The Second International Symposium on Open Energy Systems

Centralized or Distributed?:
The Power System Reformation and Business Chances in Japan
A Case Study in Hokkaido

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Agenda

1. Outline of Power business in Japan
2. Electricity market reformation in Japan
3. Electricity market and its constraints in Hokkaido
4. Our business approach

Photo: Lake Shikotsuko

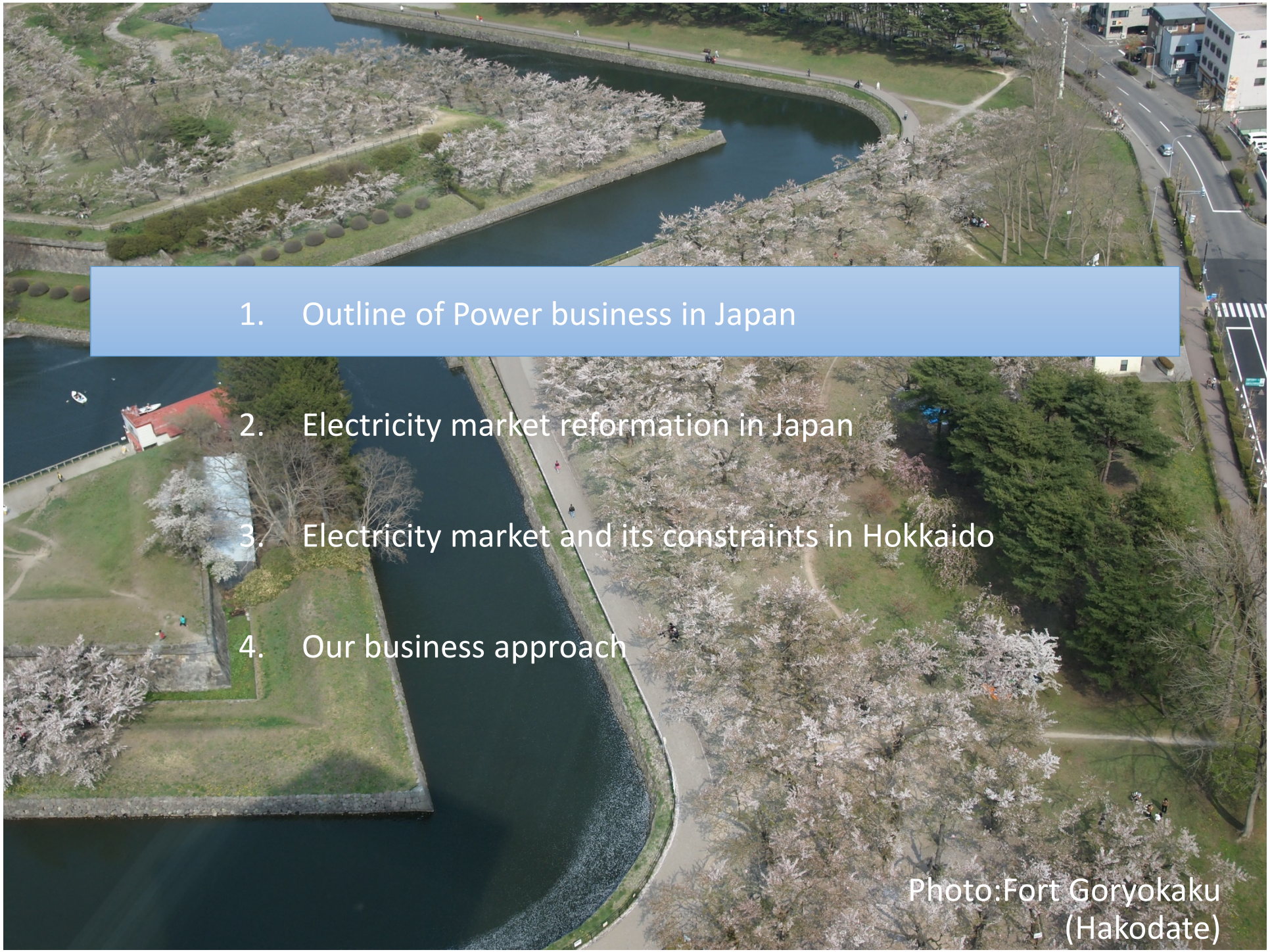
1. Outline of Power business in Japan
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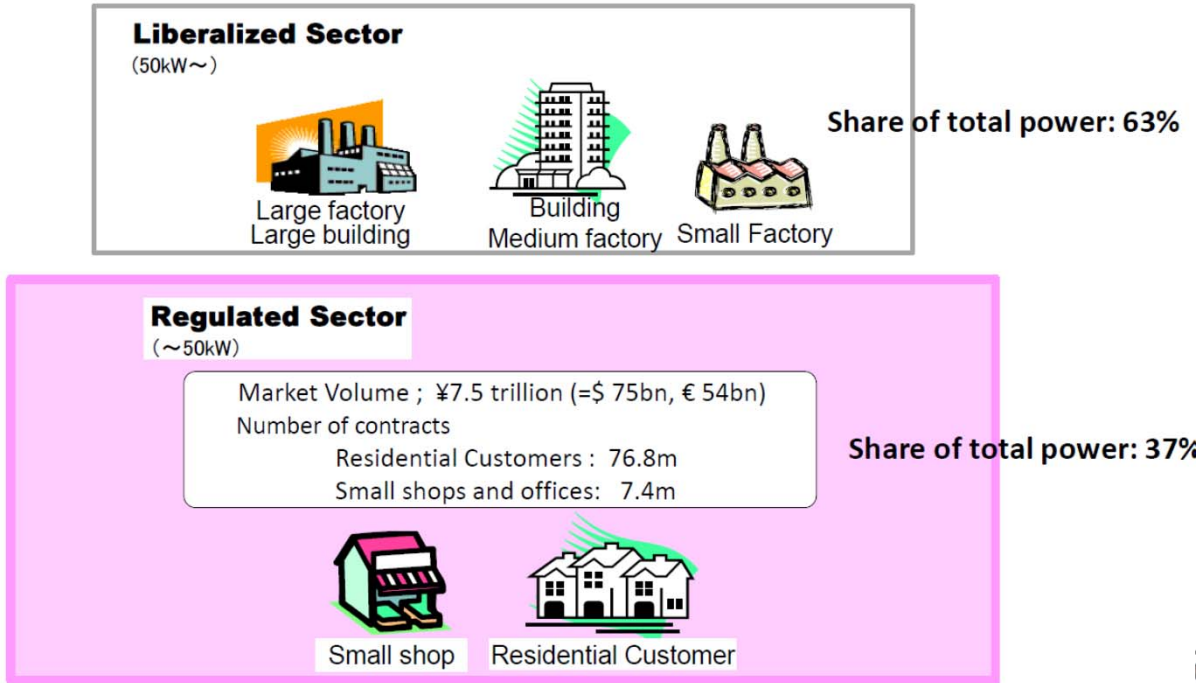
Photo:Fort Goryokaku (Hakodate)

Electricity business outline in Japan

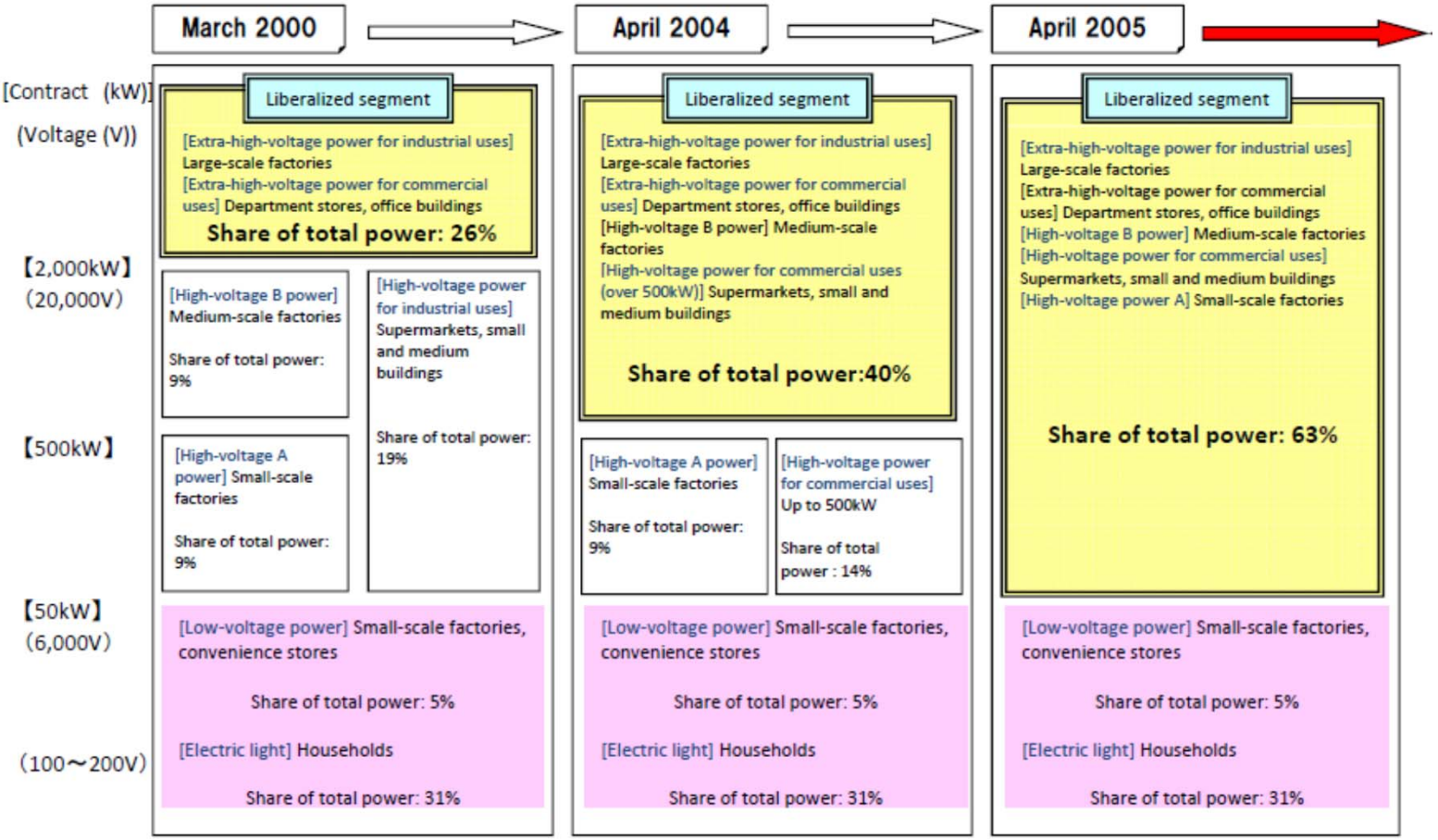
There are 10 Vertically Integrated Power Companies (EPCOs: Electricity Power Company) and New Entrance (PPSs: Power Producers and Suppliers) in Japan electricity market

