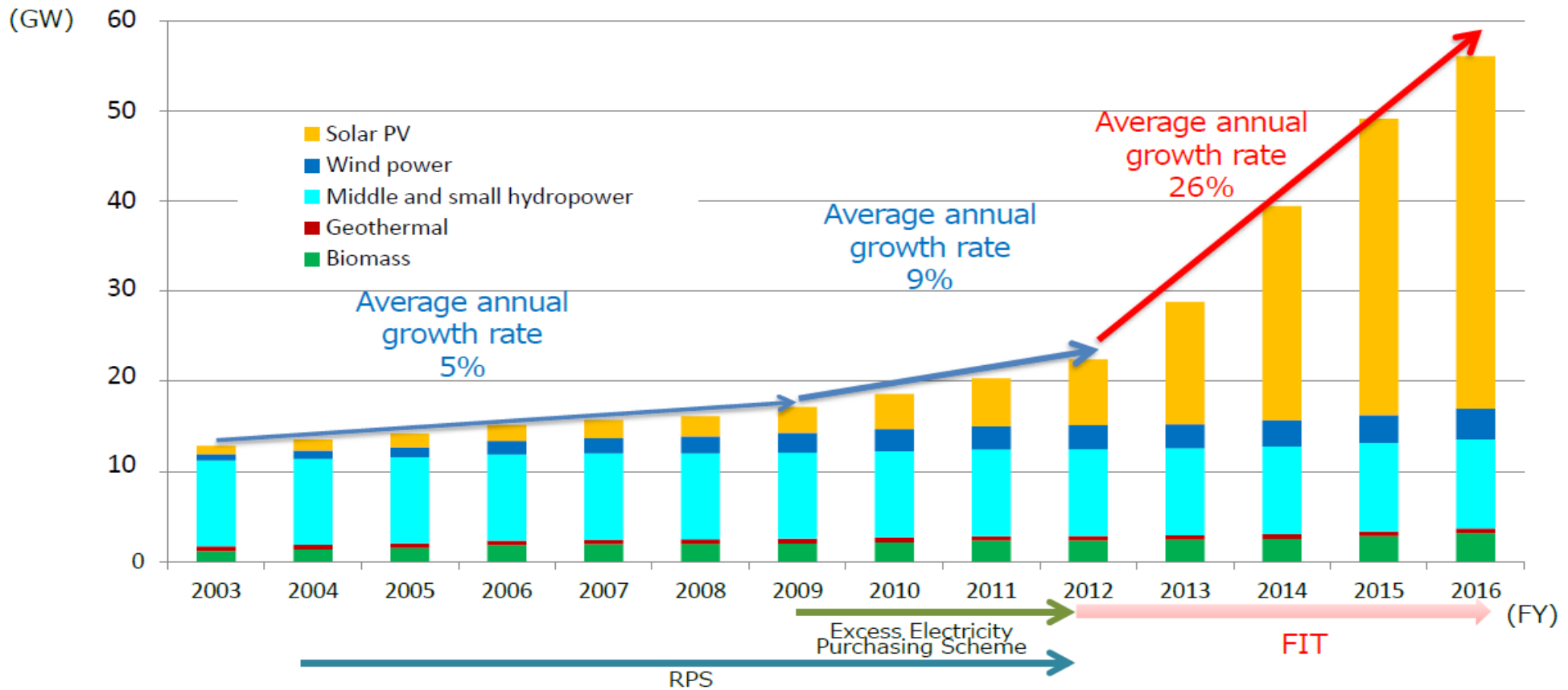
Concerns for rising surcharges



Source: METI, compiled by RTS Corporation

Only PV is growing

Trend in renewables generation by technology



Points of new approval procedure

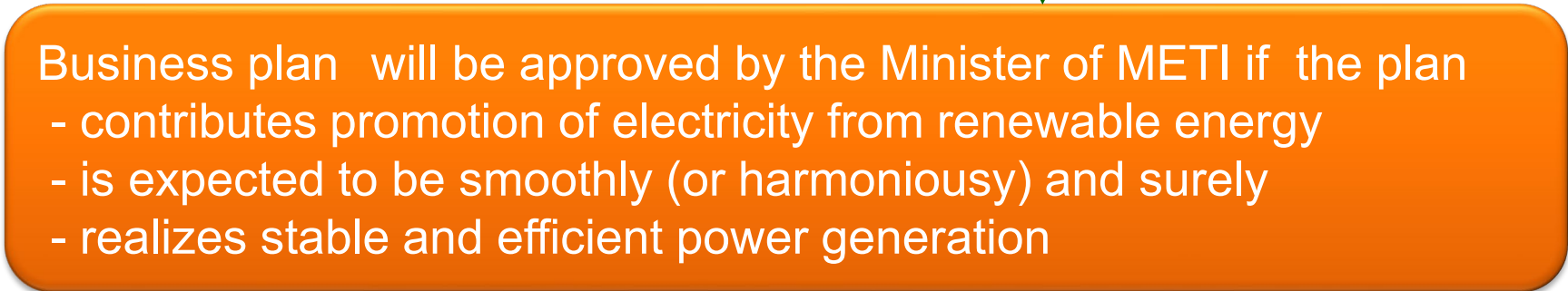
Before (current procedure)



