

Japan's Energy Market Reform

Full Retail Choice In Electricity Market

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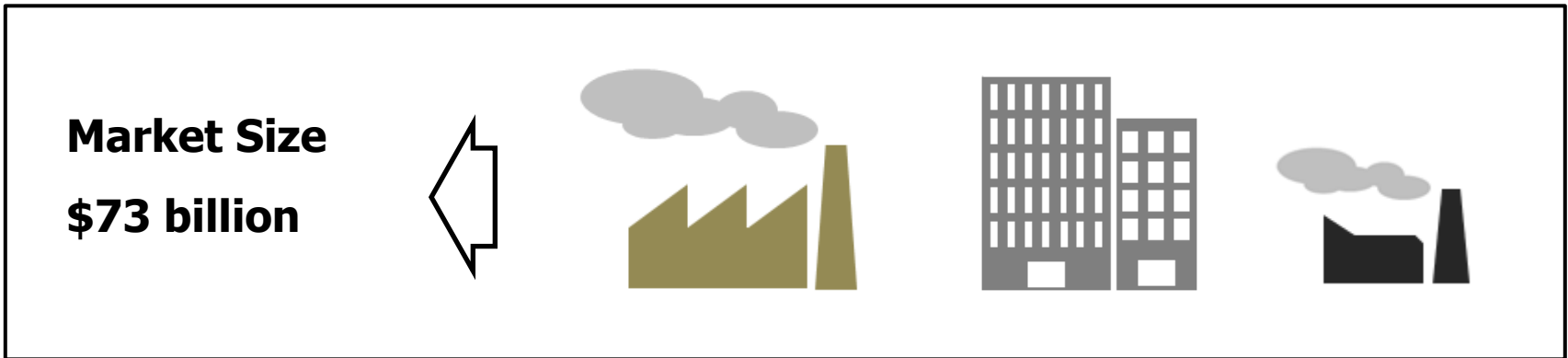
JETRO

Japan External Trade Organization

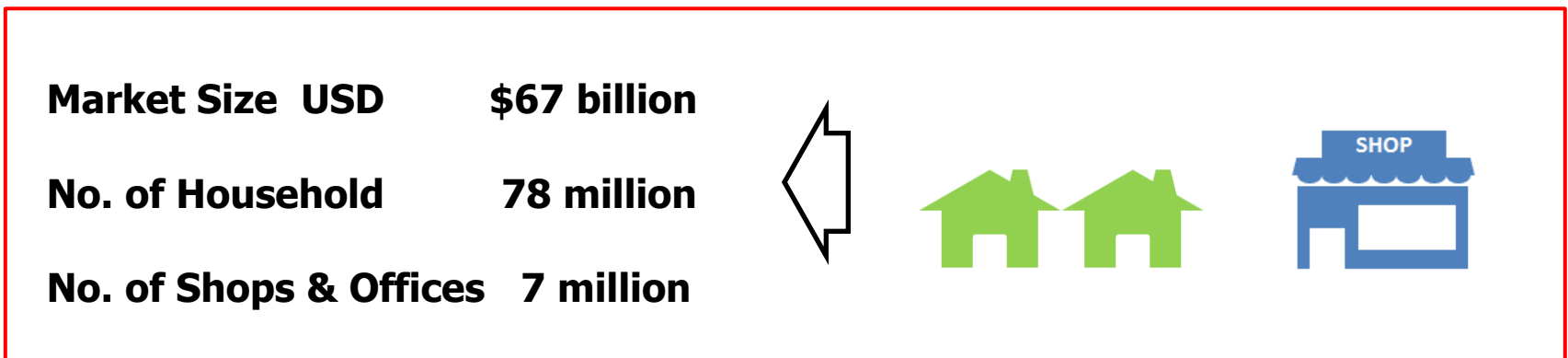
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Liberalized Electricity Market is worth **\$140 billion**

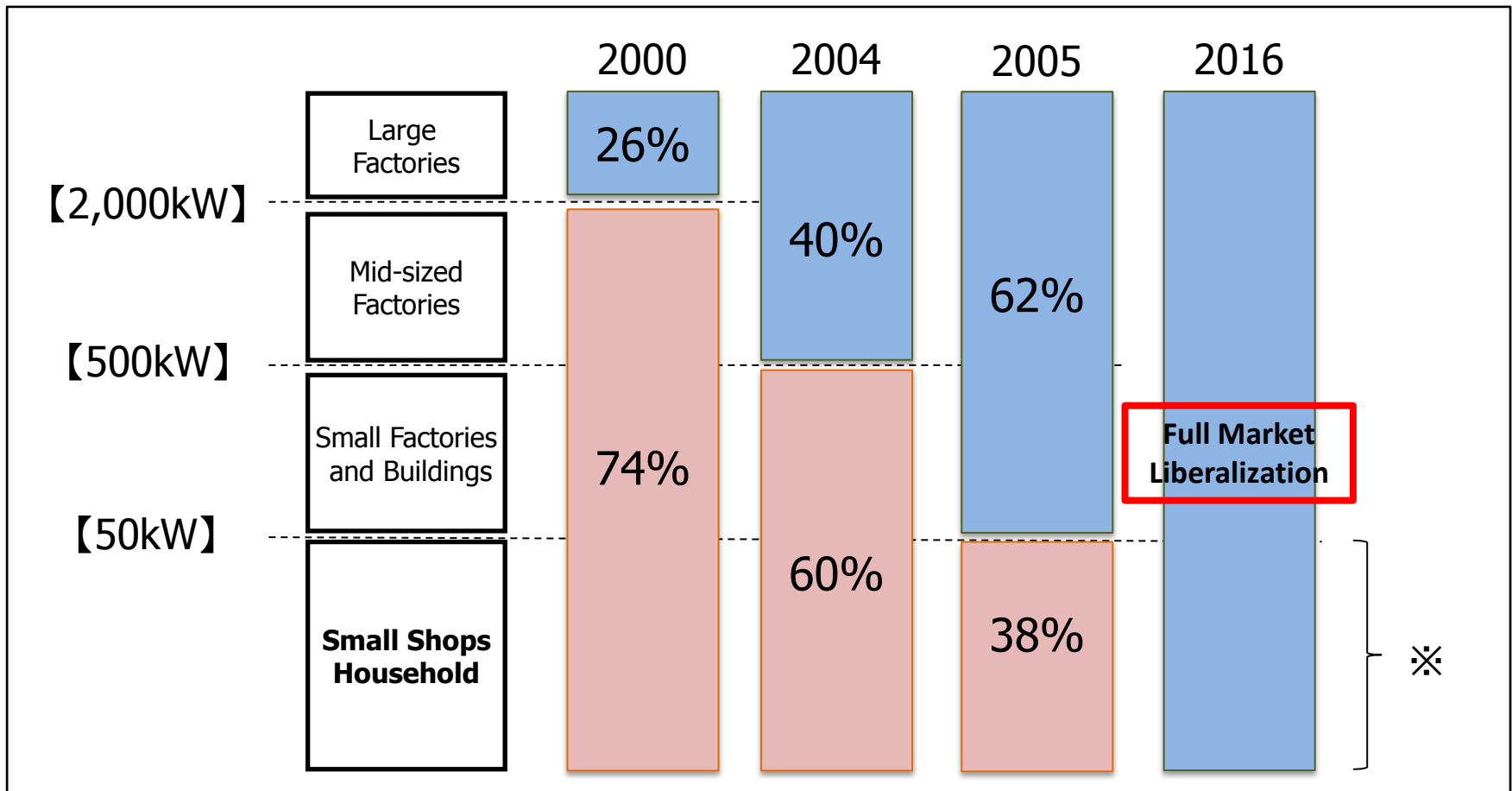
ALREADY LIBERALIZED (Over 50kW)



NEWLY LIBERALIZED



- Partial liberalization started in year 2000
- 62% of the market had been open for competition before April



※ Regulated tariffs will be maintained as an option for customers at least until 2020.