- Market volume: 1094TWh / 287 GW (2012)
- Retail competition for over 50kW customers (62% of the market in 2013)
  - Share of non-EPCOs: 4.2% (2013)



Electricity market liberation in the past

Gradually liberalized, but new entrances' share remains under 5%.....



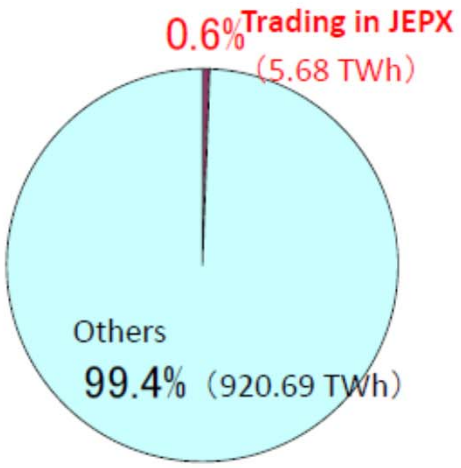
(Note) The scope of liberalization of Okinawa Electric Power Company was expanded in April 2004, from users of power over 20,000kW, 60,000V, to extra-high-voltage power users (over 2,000kW, in principle).

Power market overview

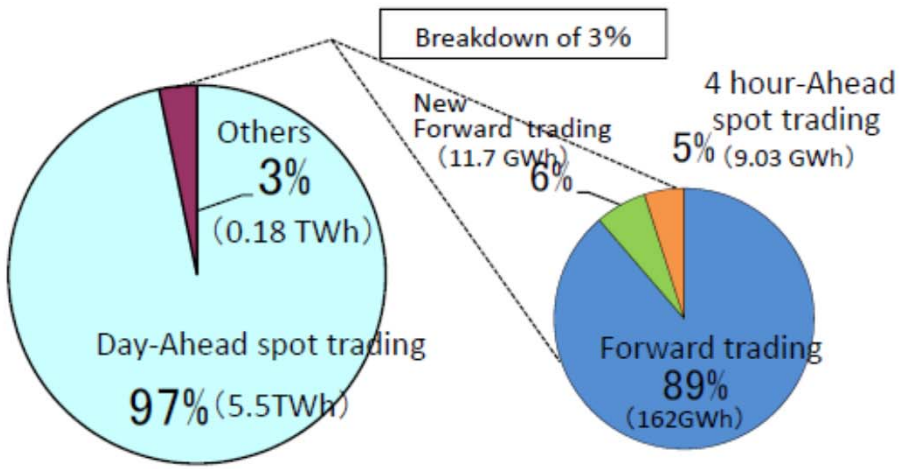
Little use of the current wholesale market (JEPX). Under 1%!!!

Although about 17% of electricity is generated by non-EPCO, but mostly is traded by the long term contract base with EPCOs.

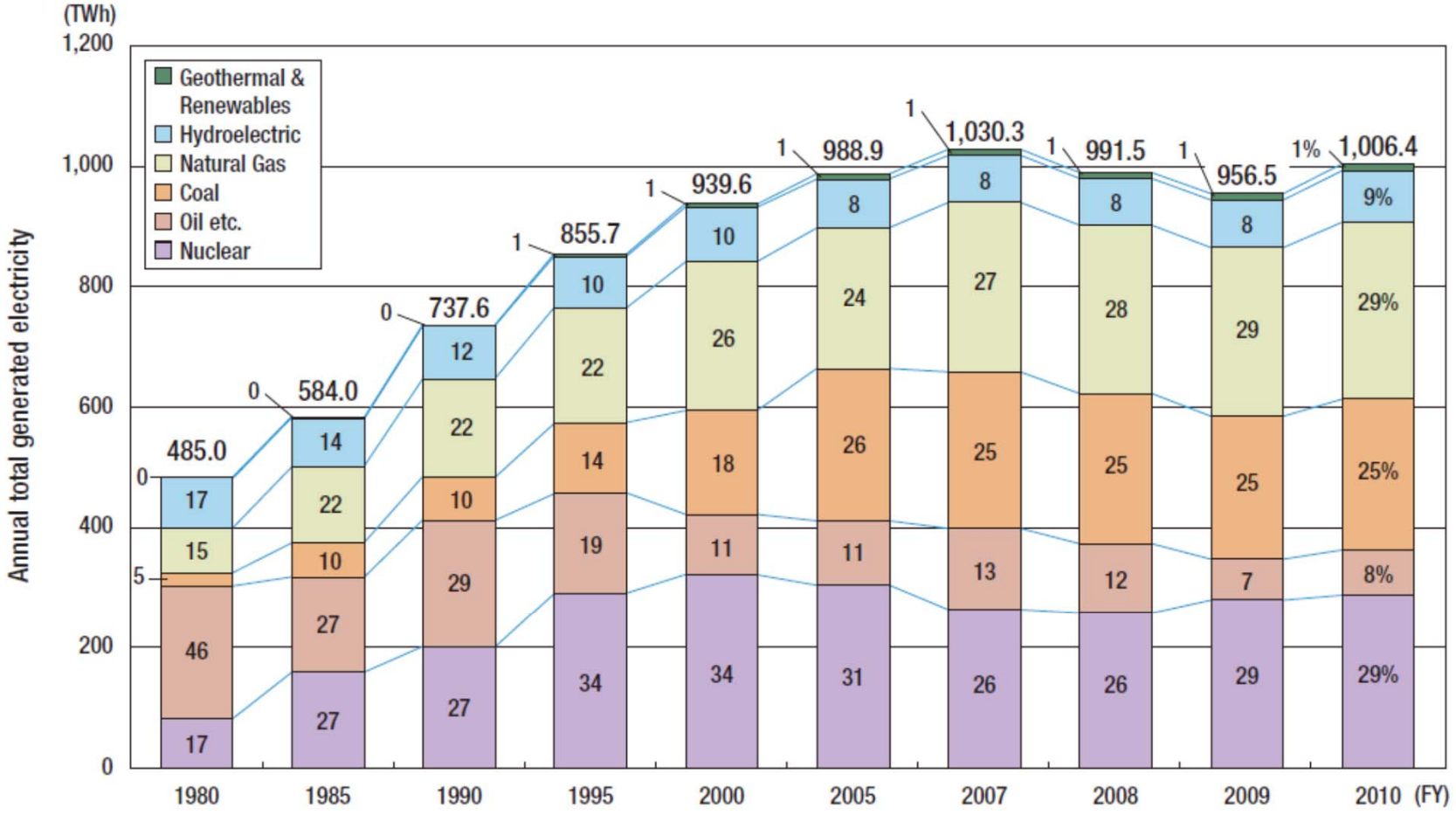
Share of trading in JEPX to retail market sales



Breakdown of trading in JEPX



Power generation outline in Japan (before 3.11)



(Note) Oil etc. includes LPG and other gases.
Figures may not add up to the totals due to rounding.
Total of 10 electric power companies and power purchased.
Figures within the graph represent the composition ratio.

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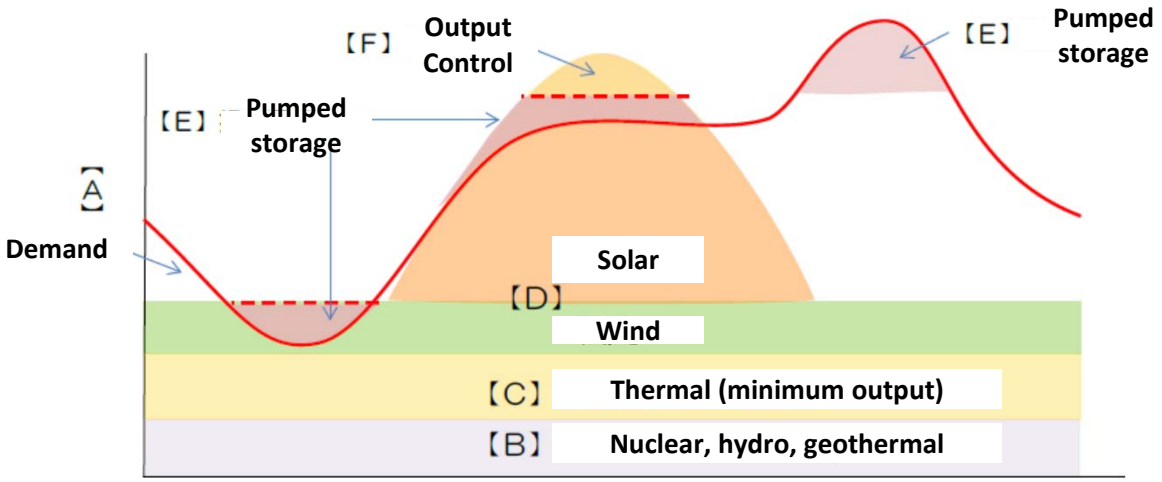
Renewable energy

Many European countries try to use maximum of renewable energy.
But, Japanese EPCO's policy seems to be different……

EPCO'S policy seems……

Transmission	● Transmission is very limited for Wind or PV (because of electric power fluctuation they say) ● No replacement existing Power generation
Demand / Supply	● Maximum use of existing Nuclear plant ● Maintain existing thermal power station (oil, natural gas, coal) No substitution to renewable energies



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To increase introducing renewables

Grid parity

- Home power tariff is about 27yen/kWh
- If PV is used 20 years, it costs 21yen/kWh considering of maintenance cost!!