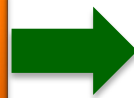
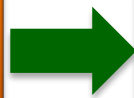
From FY 2017 (New procedure)



Requirements under new procedure

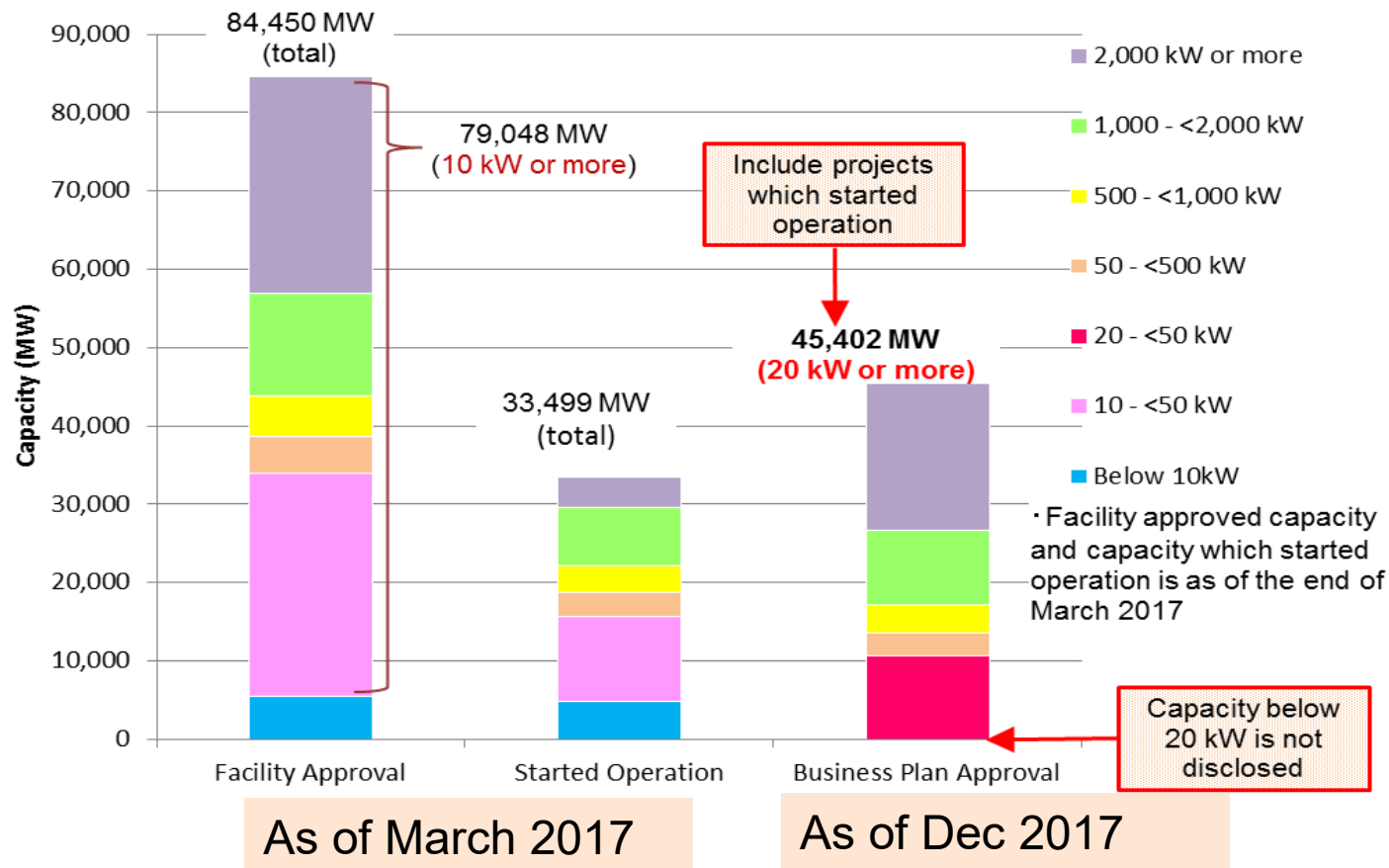


In case of violation of compliance rules



Violation of compliance rules in the government and ministry ordinances and guidelines may results revocation of approval

Facility approved, commissioned and approved PV business plan



154,180 projects
28,418MW
 As of 15th September 2017

Increased by 15 GW

274,979 projects
45,402MW
 As of December 2017

Due date of deemed approval was in the end of September

Hot news, 15th October ! : New measures for uncommissioned projects (for projects having concluded connection contracts by July 31, 2016)

Projects which have not started operation		
Date of connection contract	By July 31, 2016	Aug. 1, 2016 and onwards
Deadline for starting operation	None	3 years
Changes in PV modules	×	○

Applicable to new measures

Not applicable to the new measures

Target projects are those which have not started operation **for 4 years or longer after approval**