A LITTLE HISTORY

- No competition in the electricity market before 1995
- METI embarked on a series of reforms

No.	Year enforced	Overview
1	1995	<ul style="list-style-type: none">• Opened the IPP (Independent Power Producer) market• Allowed specified-scaled and vertically integrated power generators
2	2000	<ul style="list-style-type: none">• Introduced partial retail competition (over 2,000kW in 2000 [26%], over 500kW in 2004 [40%])• Introduced regulation of third party access to grid lines
3	2005	<ul style="list-style-type: none">• Expanded retail competition (over 50kW [62%])• Established the wholesale power exchange (JEPX) and its supporting body for transmission in wider areas• Improved regulation of third party access to grid lines, and introduced accounting separation of transmission/distribution sector
4	2008	<ul style="list-style-type: none">• Modified the rule of wheeling rates

GOALS OF THE REFORM

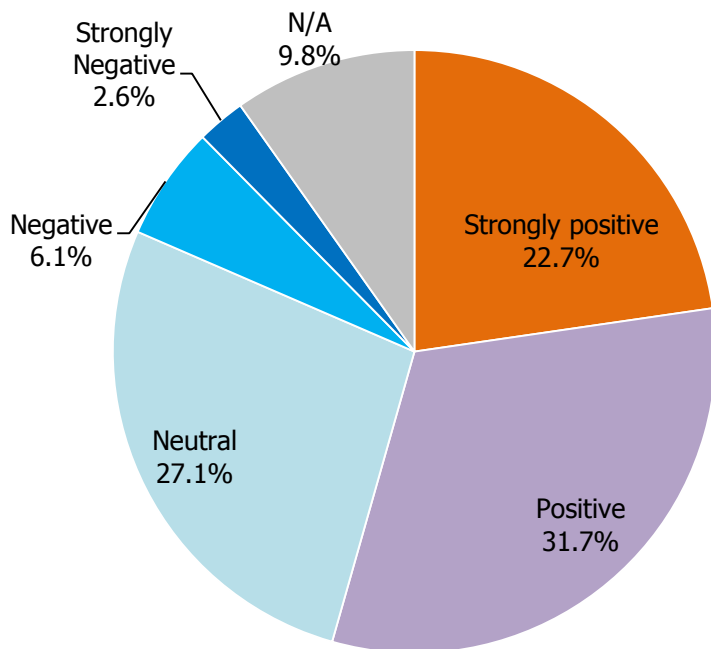
Secure stable supply of electricity by facilitating power interchange between regions

Hold down increasing tariffs as much as possible

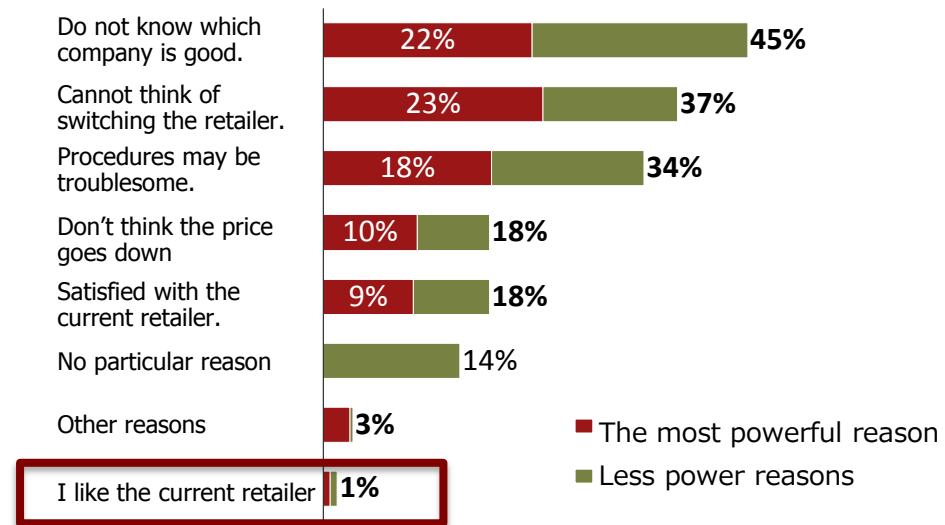
Increase consumer's choice while expanding business opportunities

THE PUBLIC IN JAPAN WANTS REFORM

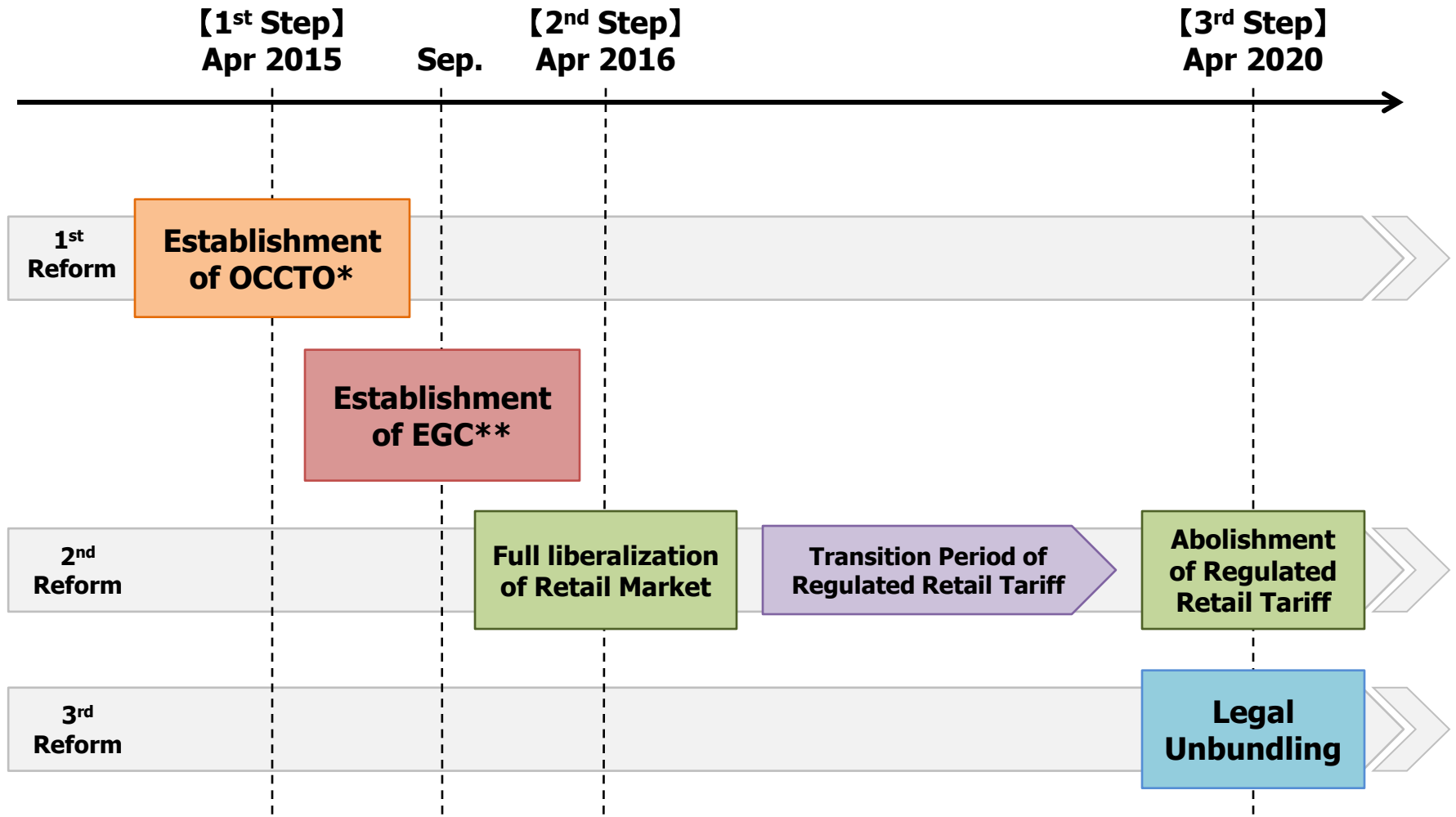
- A 2014 survey conducted by METI resulted in 54% of people wanting to switch their electricity retailer if its fully deregulated
- Among those who do not think about switching, only 1% say they like to current retailer



Reason why you are negative?