PPS purchase the generated power

- If the transmission is OK, PPS can purchase generated power.
- Depends on the PPS's policy, not on EPCO's

Conclusion

Vertically Integrated Giants

Renewable energies

Demand side management


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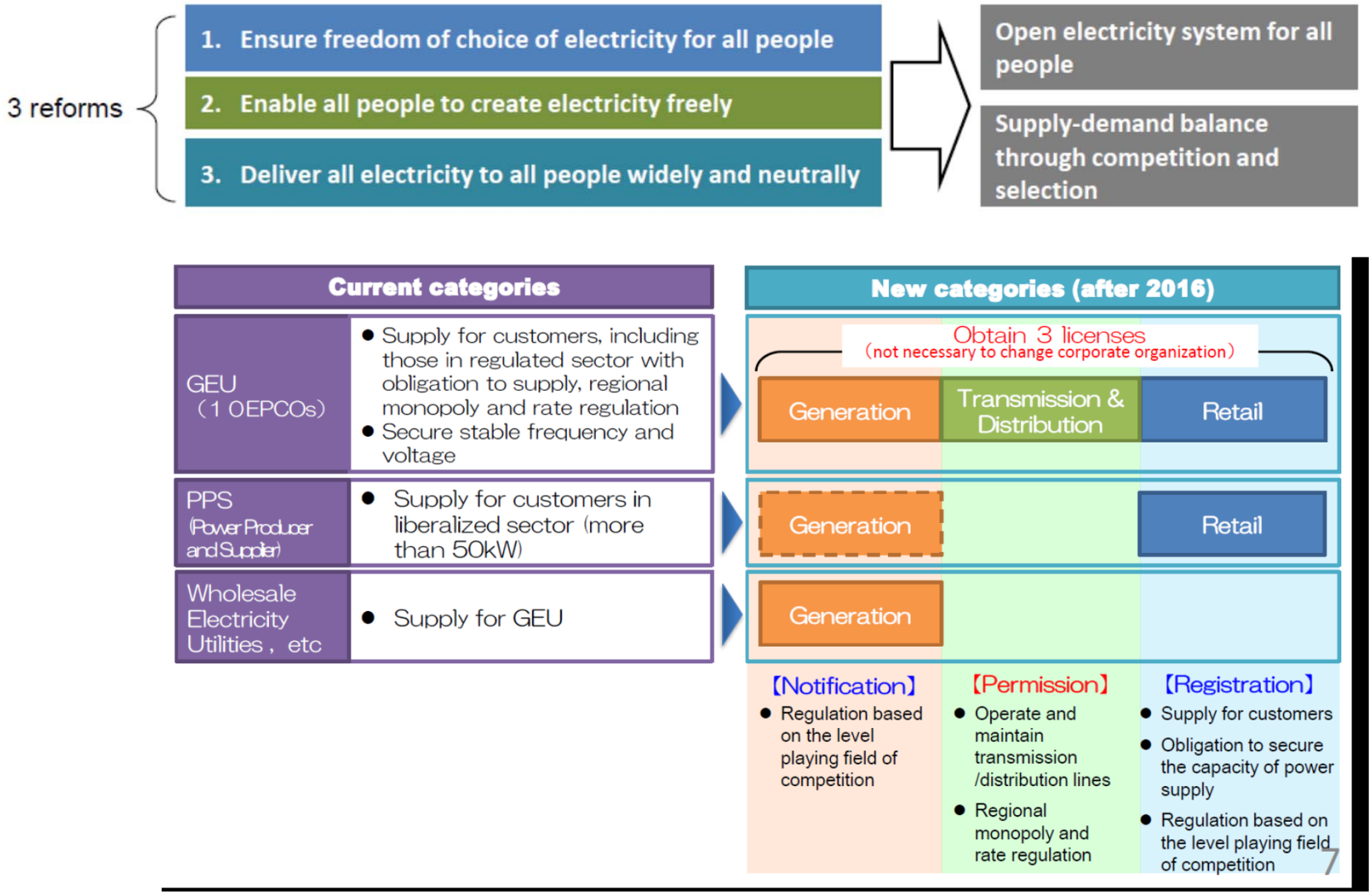
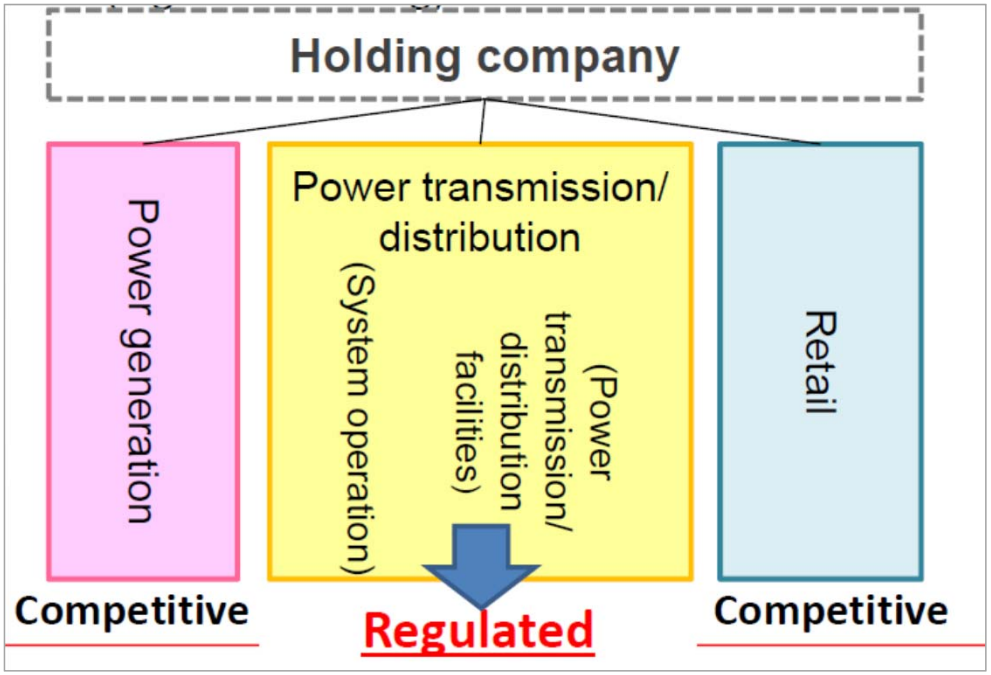
Photo: Moerenuma Park (Sapporo)

Opening electricity market in residential sector



Unbundling

Unbundle the transmission/distribution sectors by TSO-style (legal unbundling) at around 2018-2020



Some issues to be determined

Secure a stable supply

Fair competition

Consistency with Energy basic plan


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Photo: Shakotan Peninsula

Hokkaido

Hokkaido is located at the northern part of Japan.

Area: 83,457.48km²
Population: 5,460,000
House hold: 2,730,000

Compared to European Countries

Denmark	5,676,000
Finland	5,487,000
Slovakia	5,420,000
Norway	5,202,000
Ireland	4,630,000

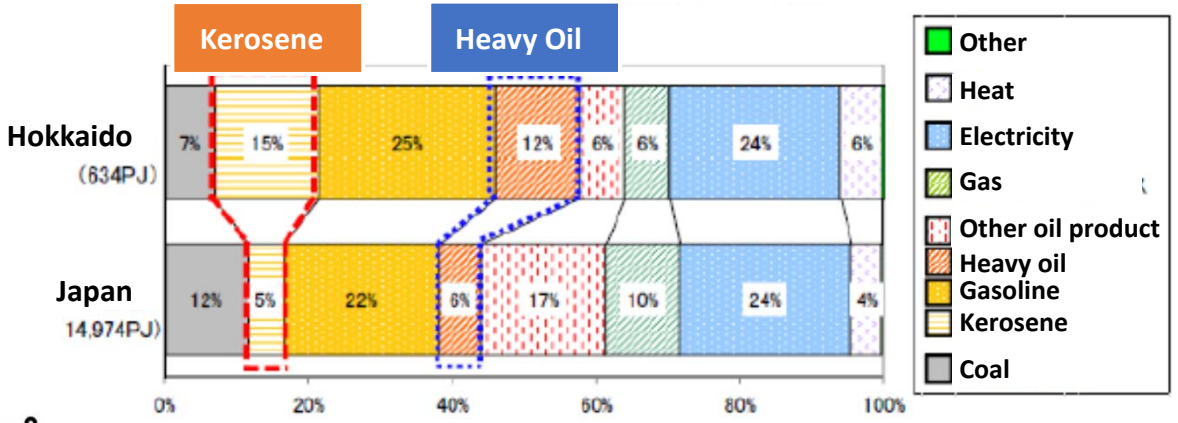
Energy consumption

Home sector's ratio in total energy consumption is bigger than the national average.

