



DH in Japan – current situation, challenges and possibilities

Kanau Takahashi

Graduate School of Global Environmental Studies, Kyoto University



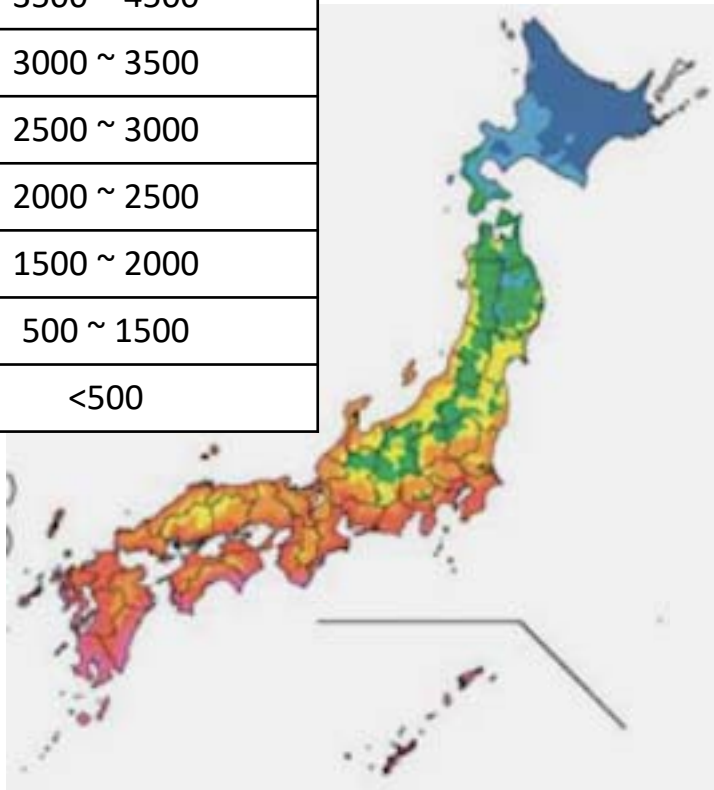
AALBORG UNIVERSITY
DENMARK

3rd international conference on
SMART ENERGY SYSTEMS AND 4TH GENERATION DISTRICT HEATING
Copenhagen, 12-13 September 2017

General information on Japan



	Heating degree days
Dark Blue	4500
Light Blue	3500 ~ 4500
Green	3000 ~ 3500
Blue-Gray	2500 ~ 3000
Yellow	2000 ~ 2500
Orange	1500 ~ 2000
Pink	500 ~ 1500
Red	<500



	Japan	Denmark
Population (million)	127	5.7
Area (km ²)	378,000	42,930
Population Density (people/km ²)	335	133
Latitude range	24 - 45°N	54 - 58°N

- Very densely populated
- Climate varies within
- Northern area is even colder than Denmark

Heating methods in Japan



Air conditioner



Water heater (gas)



Oil stove



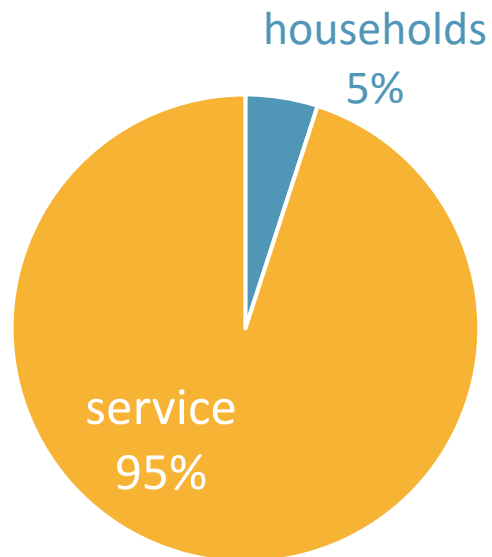
Kotatsu
(Table with blanket and
heater inside)