ROADMAP FOR ELECTRICITY MARKET REFORM

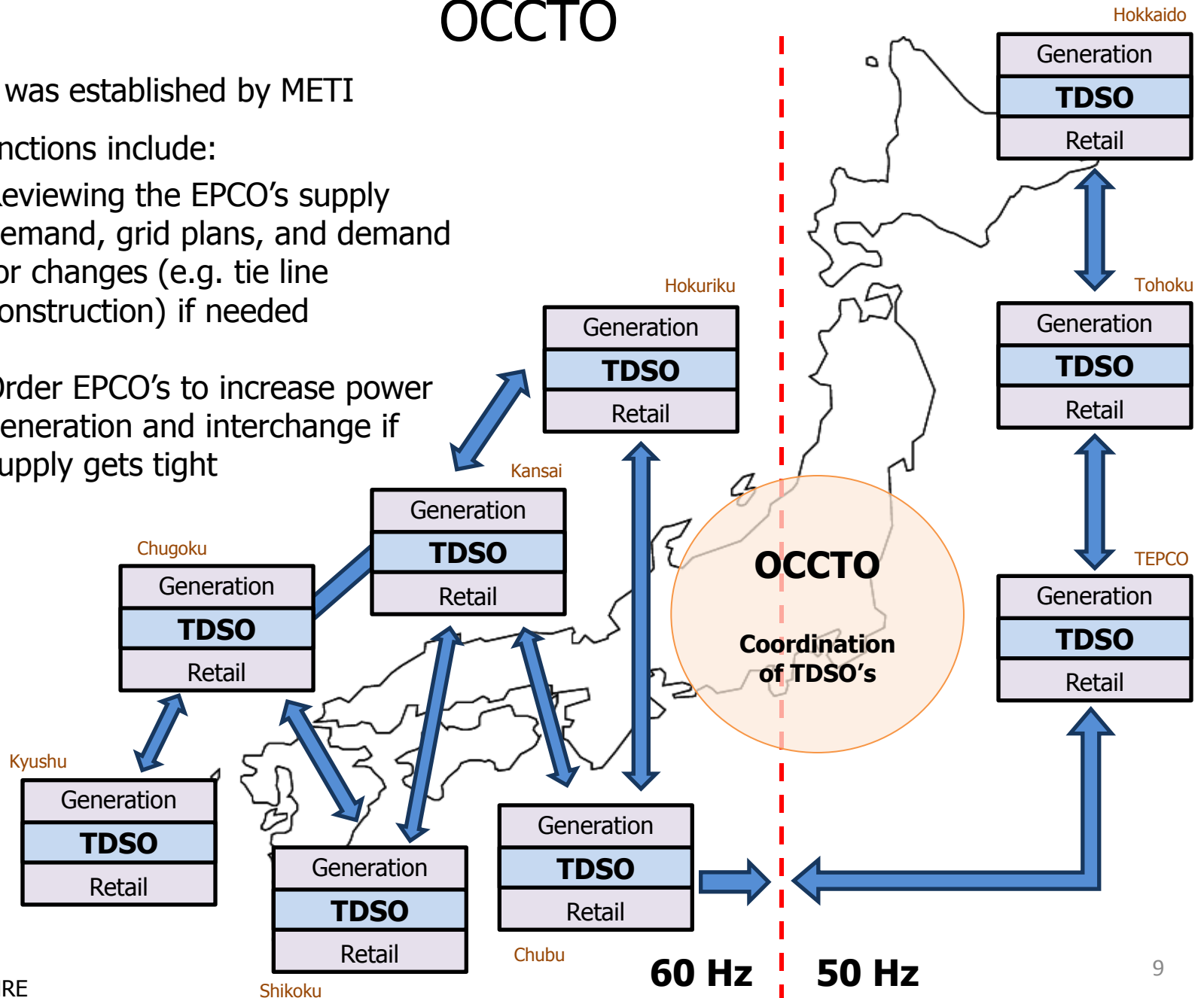


* The Organization of Cross-regional Coordination of Transmission Operators

** Electricity and Gas Market Surveillance Commission

OCCTO

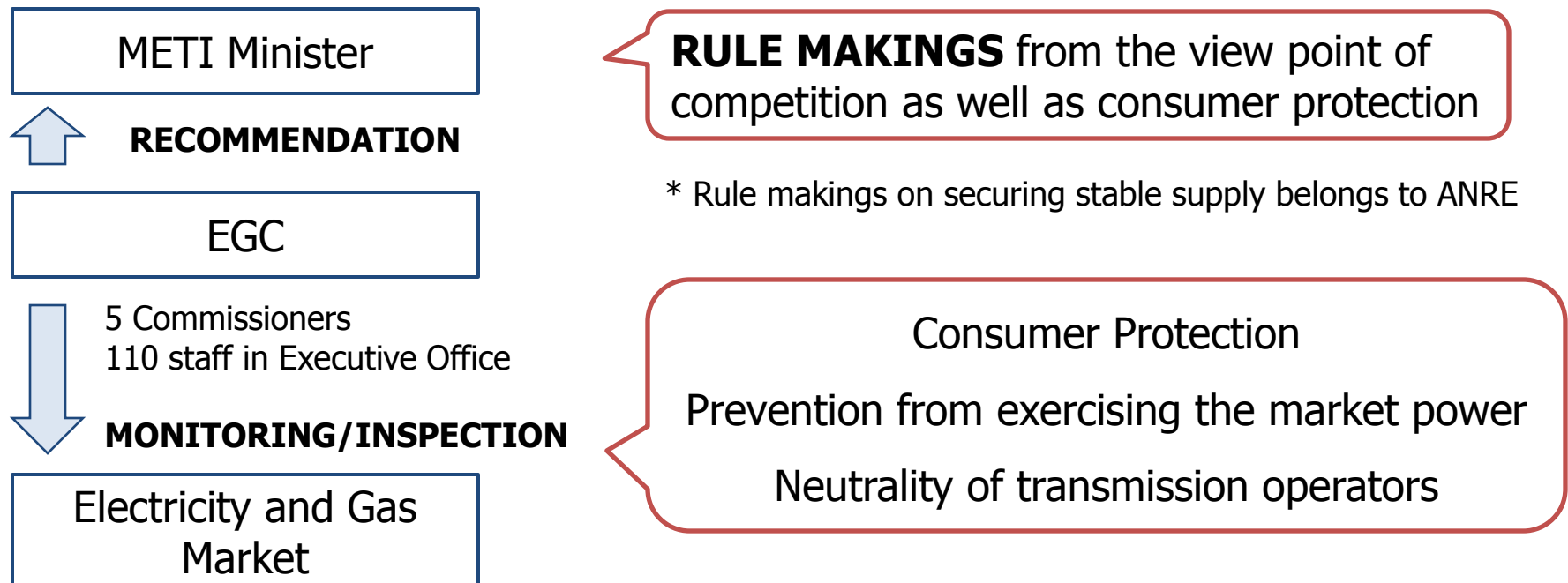
- OCCTO was established by METI
- Main functions include:
 1. Reviewing the EPCO's supply demand, grid plans, and demand for changes (e.g. tie line construction) if needed
 2. Order EPCO's to increase power generation and interchange if supply gets tight



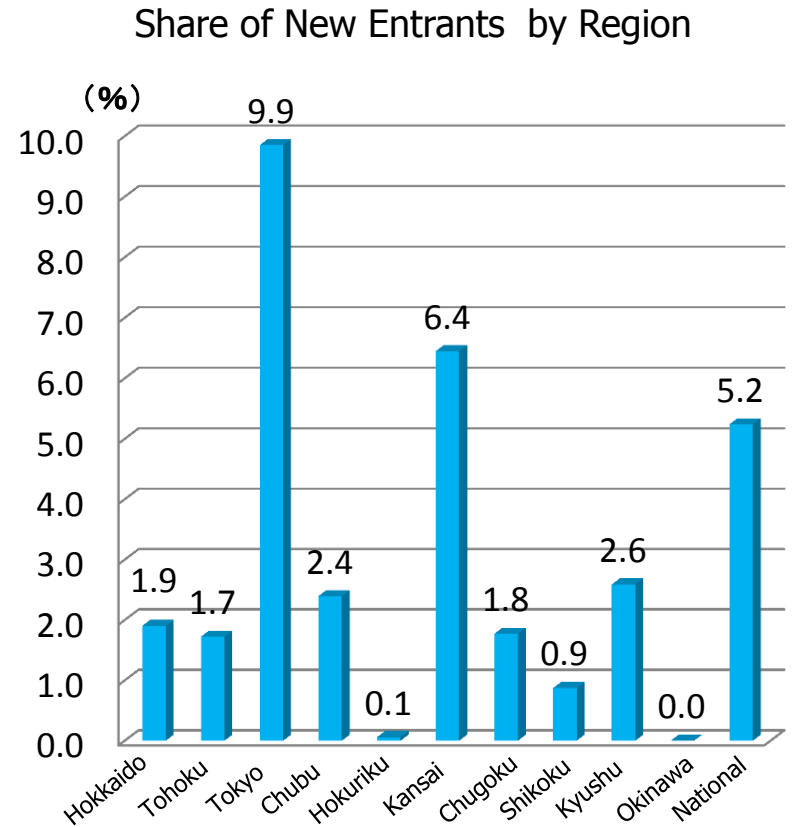
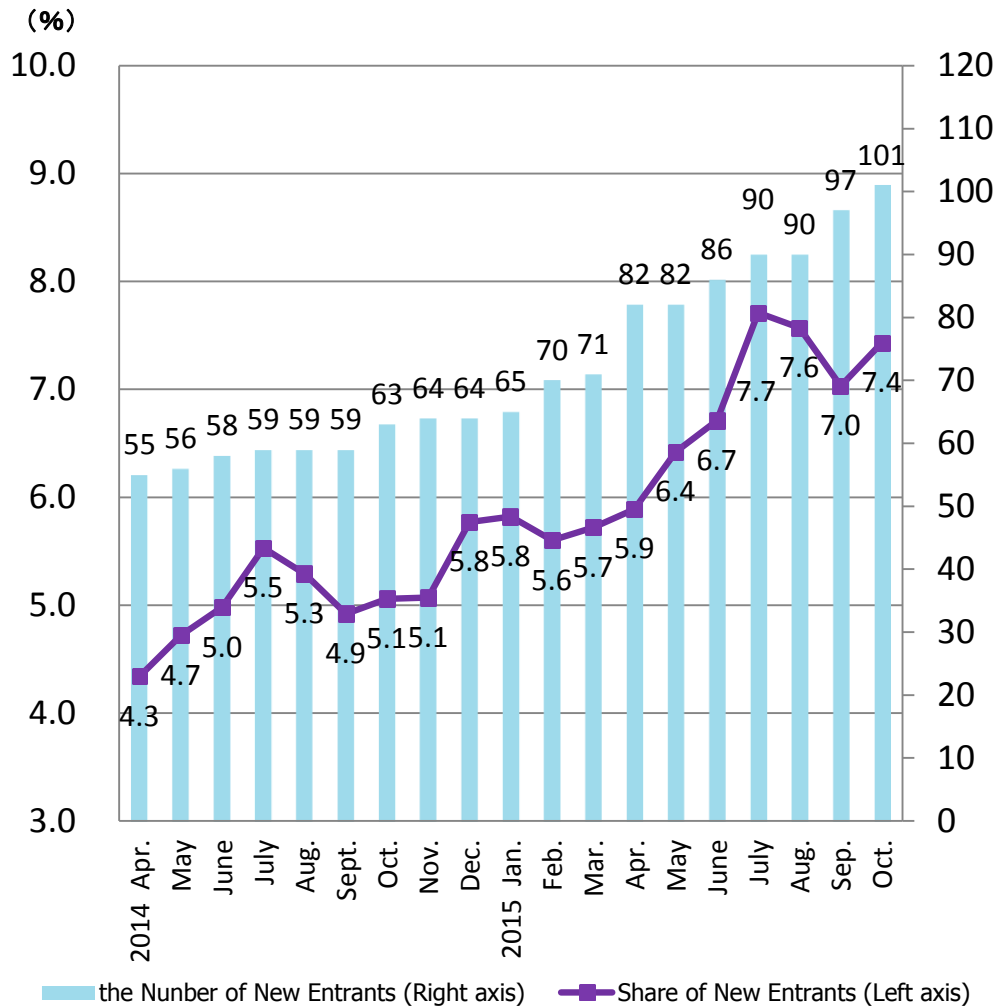
ELECTRICITY AND GAS MARKET SURVEILLANCE COMMISSION