Energy consumption by sector (FY 2010) (PJ)

		Japan		Hokkaido	
Industrial use	Manufacture	6,145	41%	148	23%
	Non-manufacture	425	3%	45	7%
General use	Home sector	2,154	14%	135	21%
	Office, store	2,818	19%	115	18%
Transportation	Passenger	2,133	14%	119	19%
	Freight	1,297	9%	72	11%
Total		14,972	100%	634	100%

Energy consumption by type (FY2010)



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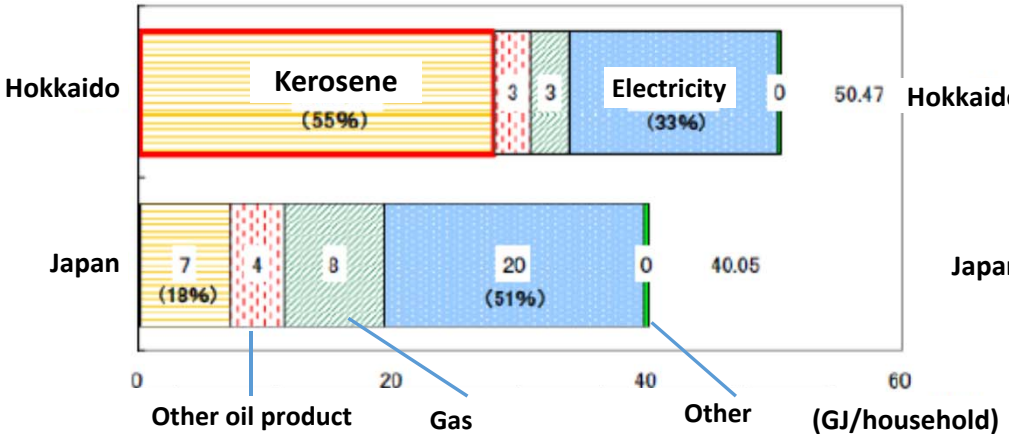
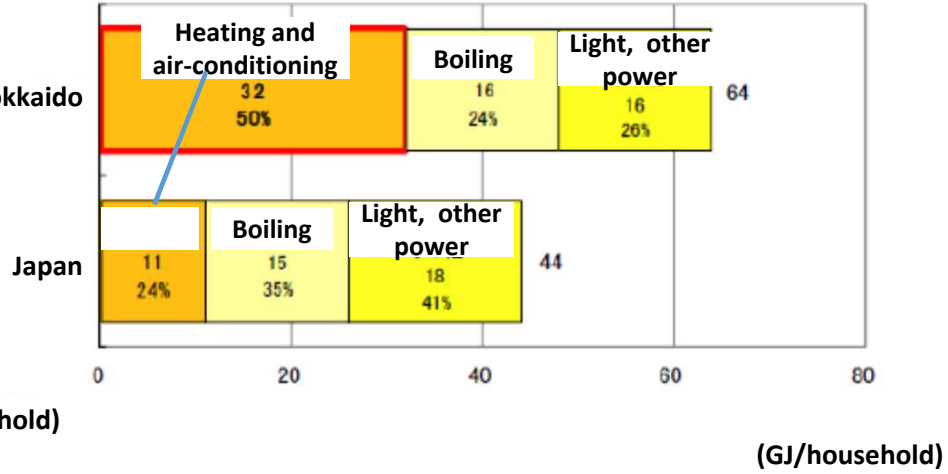
Energy consumption in Home sector

Home sector in Hokkaido uses kerosene over 50%.
Energy usage for heating is over 50%.

Energy consumption by source per household (2010)

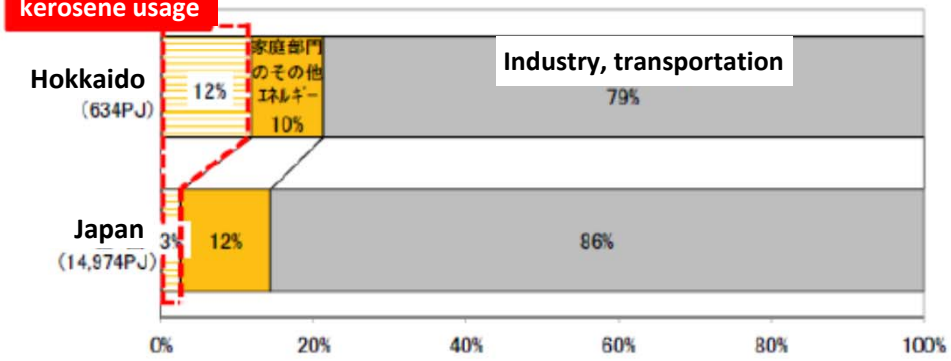


Energy consumption by usage per household (2010)



Home sector's kerosene usage

Home sector's ratio of kerosene usage (2010)



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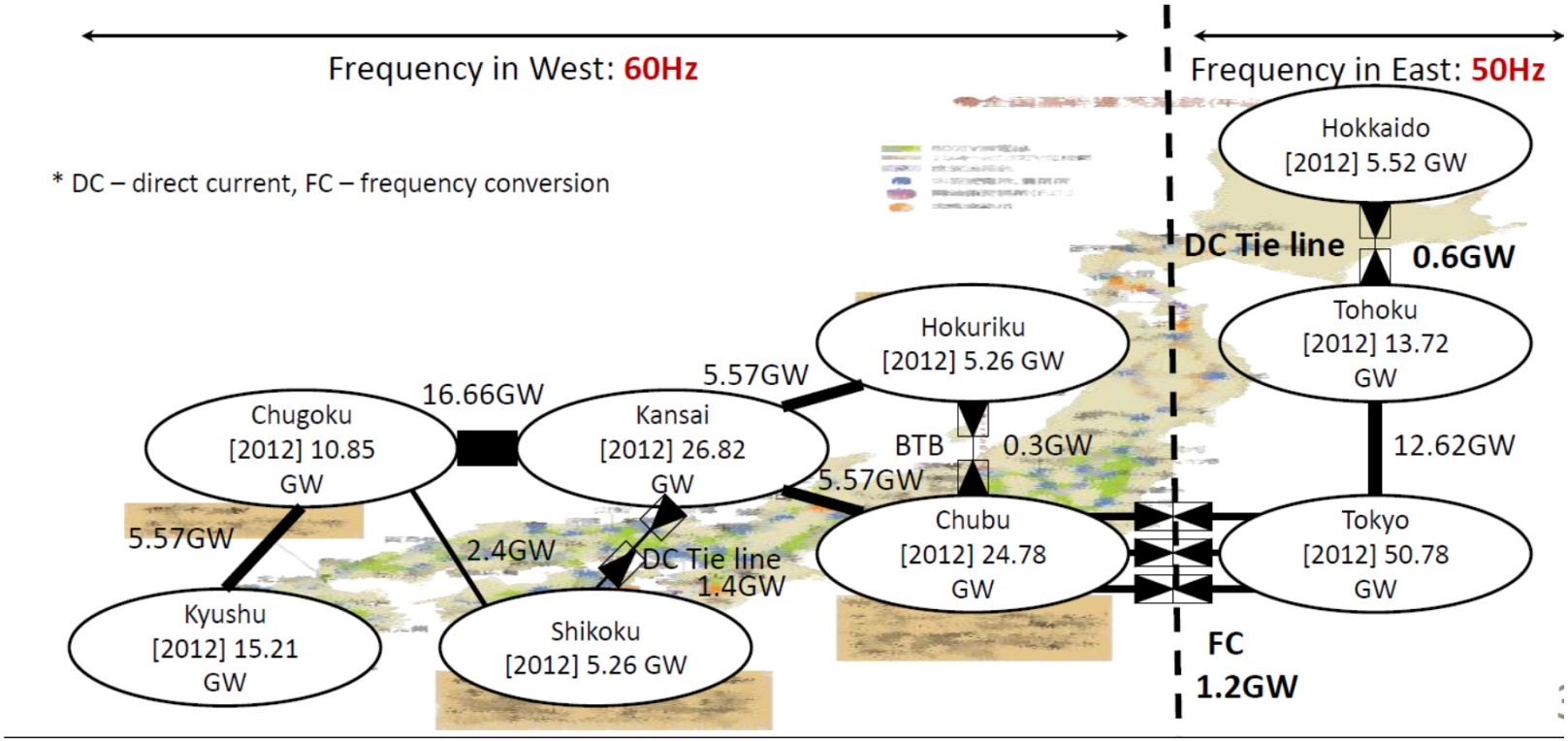
Transmission

Hokkaido is an isolated island in a sense of electricity transmission.

Hokkaido (peak demand: about 5.7 GW) is connected by thin DC line (0.6GW).



Power source (before 3.11)

Hokkaido Electric Power Company generate almost 90% of electricity. Only about 12% is generated by third party. (17% national wide) But over 70% is generated by J-POWER and sold to HEPCO on long-term contract basis.