Applicable Fiscal Year (FY) will be extended by one FY annually

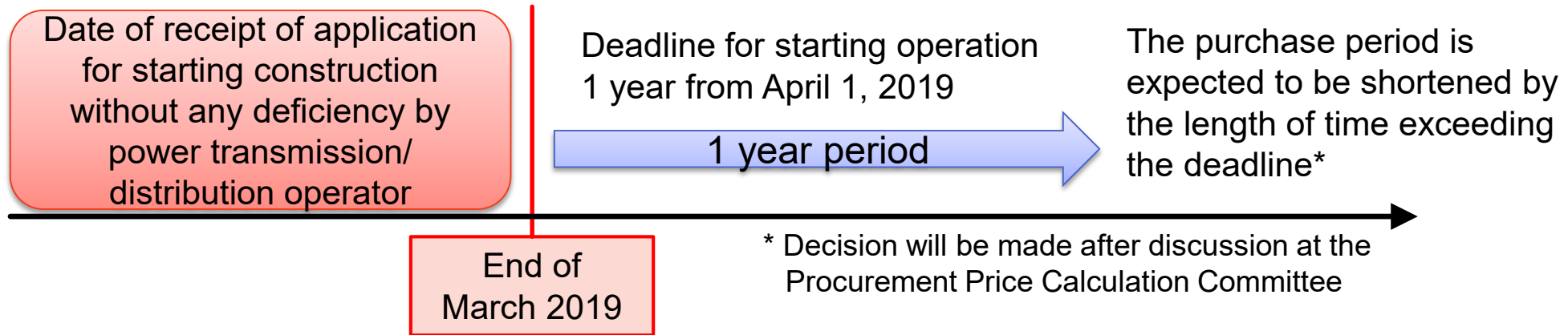
Applicable Fiscal Year (FY)	This time	1 year later	2 years later
FY 2012 (40 Yen/kWh)	○	○	○
FY 2013 (36 Yen/kWh)	○	○	○
FY 2014 (32 Yen/kWh)	○	○	○
FY 2015 (27 Yen/kWh)		○	○
FY 2016 (24 Yen/kWh)			○

Total capacity of target projects is in the range of almost 11 GW to almost 17 GW

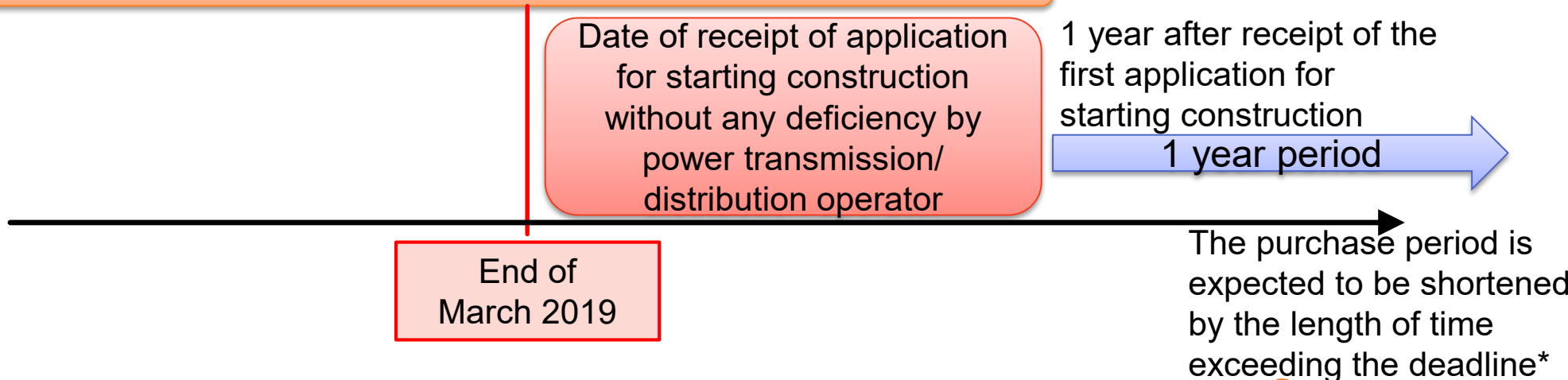
Image for the enforcement of new measures on April 1, 2019

Judgement shall be made depending on whether application for start of grid connection construction is received without any deficiency by power transmission/ distribution operator by the end of March 2019