The Commission was established as EMSC in September 2015 in order to urge sound competition in the electricity market

EGC also started to watch gas and heat markets from April 2016



NEW ENTRY TO THE FULLY LIBERALIZED MARKET



POSITIVE SIGNS OF MORE COMPETITION

- Non-EPCO companies announced to enter the power retail market after 2016
 - Gas company : electricity + gas,
 - Telecom company : telecom + electricity, etc.

- Big EPCOs announced to start preparing for offering power retail business in other EPCOs' regions.

- Non-EPCO Companies start making new investments in power generation
 - KOBELCO: 1.4GW (2019-2020), Saibu Gas: 1.6GW (2020), Ohgishima Power: 0.4GW (2016), etc.

- EPCOs promote partnership
 - Tokyo EPCO and Chubu EPCO formed a comprehensive partnership (JERA) to jointly procure fuel, operate related businesses (upstream investment, transportation and trading), construct and replace thermal power plants, etc.

NEW ENTRY TO THE FULLY LIBERALIZED MARKET

Nearly **300** entrants from a variety of sectors already registered as retailers in this market

GAS / OIL

- Tokyo Gas
- Osaka Gas
- JX Nippon Oil
- Tonen General
- Showa Shell
- Idemitsu Kosan

EPCO / PPS

- EPCO's
- Ennet Corporation
- F-Power
- eRex
- Marubeni Mitsui Group

TELECOM / RAILWAY

- Softbank
- KDDI
- J:COM
- Tokyu Power Supply

RENEWABLE / LOCAL / OTHER

- Maniwa Bioenergy
- Green Circle
- Loop
- Local Prefectures
- H.I.S

The FULL list is available on METI's site, however it is in Japanese at the moment.

FOREIGN COMPANIES ALREADY INVOLVED IN THE MARKET

EREX CO., LTD. – SPARK ENERGY

In August 2015, Texas energy company, Spark Energy, formed a strategic partnership with Japanese energy company eRex Co., Ltd, to form eRex Spark Marketing Co. Ltd.

In February 2016, eRex Spark Marketing Co., Ltd. enters a new service agreement with Kanematsu Corporation and Tanita Health Link, Inc. to provide sale of electricity power for residential use.

HITACHI – ABB

In October 2015, Leading power and automation technology group announced the completion of a joint venture company with Hitachi, named Hitachi ABB HVDC Technologies.

Given the need to strengthen and better integrate the different electrical systems in Japan, the use of High Voltage Direct Current (HVDC) transmission is expected to increase, especially in the regional interconnections for transmission grid and grid connections for renewable energy (i.e., offshore wind).

FOREIGN COMPANIES ALREADY INVOLVED IN THE MARKET

SKIPPING STONE - TEPCO

Skipping Stone, an energy consultancy, partnered up with TEPCO to manage its Open Innovation Program, a clearing house for receiving applications to enter Japan's electric energy markets

ITOCHU CORP – GREEN CHARGE NETWORK

In March 2015, Itochu decided to acquire a minority stake in Green Charge Network, a California based company that specializes in energy storage systems, as they see the smart home management system become more common.

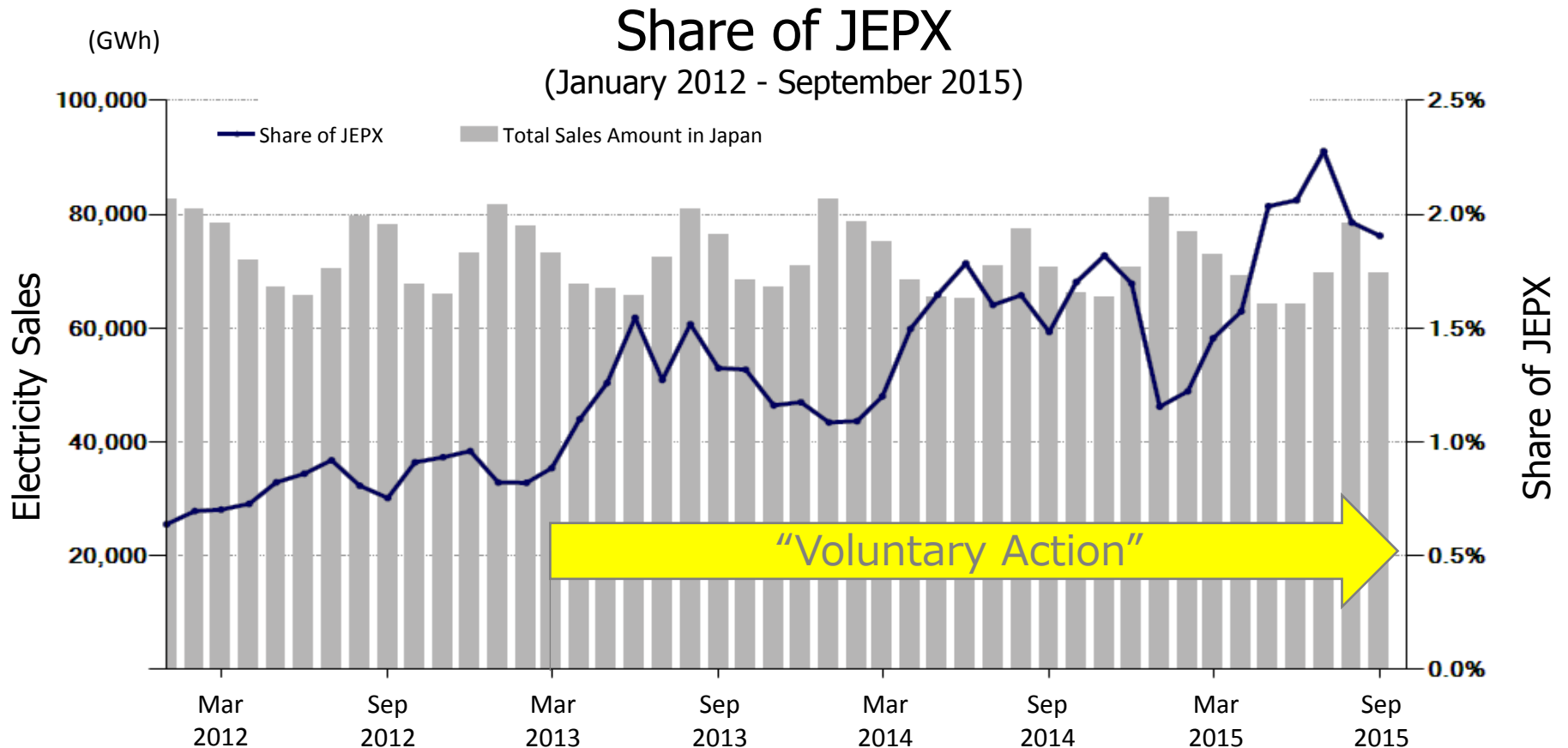
SOLAR POWER NETWORK

Toronto based Solar Power Network entered Japan by designing, operating, building, and operating roof top solar systems in Japan. Having the success with partnering with various Japanese companies, they expect to install approximately 60MW of solar on roof tops.