Power generation by source in Hokkaido

			Sites	Output (MW)	%	Generated Power (%)
Hydro	HEPCO		53	1,238	15%	10.4%
	Others		35	358	4%	4.7%
	Total		88	1,596	19%	15.1%
Thermal	Coal	HEPCO	3	2,250	27%	38.2%
		Others	2	180	2%	2.9%
		Sub total	5	2,430	29%	41.1%
	Oil	HEPCO	8	1,890	23%	18.1%
		Others	5	317	4%	4.3%
		Sub total	13	2,207	26%	22.4%
	Total		18	4,637	56%	63.5%
Nuclear	HEPCO		1	2,070	25%	29.2%
Geothermal	HEPCO		1	25	0%	2.4%
PV	HEPCO		1	1	0%	
Total			109	8,329	100%	100%

* HEPCO = Hokkaido Electric Power Company

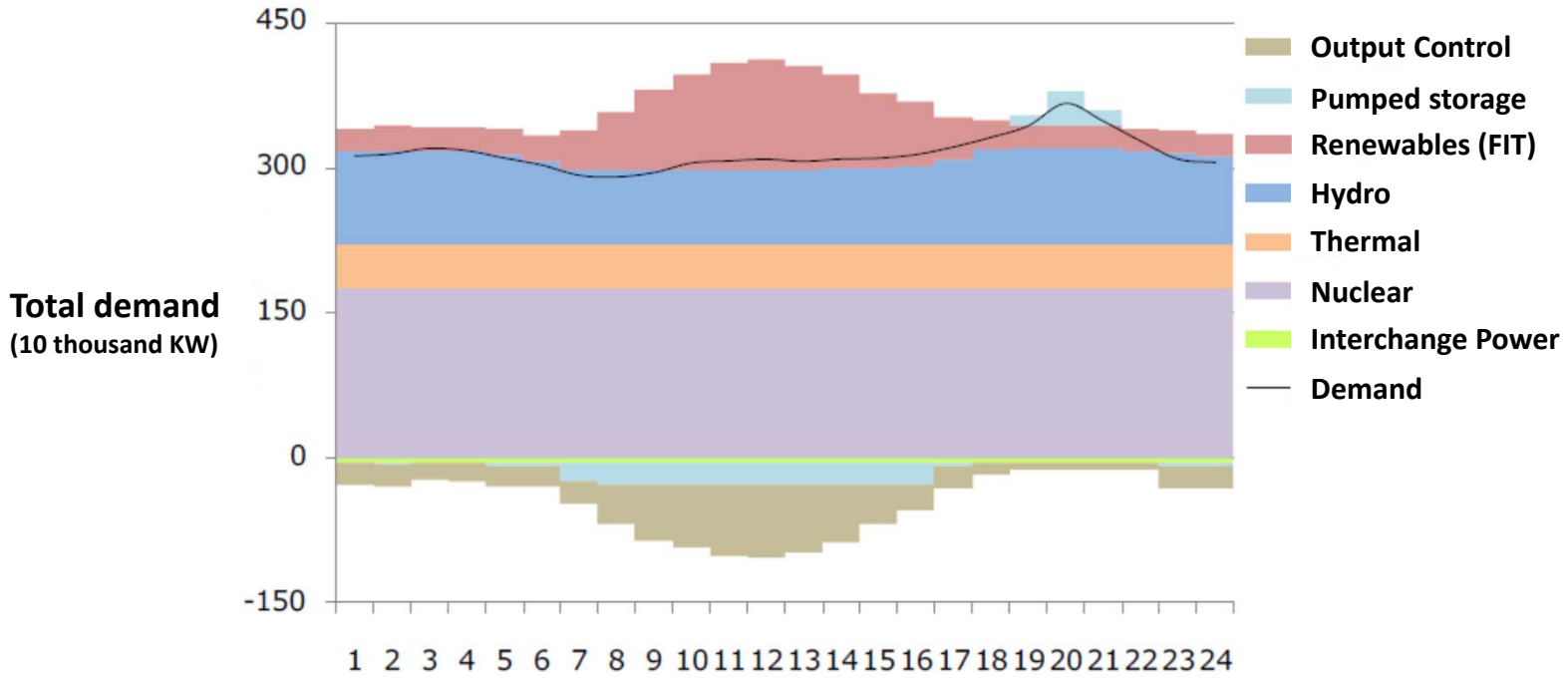
Renewable energies

Renewable energy potential in Hokkaido is very large, but, Hokkaido Electric Power Company limits its introduction.

Additional regulations

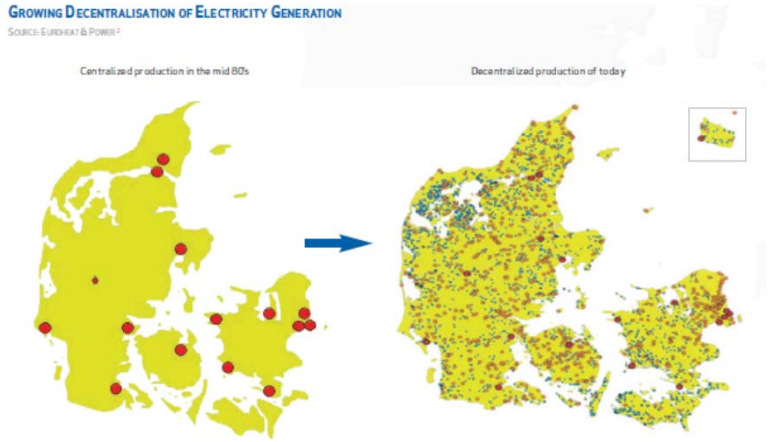
- 1% rule (Over 2MW)
- Output control

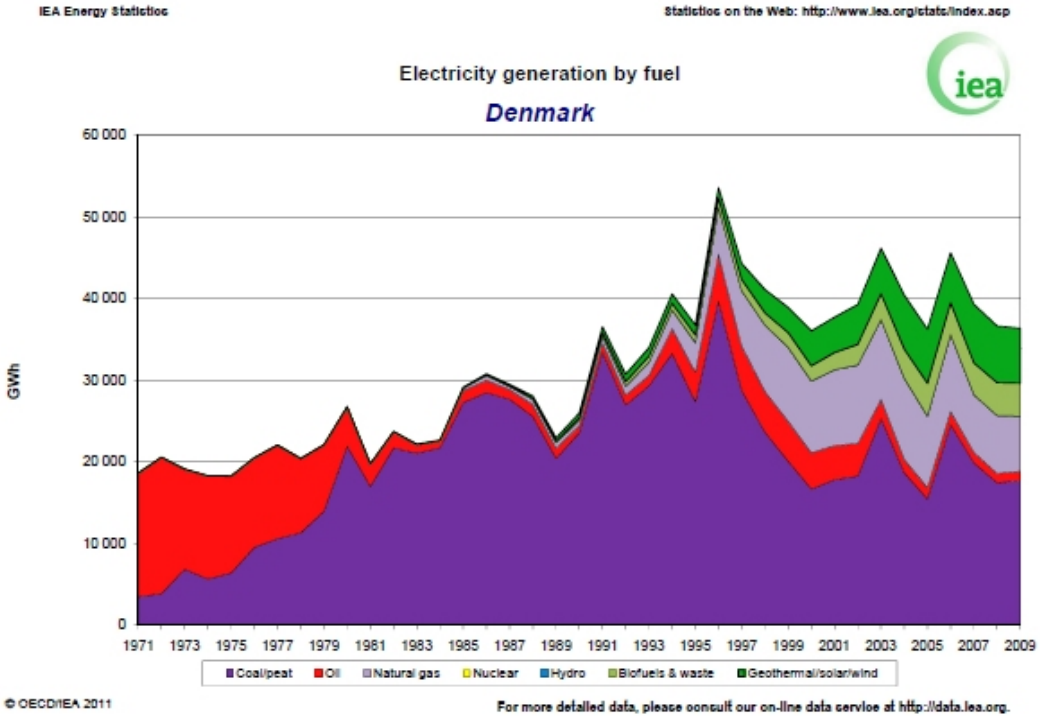
Load curve at lowest demand date (26 May)



Denmark

In 2014 Denmark got 39.1 percent of its overall electricity from wind. Denmark's generated energy is about 3.4 million kWh yearly. (Almost same as Hokkaido)





"The expansion of wind power and conversion of combined heat and power plants to biomass mean that renewable energy sources will constitute approx. 71% of our electricity consumption in 2020, compared with 43% in 2012."

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Photo: Lavender farm (Furano)

CO-OP Sapporo

CO-OP Sapporo is a Consumers cooperative in the Hokkaido area.

Membership ratio is over 50 %.

Name	Consumers Cooperative Co-op Sapporo
Established	18-Jul-65
Start of Business	1-Oct-65
Area of Operations	Hokkaido, Japan
Members	1,500,000
Member Share Capital	¥62.0 billion (as of March 20, 2013)
Total Business Turnover	¥25.5 billion (Fiscal 2012)
	Store Business ¥175.2 billion Delivery Business ¥74.3 billion Mutual Aid ¥1.5 billion Others ¥3.7 billion
Numter of Staff	Regular Empoyees 1,319 Contract Workers 1,278 Part Time Workers 10,172 (as of March 20, 2013)