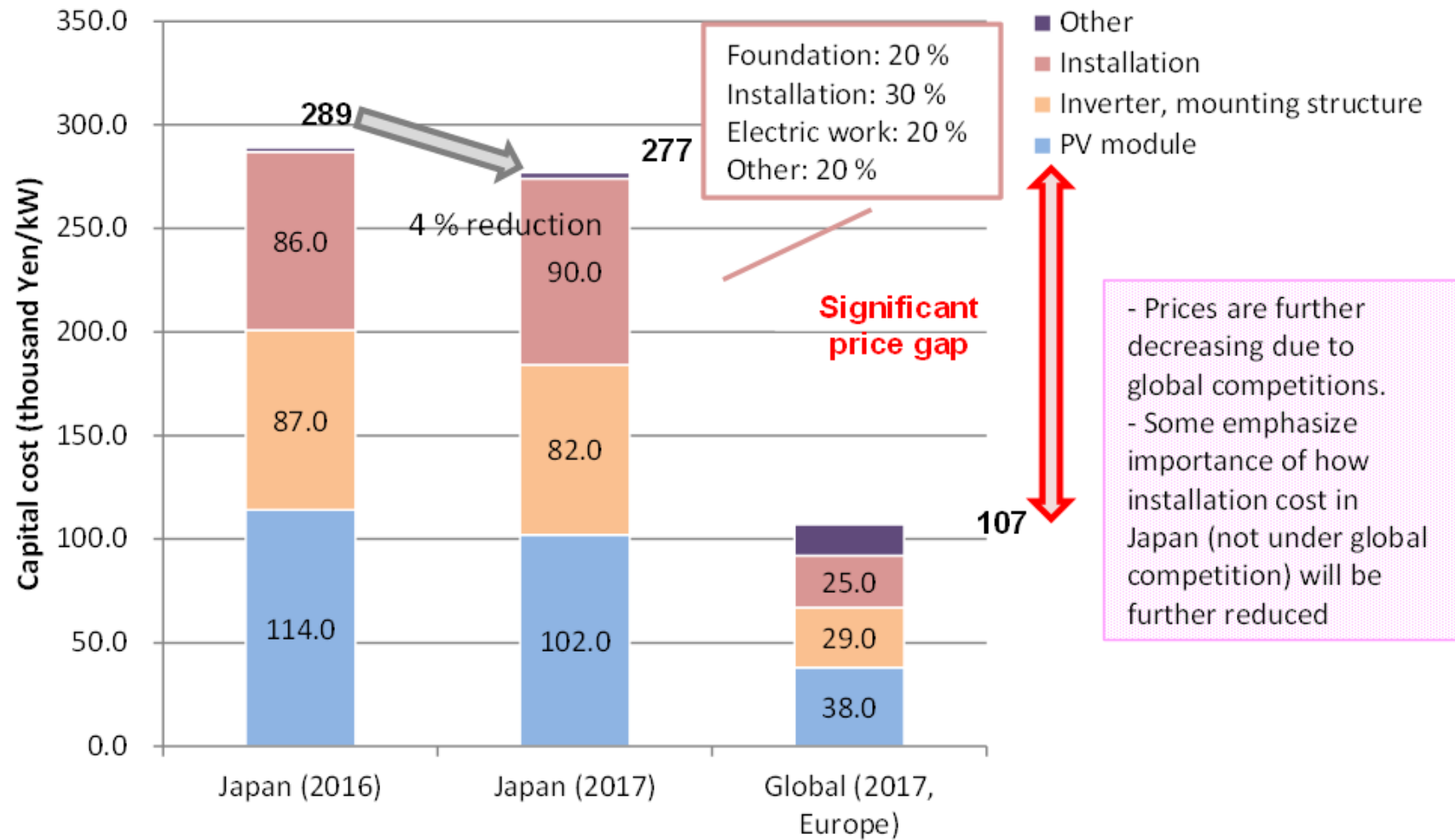
Cases when the conventional FIT (40, 36, 32 Yen/kWh) is ensured



Case when the FIT is changed to 21 Yen/kWh



Cost difference of PV system between domestic and overseas

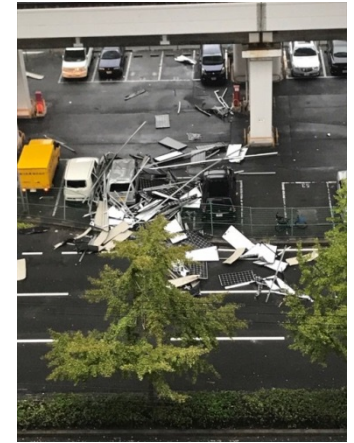


2. 2 Concerns for installation quality and environmental damages and accidents caused by natural disasters

10月21日07時00分



Typhoon Jebi (21st)



<https://twitter.com/i/moments/>

<https://togetter.com/li/865216> 1036934335100678144

https://www.huffingtonpost.jp/tenkijp/typhoon-21-strong-winds_a_23250873/



<https://t.co/y06jQLmWt5>



<https://t.co/DcdYTsqTks>



<https://twitter.com/i/moments/1036934335100678144>

Purpose and positioning of formulating the guidelines

1. Planning

- 1) Research of land and surrounding environment, selection of land, and related procedures
- 2) Establishing relations with local communities

2. Design and Installation

- 1) Designing land development
- 2) Designing power generation facilities
- 3) Installation
- 4) Consideration for surrounding environment

Necessary measures for appropriate implementation of the project

3. Operation & Maintenance (O&M)

- 1) Formulation of plan on maintenance and inspection (M&I)/ operation and maintenance (O&M) and establishment of framework
- 2) Efforts required in normal operation
- 3) Responses required in emergency
- 4) Consideration for local communities
- 5) Renewing facilities