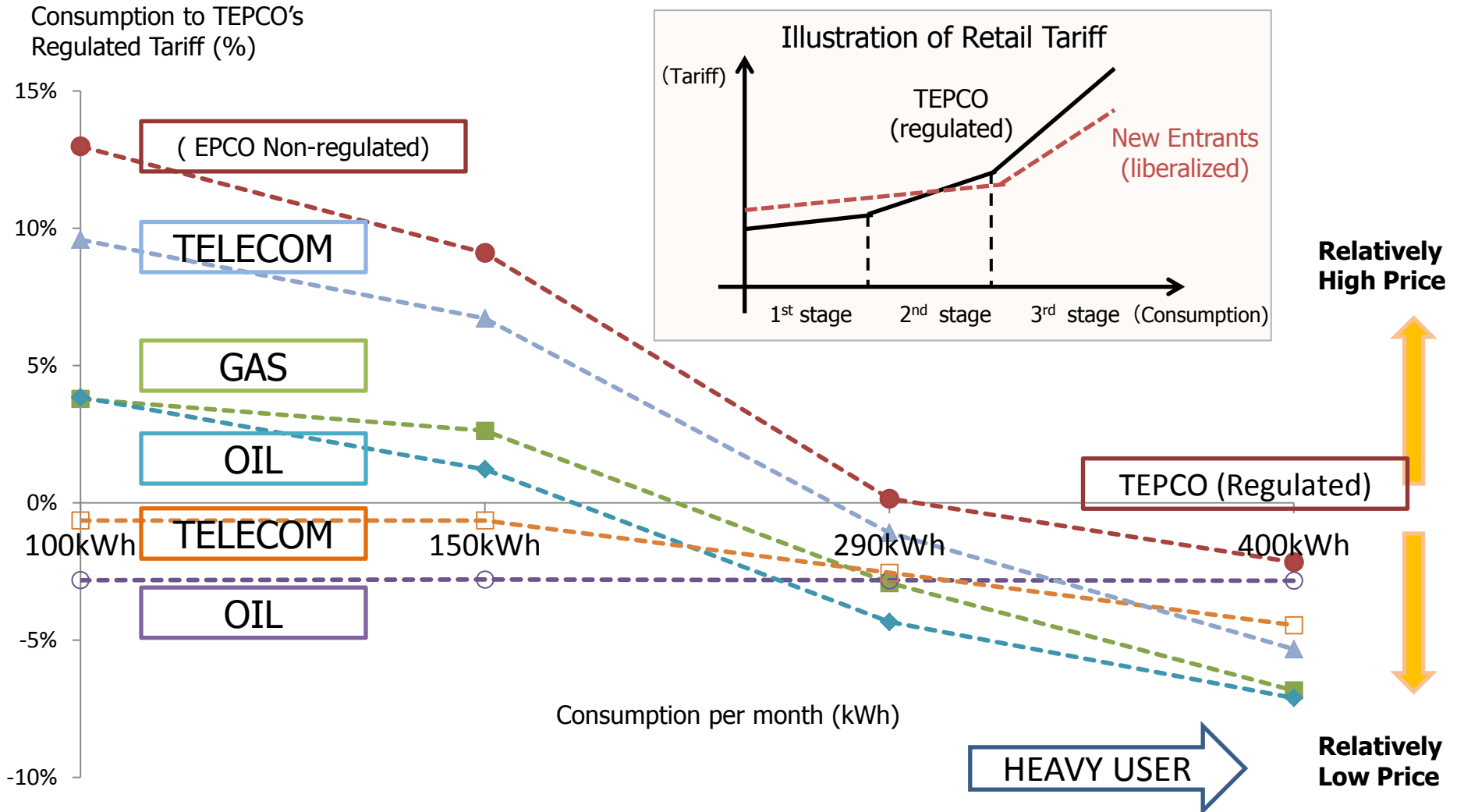
NEW ENTRY TO THE FULLY LIBERALIZED MARKET

2% of total sales amount is traded at JEPX (Japan Electric Power Exchange)

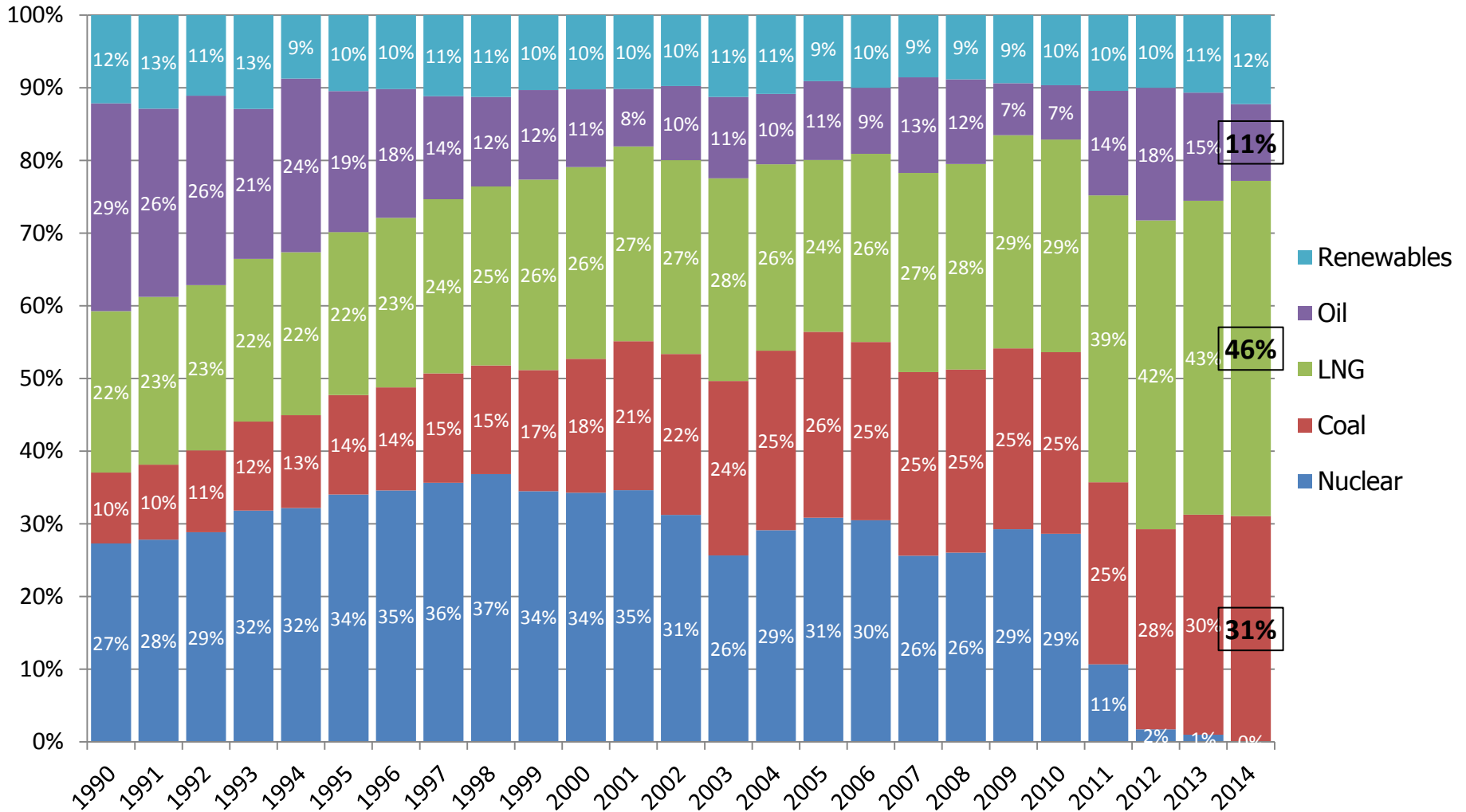
Currently, more than 130 companies are registered to buy or sell with JEPX



COMPARISON OF NEW RATES (TOKYO)