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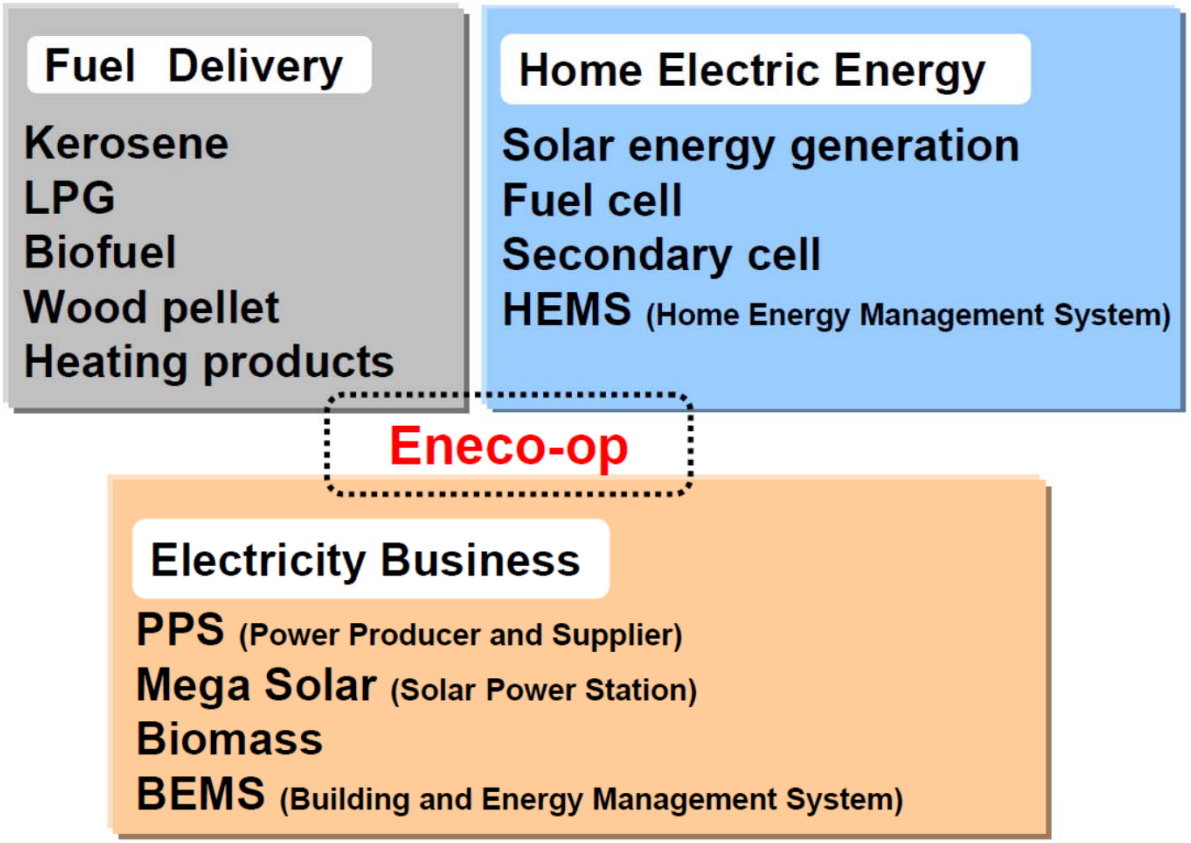
ENECO-OP outline

ENECO-OP's share of kerosene sales in the home sector is about 5 to 7 %.
Top share in the Hokkaido area. The sales is about 10 billion yen.



In the news paper

“CO-OP Sapporo will enter power retailing business. “

北海道新聞

2015年 1月14日 水曜日

コープさっぽろ電力小売り

7月にも新会社 家庭向け参入

脱原発へ再生エネ中心

コープさっぽろが計画している電力小売り事業（イメージ）

日高線再開

民主、秋

Japan Economic newspaper
14 January

電力小売りに参入

コープさっぽろ 16年度、家庭向け

Hokkaido newspaper
14 January

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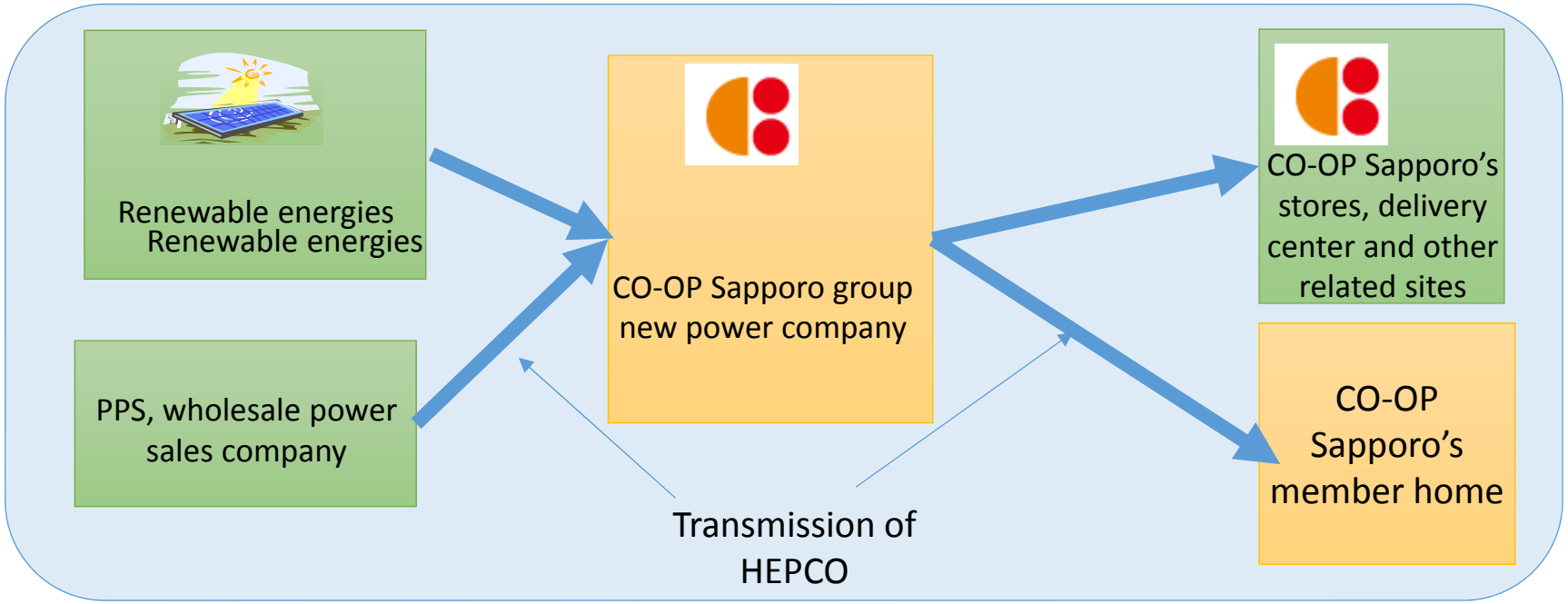
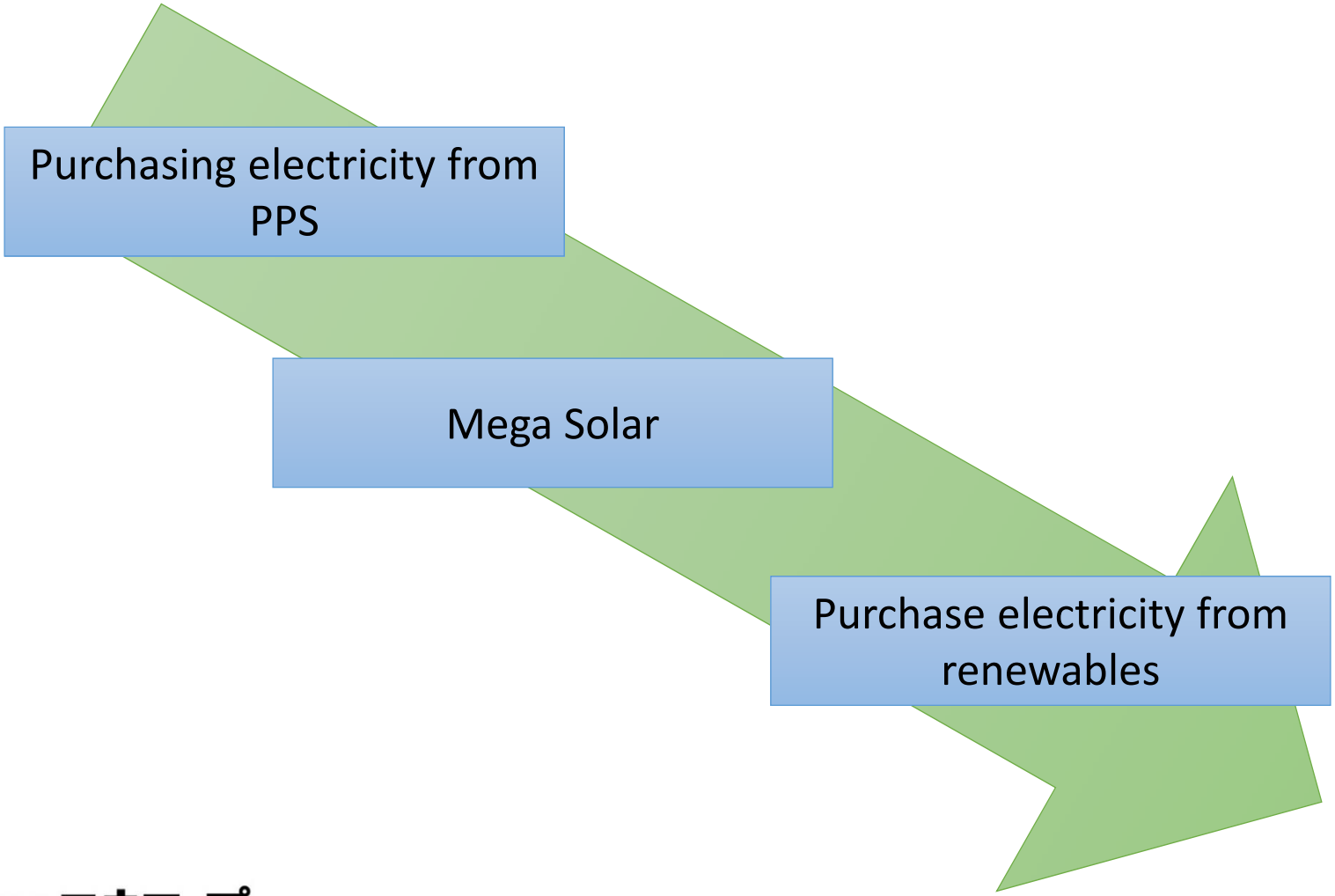
Business concept

Main target is power retail to household. Purchase electricity from other companies and sell to CO-OP Sapporo's member using HEPCO's transmission.
Maximum use of renewable energies.