4. Removal and Disposal

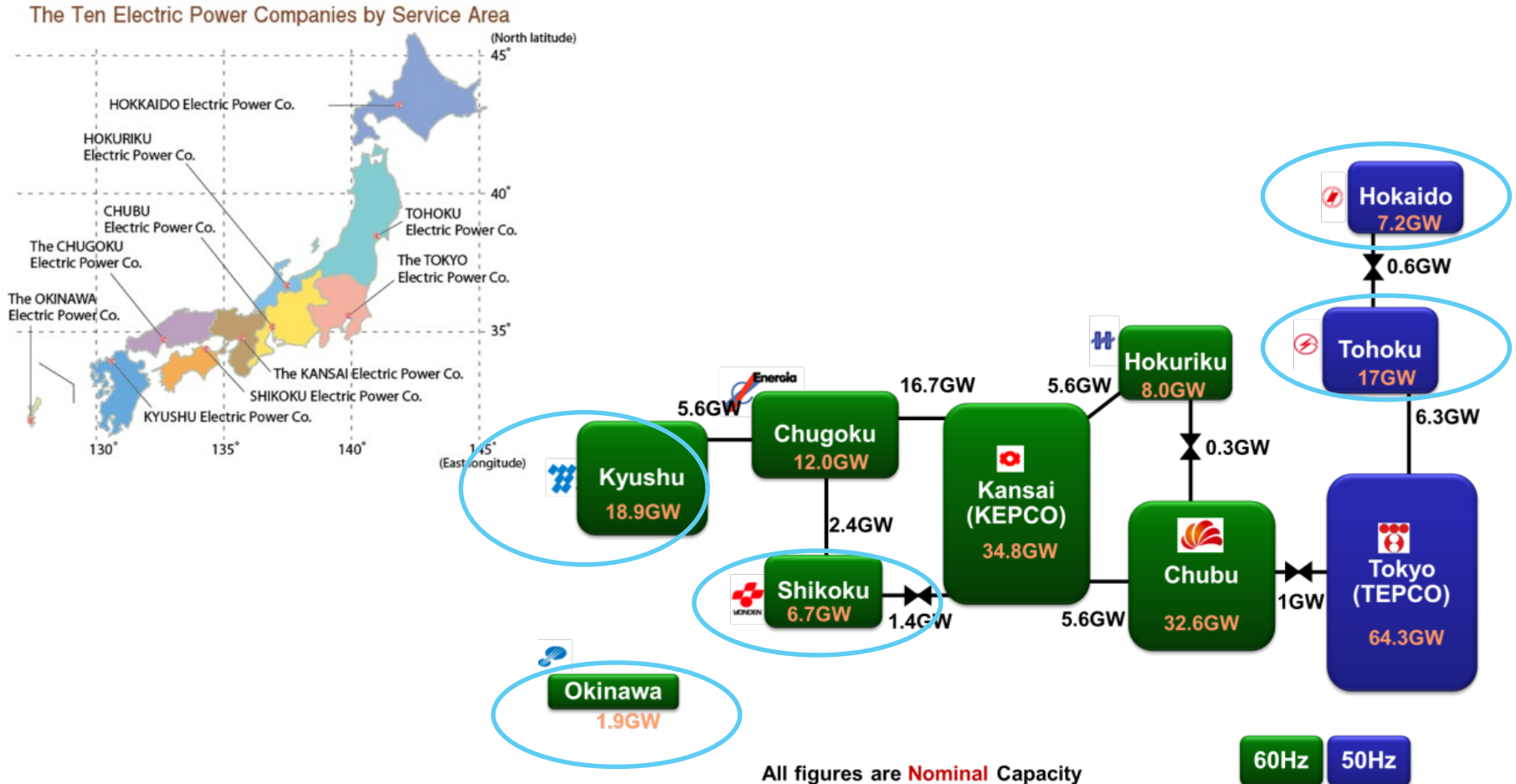
- 1) Planned removal and securing of disposal cost
- 2) Removing and disposing facilities after termination of the project

Example of conflicts between local citizens

Place	Plan	Reason	Overview	Status
Tsukuba, Ibaraki	Large scale PV	Landscape protection	1 of 4 sites located in Natinal Park	1 site withrrown,3 sites under negotiation
Bando, Ibaraki		Nature conservation	Swamps owned by prefecture and private owners. Protection for swans	Change of site
Fujimi, Nagano	28ha 24MW	Landscape protection, Water quality	Renova developed the plan. Water quality erosion and land slides were concerned	Withdraw
Yamanashi	Large scale PV	Landscape protection	Damages on land scape with Mt. Fuji Regulation was formulated and applied	
Fujieda, Shizuoka	Large scale PV,1ha	Close to residential area	City revised guideline for land use	Withdraw
Izu Kogen, Shizuoka	105ha 40.7MW	Landscape protection	Deforestation and landscape damages concerned	
Nosu, Shiga	4MW	Hazardous pollution concerned	Site was used by a pharmaceutical company and replacement of surface soils are requested	Plan aborted
Takashima, Shiga	20ha project	Landscape protection, Nature conservation	Deforestation concerned by residents nearby	
Maniwa, Okayama	1.6ha	Landscape protection	Regulation was formulated	Plan aborted