POWER SOURCE COMPOSITION

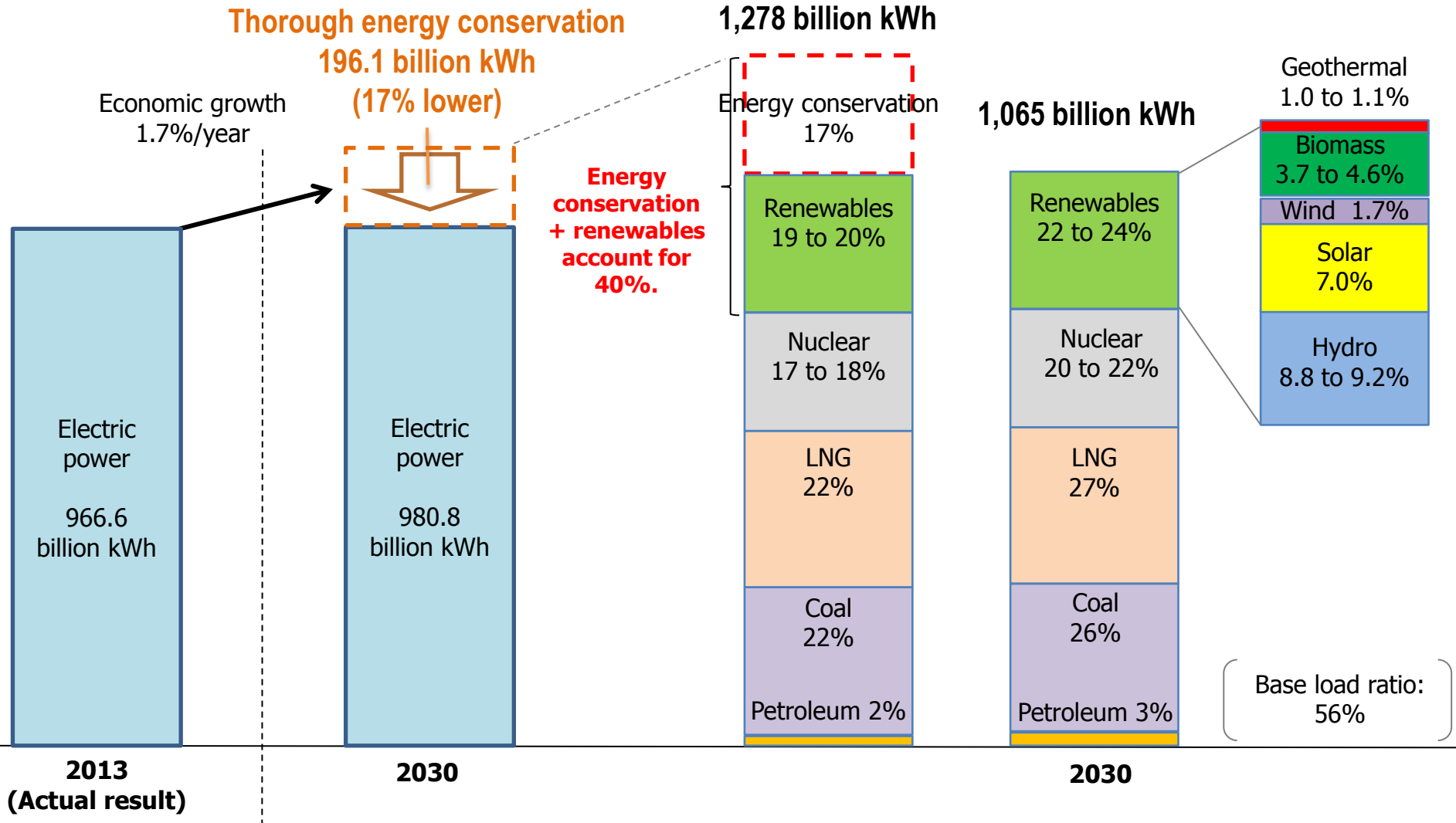


POWER DEMAND AND POWER SOURCE COMPOSITION IN 2030

Power demand

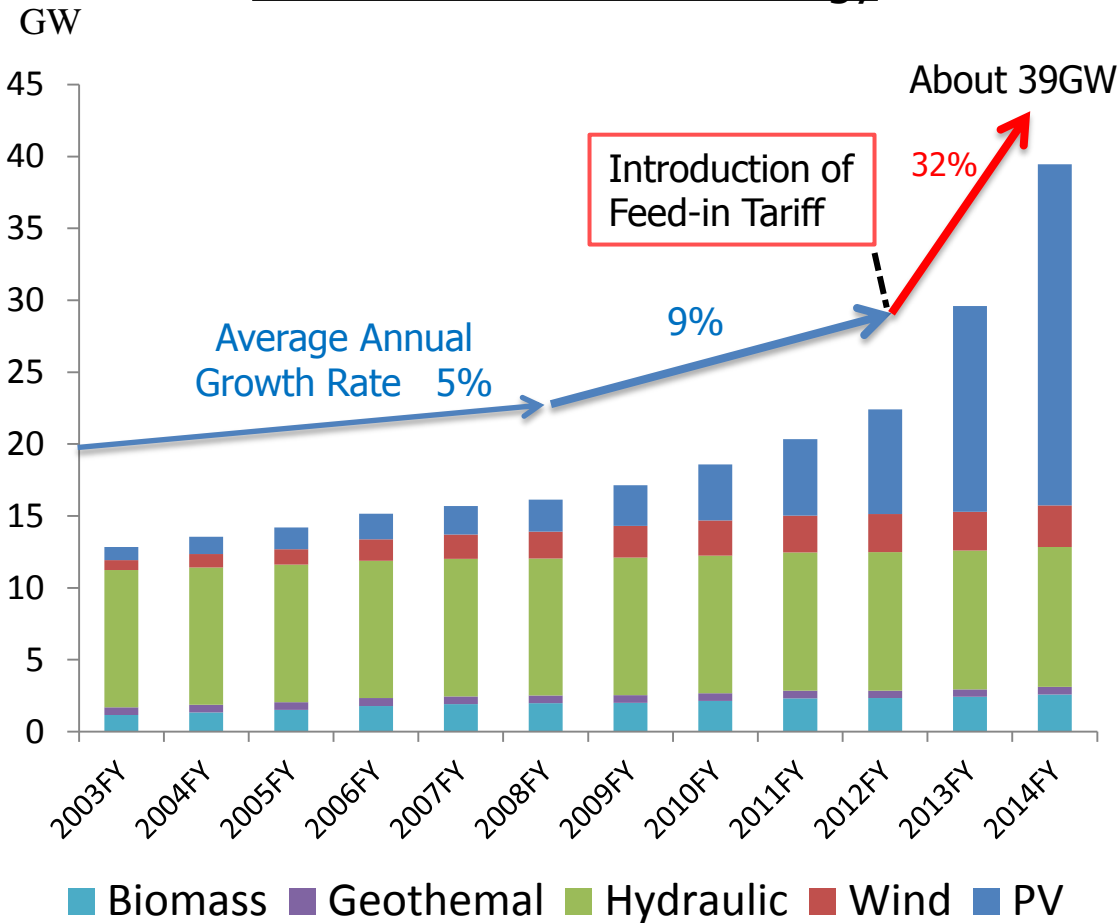
Power source composition

(Total generated energy)



POWER GENERATION BY RENEWABLES

Generated Renewable Energy



	Authorized (up to the end of 2014FY)	Already installed before 2014FY
PV (residential)	3.8GW	3.1GW
PV (non-residential)	78.8GW	15.0GW
Wind	2.3GW	0.3GW
Hydraulic	0.7GW	0.1GW
Geothermal	0.1GW	0.0GW
Biomass	2.0GW	0.2GW
Total	87.7GW	18.8GW

INTRODUCTION SCHEDULE OF SMART METERS

Smart meters will be installed for all customers including households by FY2020 in Tokyo and by FY2024 nationwide.