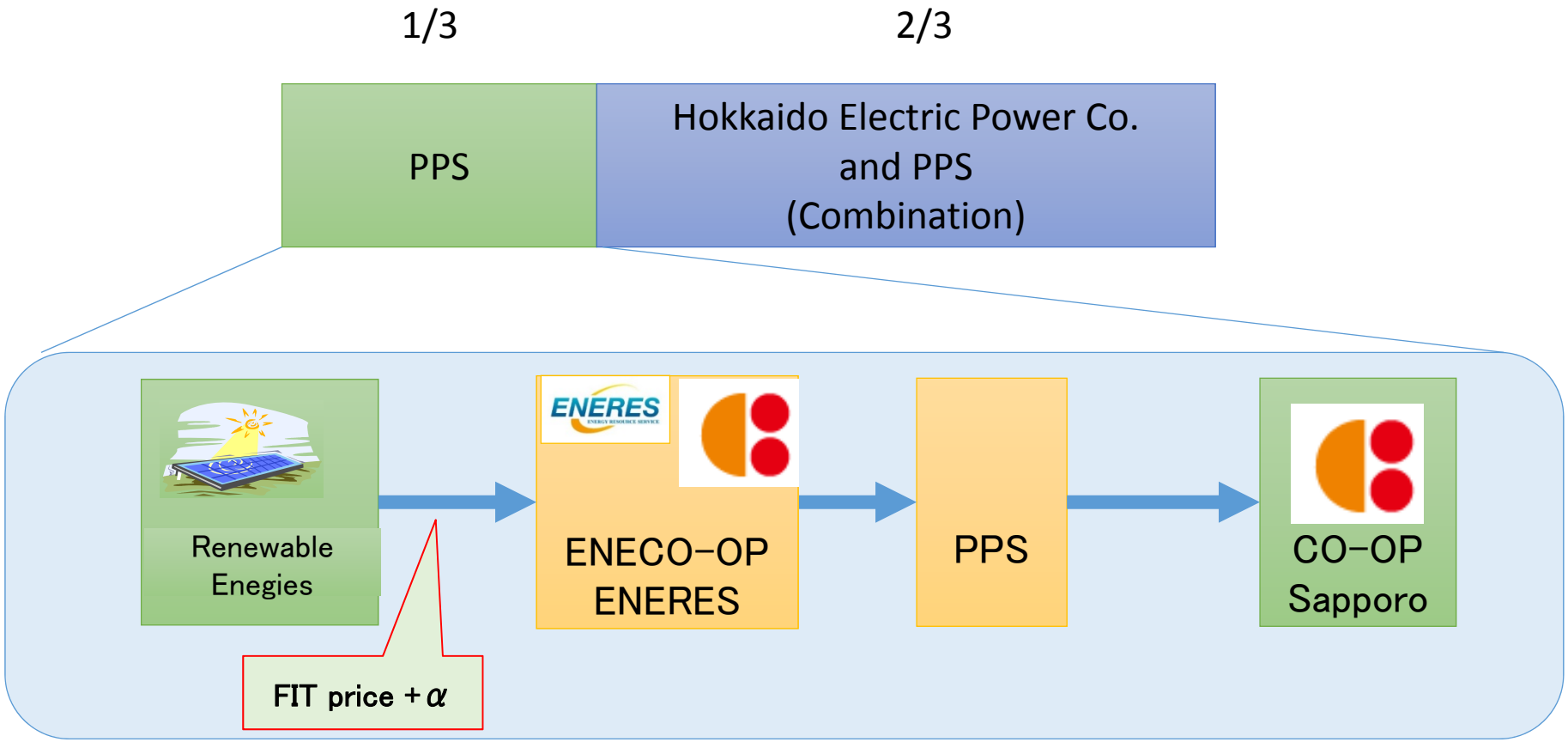


Our attempt to the power business



Electricity consumption in CO-OP Sapporo

CO-OP Sapporo is the big customer. It use almost 0.5% of overall electricity in Hokkaido.
We buy renewable energies and use them through PPS.



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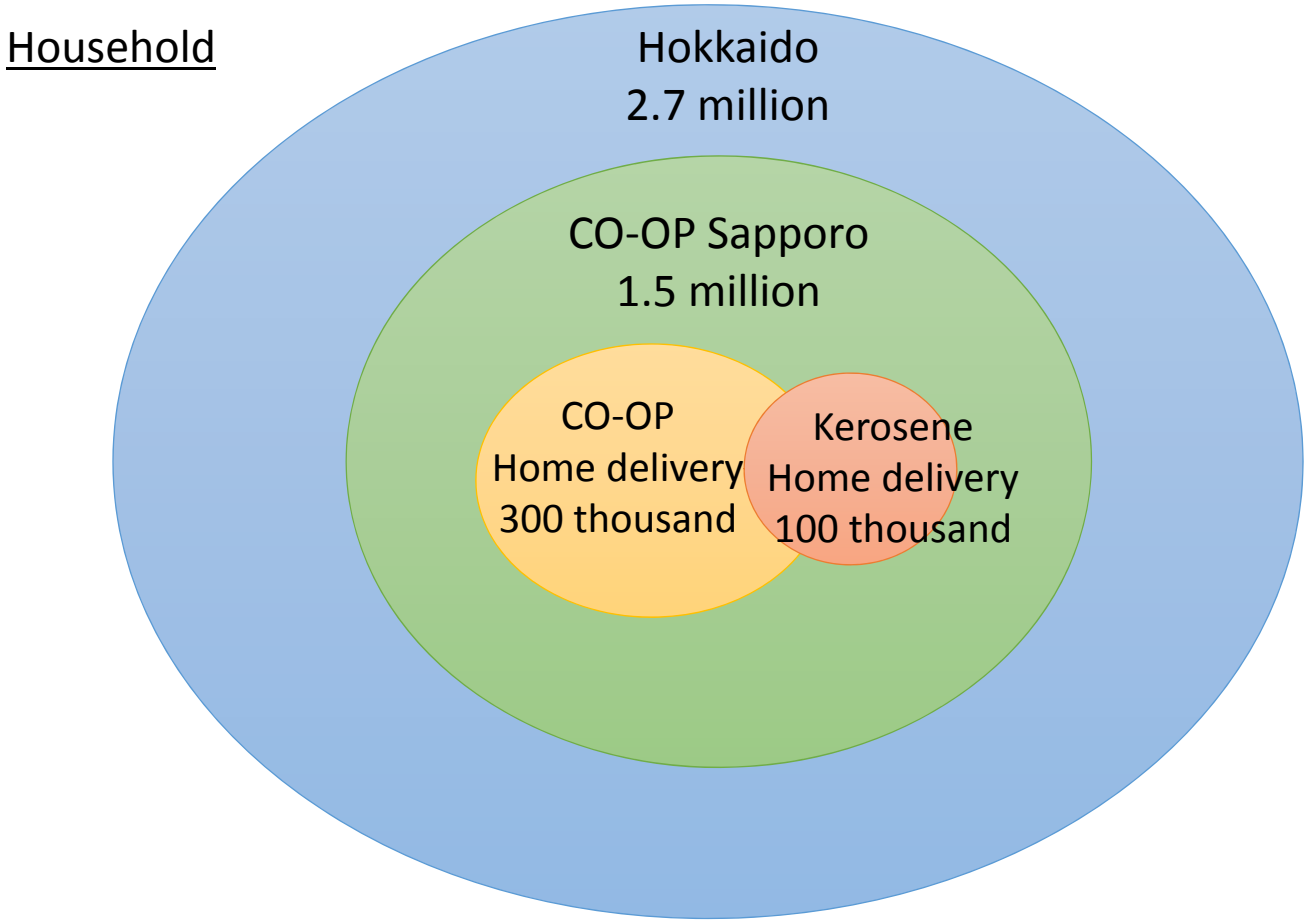
Customer base (CO-OP Sapporo and ENECO-OP)

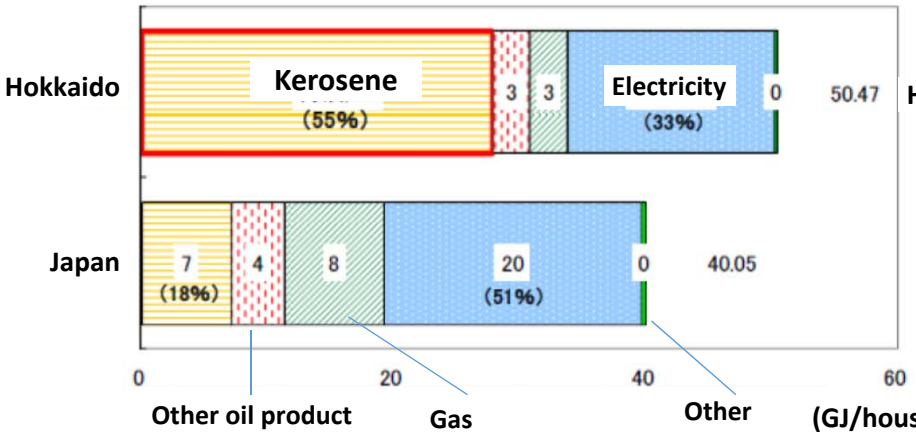
CO-OP Sapporo and ENECO-OP has large customer base in Hokkaido area.



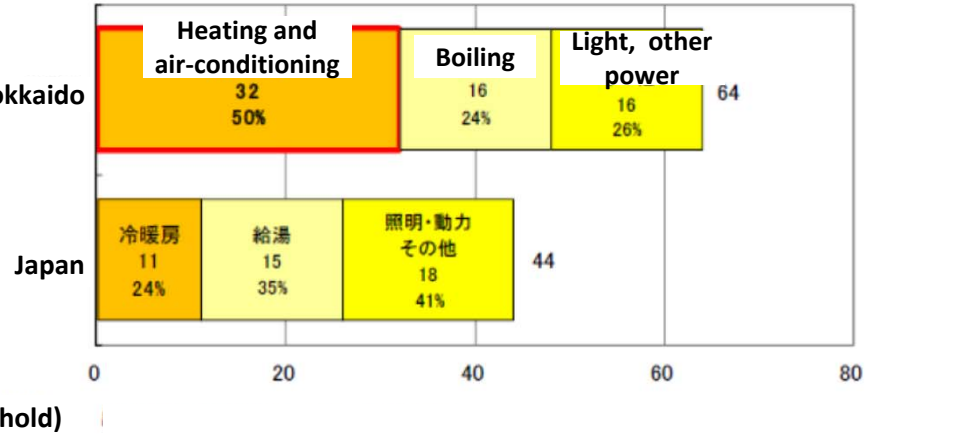
Energy consumption in house hold

Energy consumption for heat (including boiling water) is three times bigger than that of lighting and motive powers.