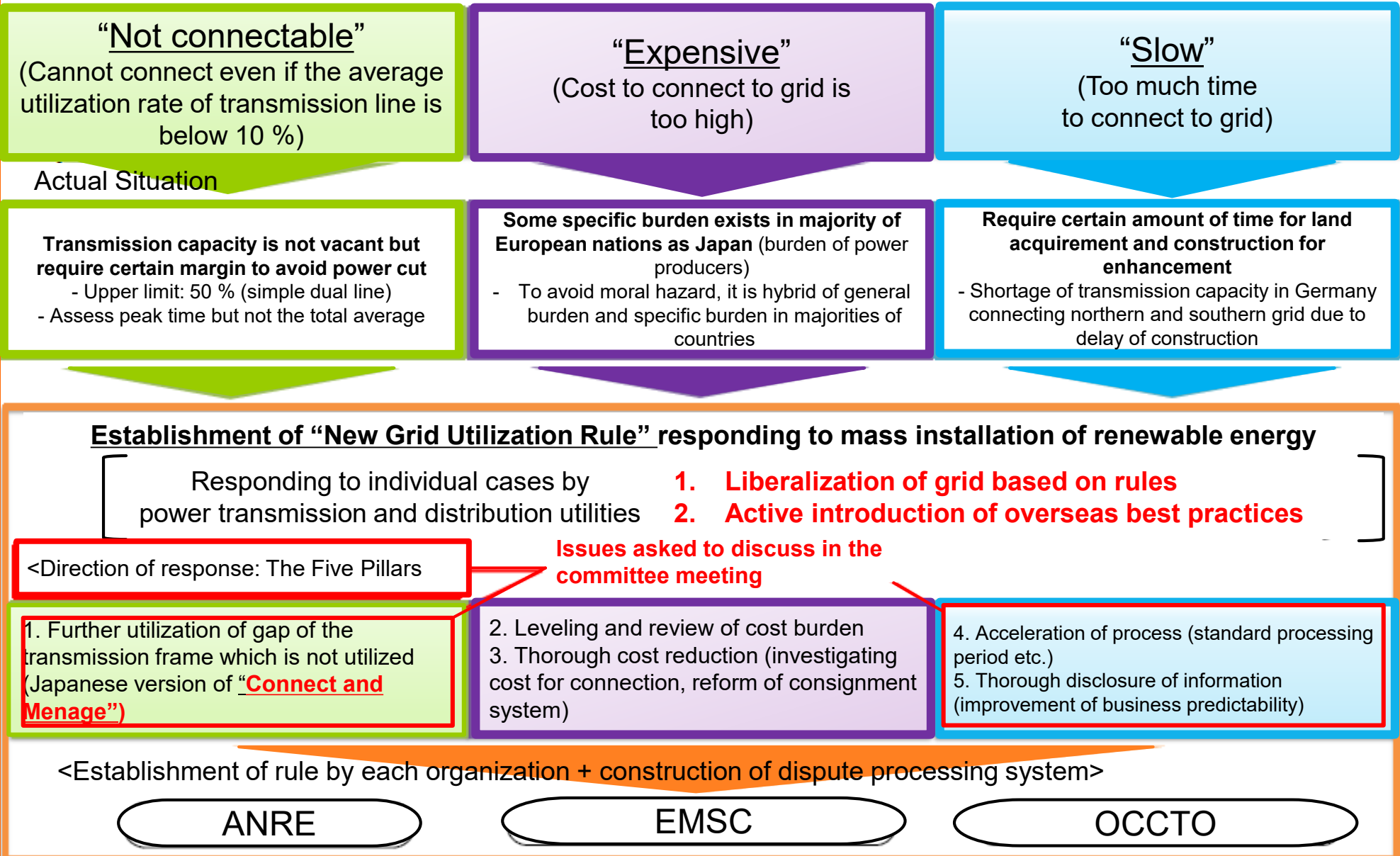
2.3 Lack of hosting capacity

5 electric utilities announced suspension of new grid connection contract in September 2014