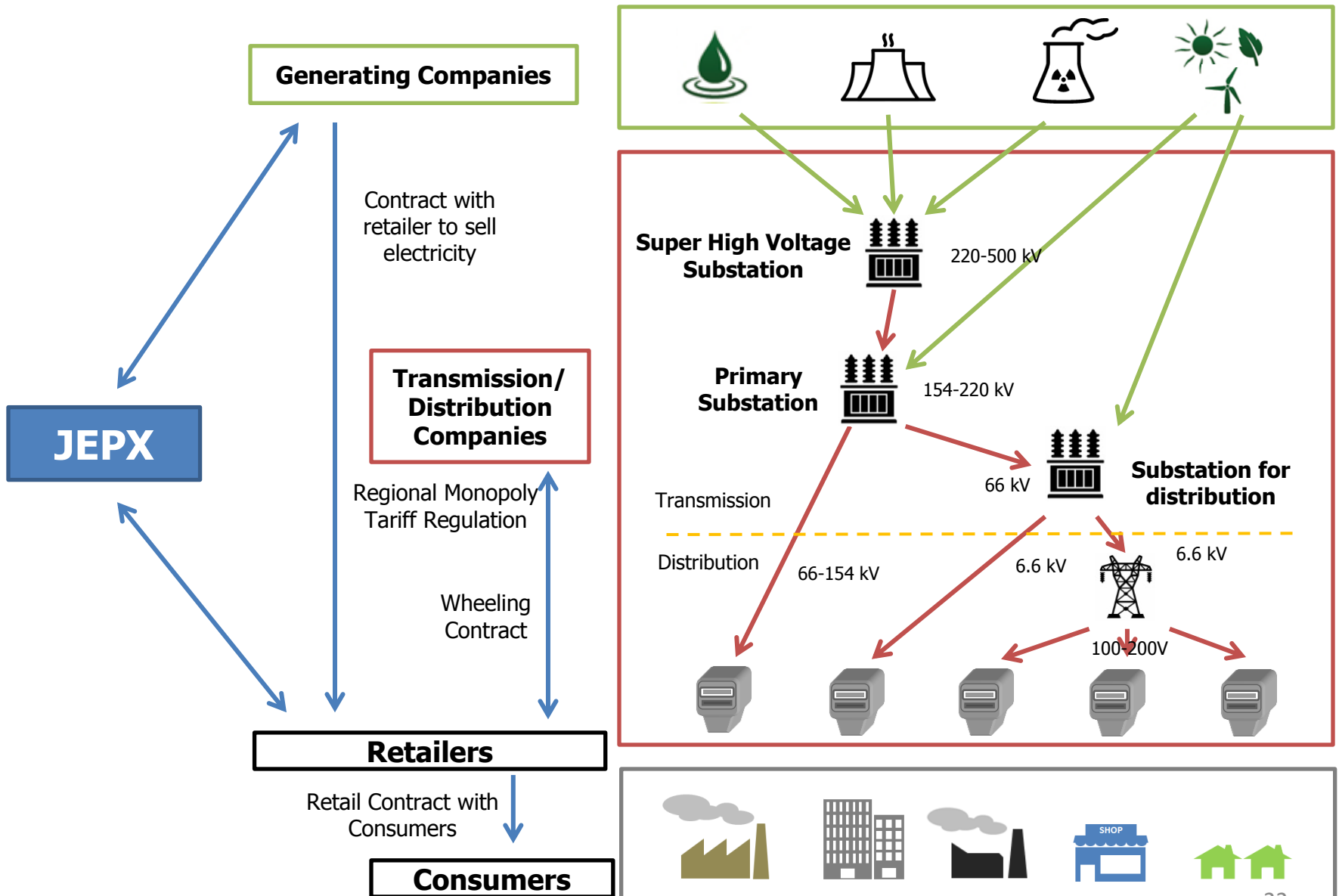
Transmission/distribution companies will install smart meters promptly for customers who switch their retailers or introduce HEMS.



- ✓ Remote metering
- ✓ 30 min. power usage data
- ✓ Remote opening/closing

		Hokkaido	Tohoku	Tokyo	Chubu	Kansai	Hokuriku	Chugoku	Shikoku	Kyushu	Okinawa
High voltage	Installation will be completed in	2016	Completed	Completed	2016	2016	Completed	2016	2016	Completed	2016
Low voltage	Installation will be started in	Started	Started	Started	Started	Started	Started	2016	Started	2016	2016
	Installation will be completed in	2023	2023	2020	2022	2022	2023	2023	2023	2023	2024

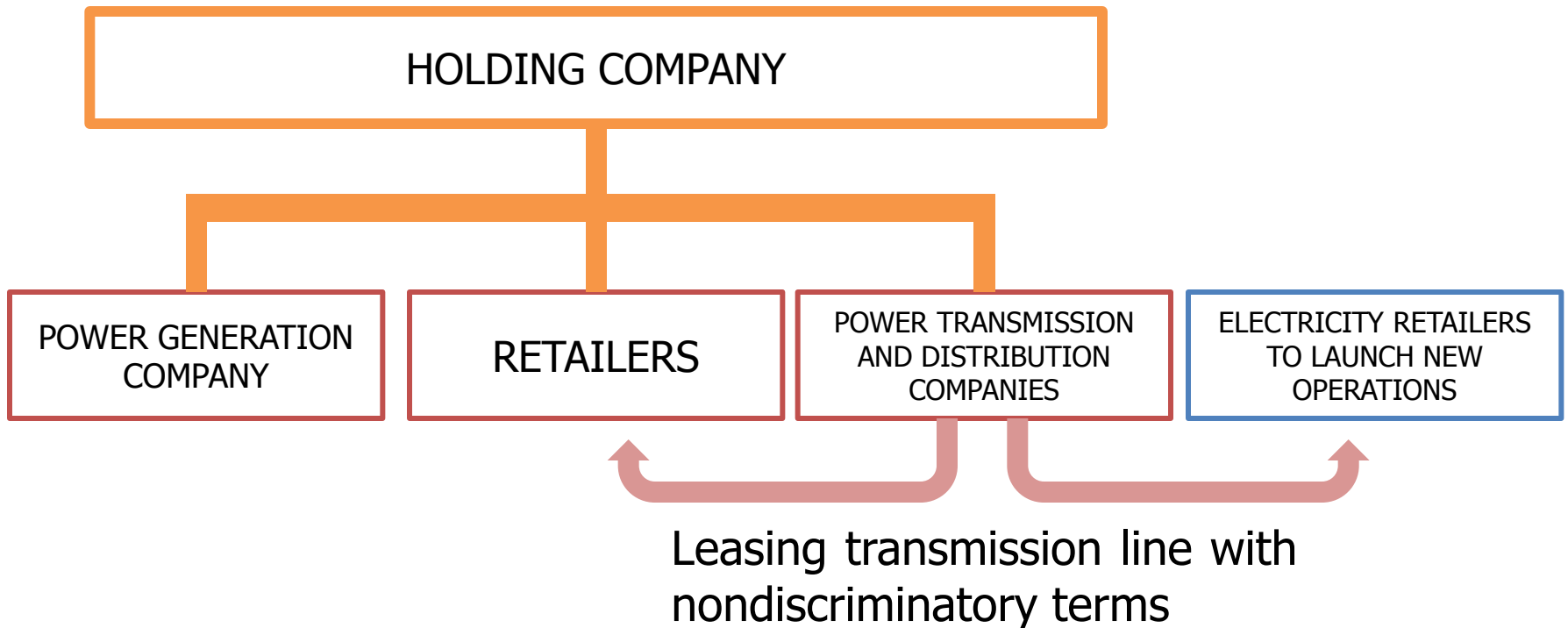
FUTURE DESIGN OF JAPAN'S ELECTRICITY MARKET



Source: METI : ANRE

FUTURE DESIGN OF JAPAN'S ELECTRICITY MARKET

An example of the potential separation of power generation and power transmission to be implemented by large scale electric utilities



RENEWABLE ENERGY OUTLOOK - SOLAR

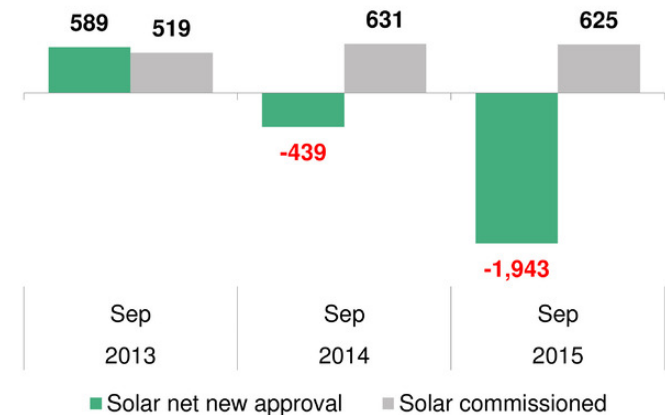
POLICY

On February 22, METI's FiT pricing committee proposed new FiT rates for FY2016. The rate for above 10kW solar has been reduced by 11.1% to JPY 24/kWh.

The latest monthly FiT statistics by METI showed November 2015 had net approved applications of -101MW (-338MW for above 1Mw segment) and commissioned capacity of 718MW.

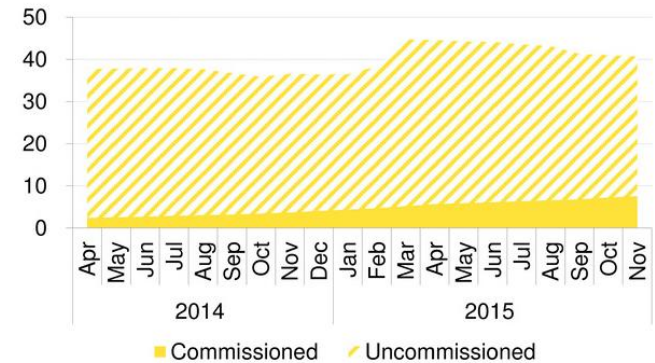
Q4 2015 also saw PV module shipment of 1,765MW, a 21.1% YoY decline.