Energy consumption by source per household (2010)



Energy consumption by usage per household (2010)

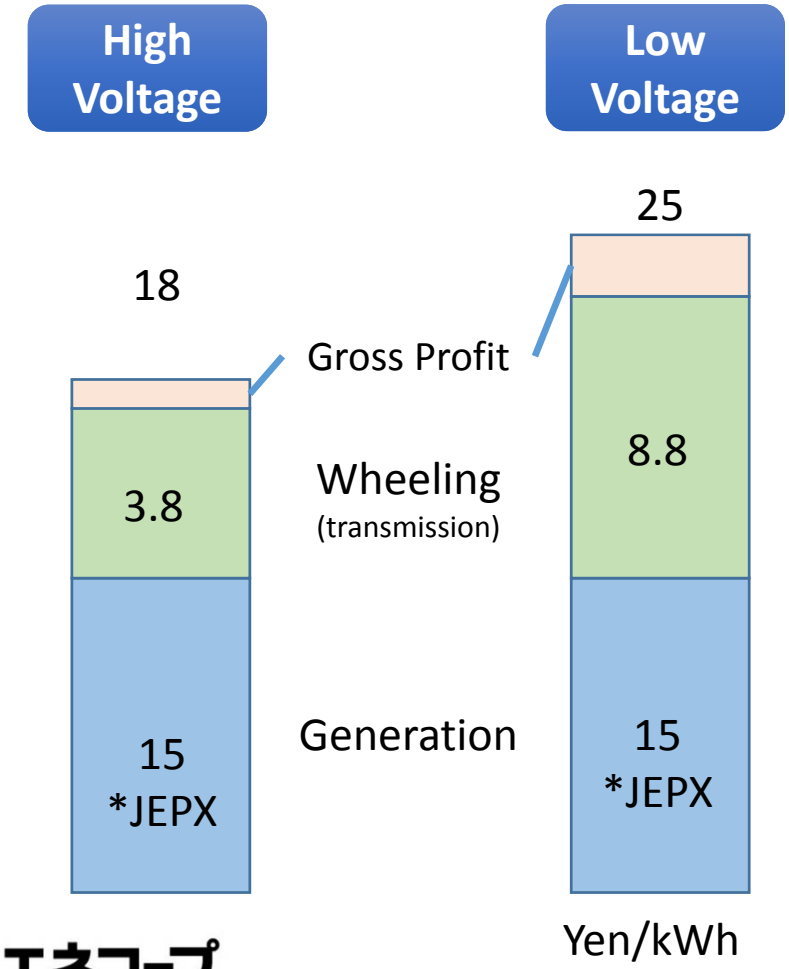


Energy consumption by source per household (2011)

	yen/month	%
Total consumer spendings	¥274,000	
Energy	¥21,800	8.0%
Electricity	¥9,300	3.4%
Gas	¥3,700	1.4%
Others (Keresene)	¥8,800	3.2%

Consumers want to reduce total energy costs.

Price and cost structure

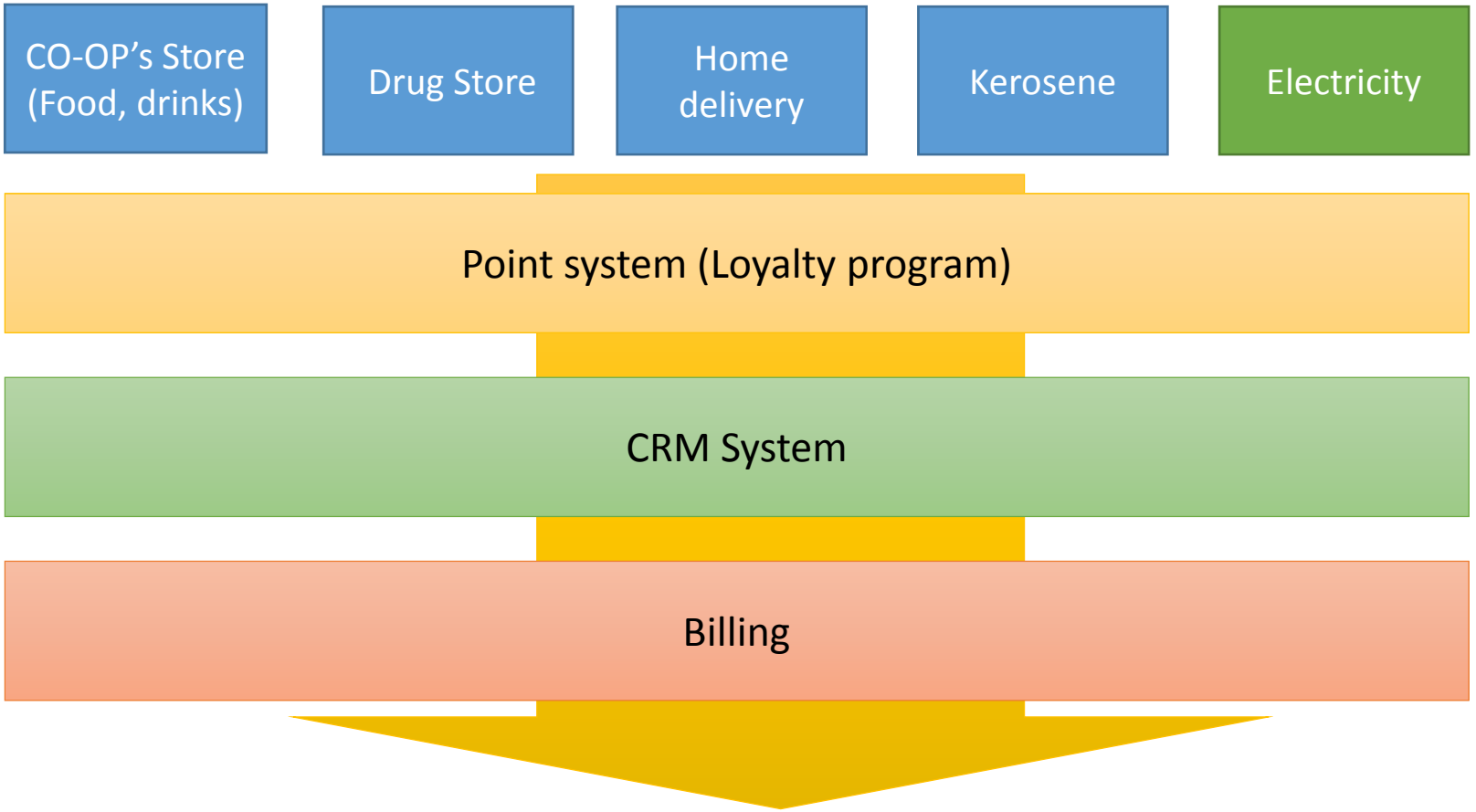


Selling and administration cost

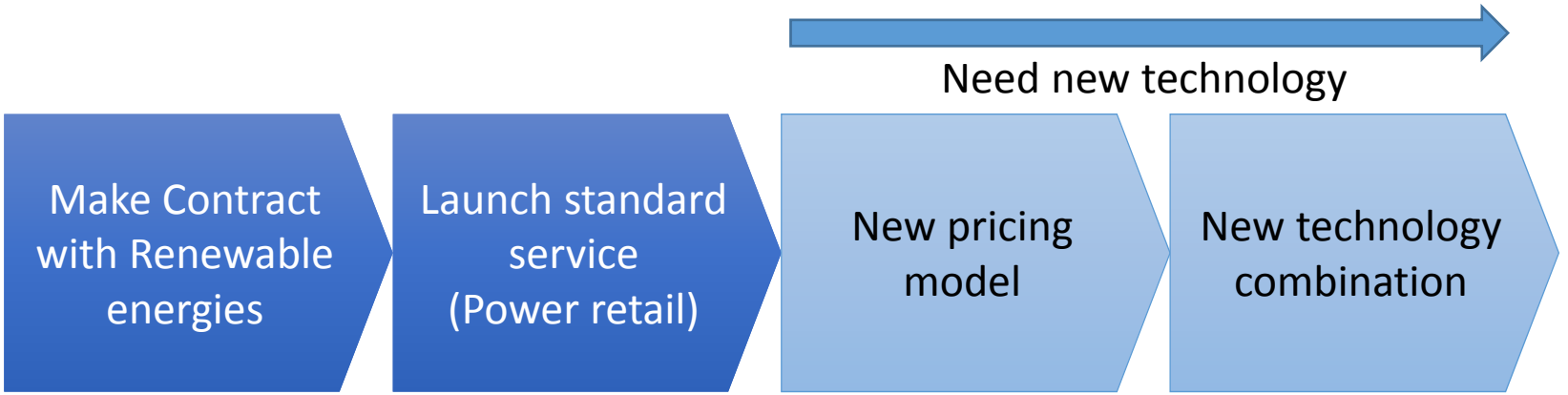
- Customer service, call center
- PR, advertisement
- IT System cost
- Billing cost

etc…

Customer relationship and Loyalty program



Our strategy



- Solar
  - •Mega-solar
  - •Home solar
- Biomass
- Hydro

- Discount program with Kerosene
- Loyalty program

- Time based pricing
- Demand response
- Combination with PV and other onsite generation

- Storage battery
- Demand control
- HEMS big-data analysis