(Reference) Overall image of response to overcome the domestic grid restriction

<Voice and Opinions of Power Producers>

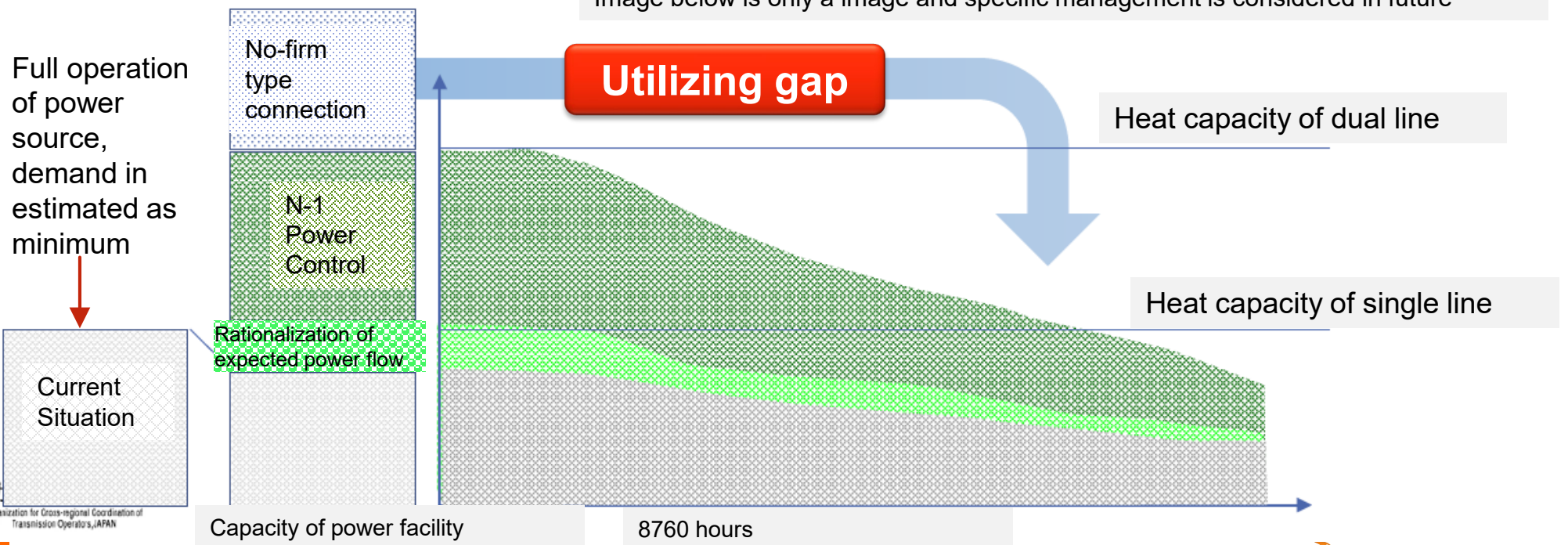


Consideration about Japanese version of Connect and Merge

Rationalization of assumed power flow	Assessed probability of power function such as leveling effect to long-term hibernated power or naturally fluctuating power. Utilizing vacant capacity when assessing cases in which difference of demand and output become the largest
Power control of N-1	Enough capacity for power transmission is secured even if failure occur in single line (N-1), the capacity is utilized by conducting power control in case of failure
No-firm type connection	New idea of power connection which allow power transmission if there is vacant capacity in grid (utilizing gap in grid). Output curtailment in crowded condition is prerequisite

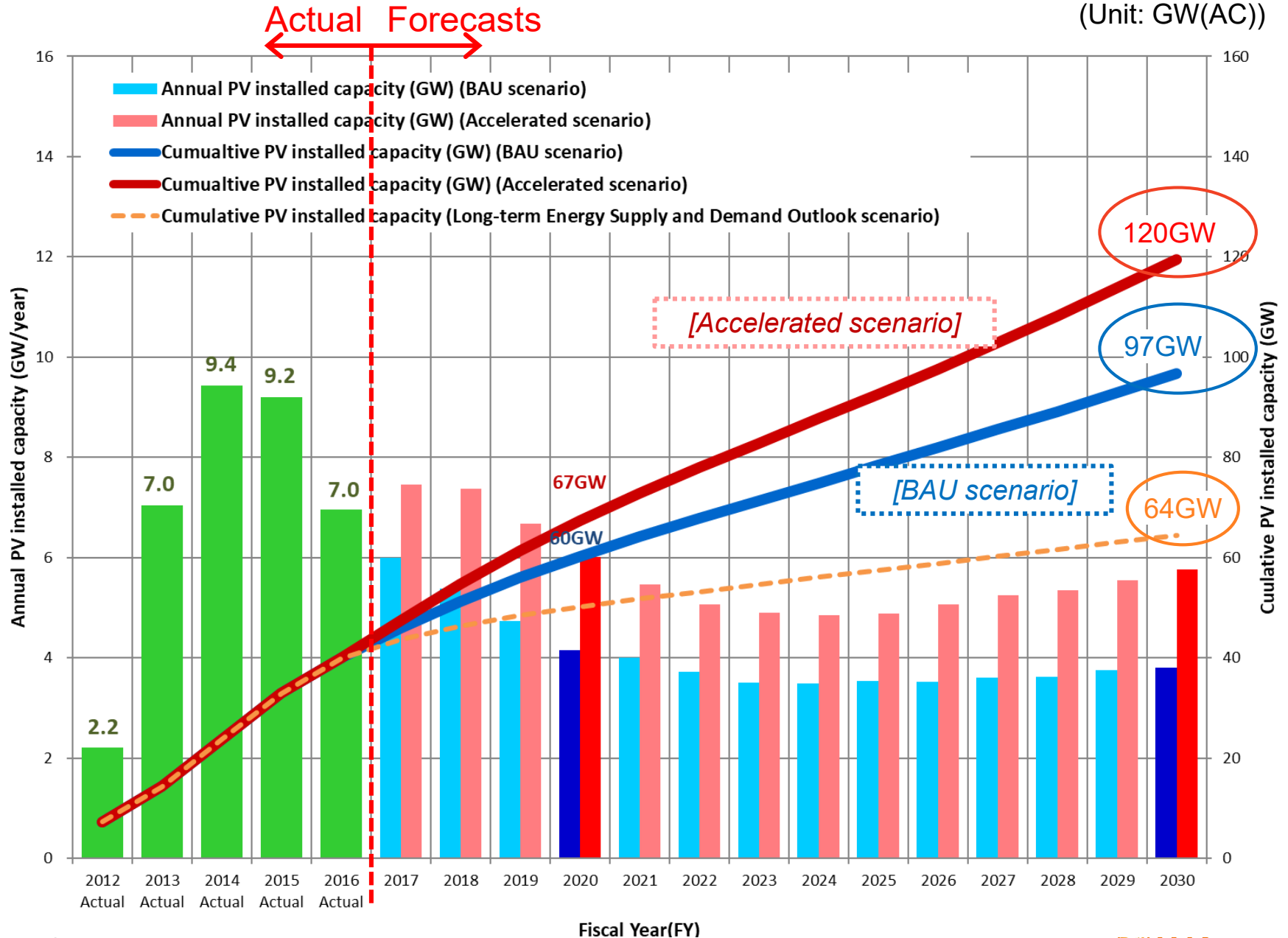
Image of power flow in Japanese version of Connect and Merge