SOLAR - NEW INSTALLS STEADY AS APPLICATIONS DIP



Source: Ministry of Economy, Trade and Industry, Bloomberg New Energy Finance

1MW+ SOLAR - COMMISSIONED VS. UNCOMMISSIONED CAPACITY (GW)



Source: Ministry of Economy, Trade and Industry, Bloomberg New Energy Finance

RENEWABLE ENERGY OUTLOOK – ALL OTHERS

WIND

November 2015 had -4.5MW of net approved FiT application, only the second time cancellations had overwhelmed new application approvals. Only 4MW was commissioned in November.

In 2016, Bloomberg New Energy Finance expects 459MW of new installations. Japan's installation is likely to peak in 2018 when projects currently under the EIA process start to be commissioned.

Hokkaido leads in wind capacity at 397MW.

Obayashi Corporation considers building 455MW Offshore Wind project off the coast of Northern prefecture of Akita, amid a push by the local government to expand the use of clean energy.

RENEWABLE ENERGY OUTLOOK – ALL OTHERS

BIOMASS

In November 2015, 85MW worth of biomass capacity was commissioned, the largest amount since the FiT programme was launched.

IHI Corporation is promoting a method to increase the ration of woody biomass that's able to burn at coal-fired power plants.

Additional cost on retrofitting mills can be recouped in several years based on the FiT rates for biomass, which haven't changed like solar.

GEOHERMAL

In November 2015, 85MW worth of biomass capacity was commissioned, the largest amount since the FiT programme was launched.

Idemitsu Kosan began construction of a 5MW geothermal power plant in Japan's southwestern prefecture of Oita. The project will be one of the largest binary power plants in Japan.

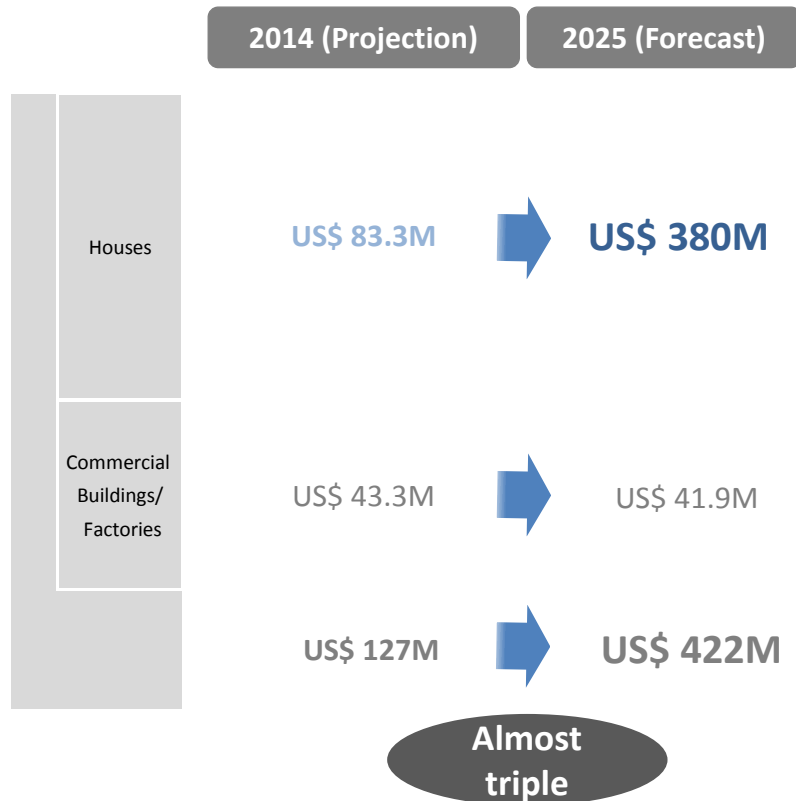
Thank you!
Easy questions please!

APPENDIX

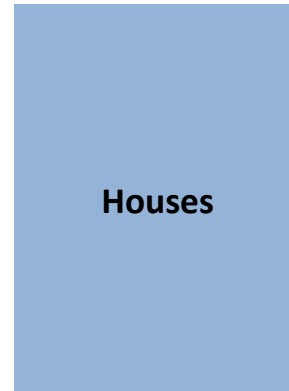
MARKET TRENDS IN ENERGY STORAGE BATTERY

The storage battery market for energy storage use is forecasted to almost triple from the US\$ 127M figure in 2014 to US\$ 422M in 2025. There is an active domestic market particularly for houses.

Forecast Size of the Storage Battery Market for Energy Storage*¹



Examples of Storage Battery Sales and Installations*²



- ✓ Sekisui House started selling houses equipped with storage batteries and solar panels in May 2015. Surplus solar power is automatically stored in the storage batteries for effective use.
- ✓ Hanwha Q Cells announced it would sell energy storage systems for houses in May 2015. Apart from storing surplus solar power, it can also be used to satisfy peak shift demand.



- ✓ Toyosu Foresia (Tokyo) was completed alongside their office and commercial buildings in August 2014. It is equipped with solar panels and storage batteries and is the first large office building in Japan incorporating arrangements to cut peak energy demand.

MARKET TRENDS IN ENERGY STORAGE BATTERY

Demand for storage batteries in the domestic environment is expected to increase in future, along with household demand for solar power and demand for peak shift.

Background

Outlook

Increased demand for household consumption

- The regulation of electricity output was extended to include renewable energies such as solar power and wind power, after electric power companies restricted connection of renewable energy in 2014*¹.
- This system change has increased the risk of not being able to sell electricity.
- The purchasing price will be reduced in stages under Japan's feed-in tariff system. The price of solar power with output greater than 10 kW was reduced on July 2015*¹.

- The risk of not being able to sell electricity will increase due to extensions of the regulation of electricity output and reduction of purchasing price. The demand of solar power which is supposed to be consumed at houses will increase, so overall consumption from households will see a boost. Consequently, increased demand for storage batteries is anticipated.

Increased demand for peak shift

- Electric power companies have introduced night tariffs to increase the night-time demand for electricity.

- If nuclear power plants resume operation, electric power companies will need to secure night-time electricity demand, and the night-time tariff is likely to continue.
- Demand to store cheap night-time electricity for consumption during the day is predicted to increase, so demand for storage batteries will increase.

MARKET TRENDS IN ENERGY STORAGE BATTERY

Many foreign-owned manufacturers are participating in Japan's storage battery industry. There are also potential opportunities for companies that have not already launched in Japan due to the prospective market growth.

Industry Map of the Storage Battery Industry

Foreign-owned companies are highlighted in red

Foreign-owned companies that have already launched in Japan

Manufacture Storage Batteries and Energy Storage Systems

Installation of Each Application

<Storage batteries>

- FDK
 - GS Yuasa
 - JM Energy
 - Asahi Kasei FDK
 - Edison Power
 - Eliiy Power
 - Kawasaki Heavy Industries
 - Toshiba
 - NGK Insulators
 - NEC
 - Panasonic
 - Hitachi
 - Furukawa Battery
 - Mitsubishi Heavy Industries
 - 4R Energy
- Axion Power
 - A123 Systems
 - BYD
 - Ecoult
 - FIAMM
 - GreenSmith
 - IronEdison
 - Kokam
 - LG Chem
 - Maxwell
 - Prudent Energy
 - Saft
 - Samsung SDI
- Silent Power
 - Solar Grid Storage
 - Wanxiang Group
 - Xtreme Power
 - ZBB

<Energy storage systems>

- Kyocera
- Nichikon
- Bosch Power-tec
- IBC Solar

<Automotive storage battery>

- Primearth EV Energy
- Automotive Energy Supply
- Lithium Energy Japan

Manufacture systems for houses

Establishment of joint ventures between automobile manufacturers and storage battery manufacturers

Supply storage batteries to automobile manufacturers

<House constructors>

- Daiwa House
 - Sekisui House
 - Asahi Kasei
- #### <UPS manufacturers>
- Schneider Electric
 - Emerson Network Power
 - Eaton
 - Mitsubishi Electric

<Wireless base station engineering companies>

- NTT Facilities
- DOCOMO Engineering

<Solar and Wind Power system manufacturers>

- First Solar
- China Power Investment
- Vestas
- Siemens

<Electric Power Companies>

- TEPCO
- Kansai Electric Power
- Chubu Electric Power

<Automobile manufacturers>

- Toyota
- Nissan
- Mitsubishi

Refer to the next page for the component industry