Image below is only a image and specific management is considered in future

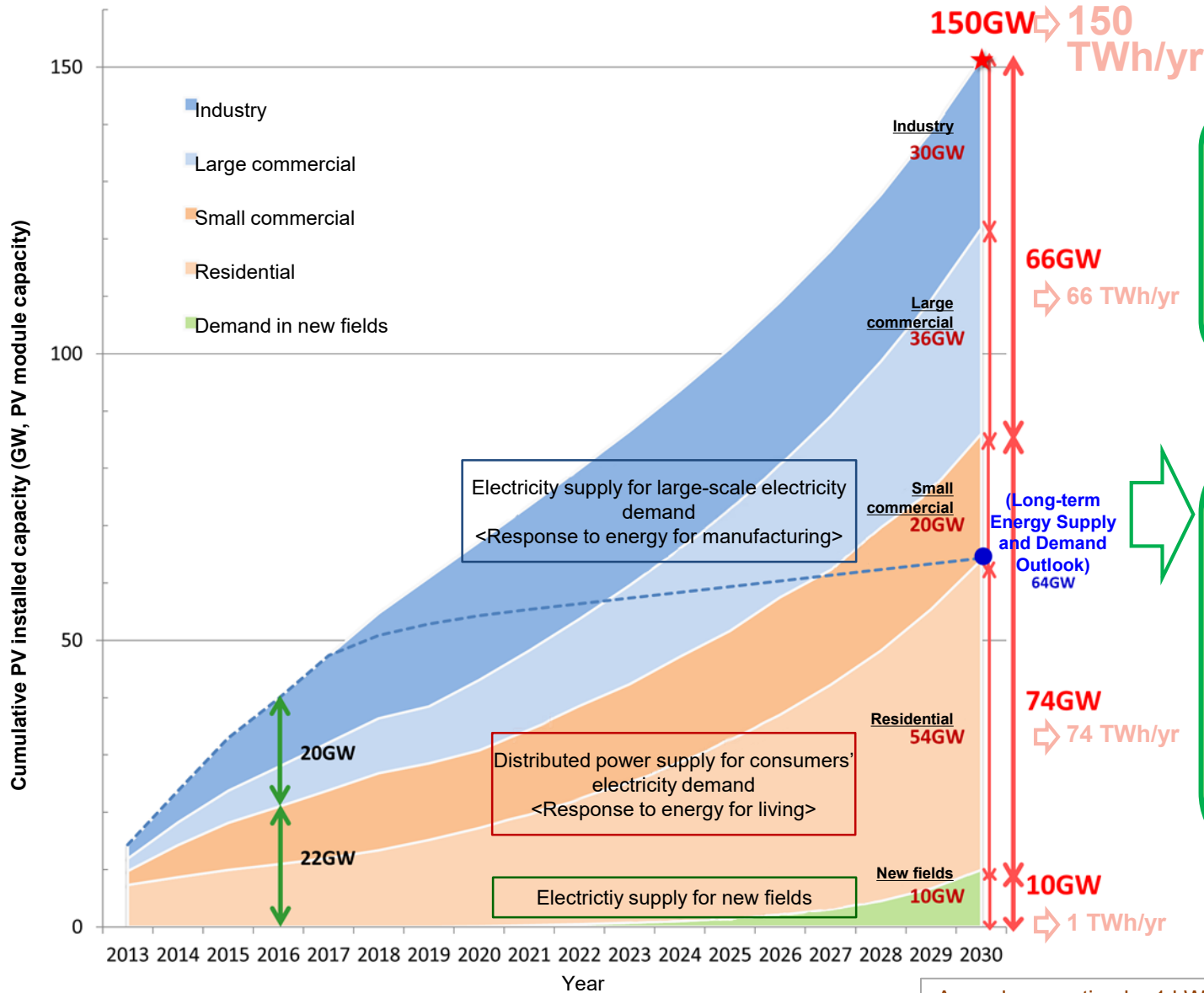


Forecast on PV installed capacity in Japan by fiscal year

(Unit: GW(AC))



RTS's proposal target PV installed capacity toward 2030



- Electricity supply of around 150 TWh/year accounting for 15% of Japan's total electricity demand
- PV can sufficiently play a role as a mainstream energy source

- Promoting transition of energy supply-demand structure
- Leading the world through the establishment of a decarbonized society
- Encouraging capital investment by private sector
- Improvement of international competitiveness of the PV industry

Annual generation by 1 kW of PV module is assumed to be 1,000 kWh.

Source: "Recommendation for development of the PV industry (PV150) A standard-bearer 'PV power generation' in the era of great energy transition - Aiming to achieve 150 GW installation in Japan in 2030-" (Feb. 2018) published by RTS Corporation

***Thank you for your kind
attention !***

感谢您的关注

끝까지 경청해 주셔서 감사합니다

ご清聴ありがとうございました

More detailed information of Japanese PV market by RTS Corporation

“PV Market in Japan 2017”

“PV Activities in Japan and Global Highlights”, Monthly Report

“Forecasting PV Installed Capacity in Japan toward FY 2020 and FY 2030 (2017 Edition)”

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