DH market

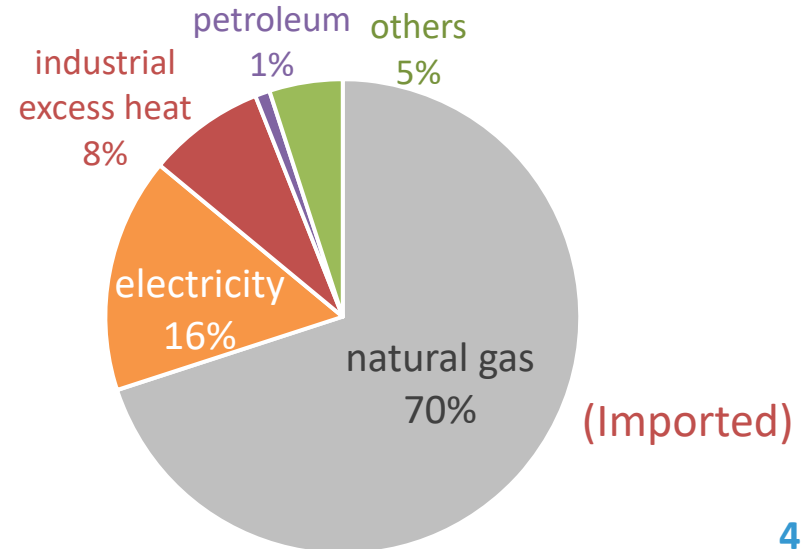


- First introduced in 1970 (Natural gas)
- 140 cases have been installed since then
- Households are not the main target among players
- Natural gas and electricity are the predominant fuels

Supplied heat from DH



Fuel consumption with DH



Renewable-based DH



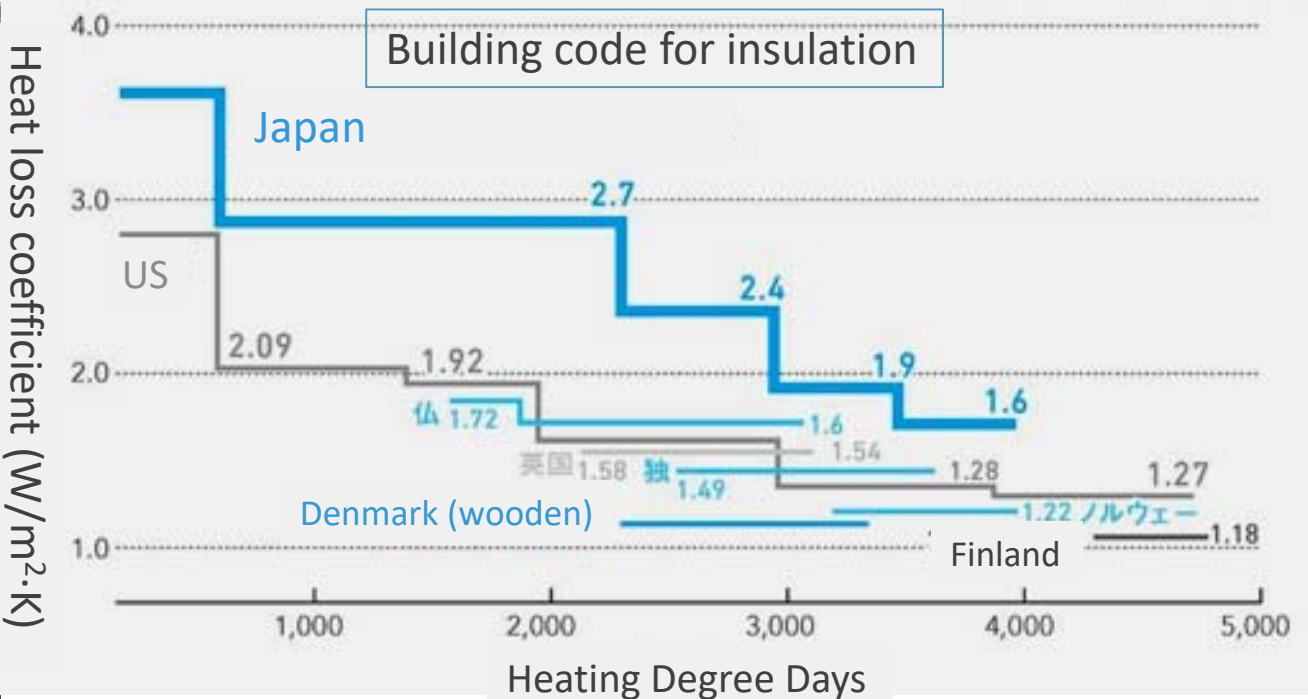
- In line with a rapid expansion of RE power production since 2011 (Fukushima nuclear disaster), attentions on RE-based DH started to grow
- Private companies are active for biomass power-only plant to sell electricity with FIT but not focus on heat utilization
- Municipalities show interest in RE-based DH, especially the area that aims to revitalize their local economy by utilizing local resources

Heat policy in Japan



- No target set for heating in national energy policy
- “Electrification of heating” has been rather on focus
 - Electricity market had been monopoly till liberalization in 2016; Large power companies have even been promoting “all-electrified-house” in which heat is also generated by electrical devices. (fossil fuel based electricity)
- A few subsidy has started for renewable heat recently

Challenge (1). Poor insulation

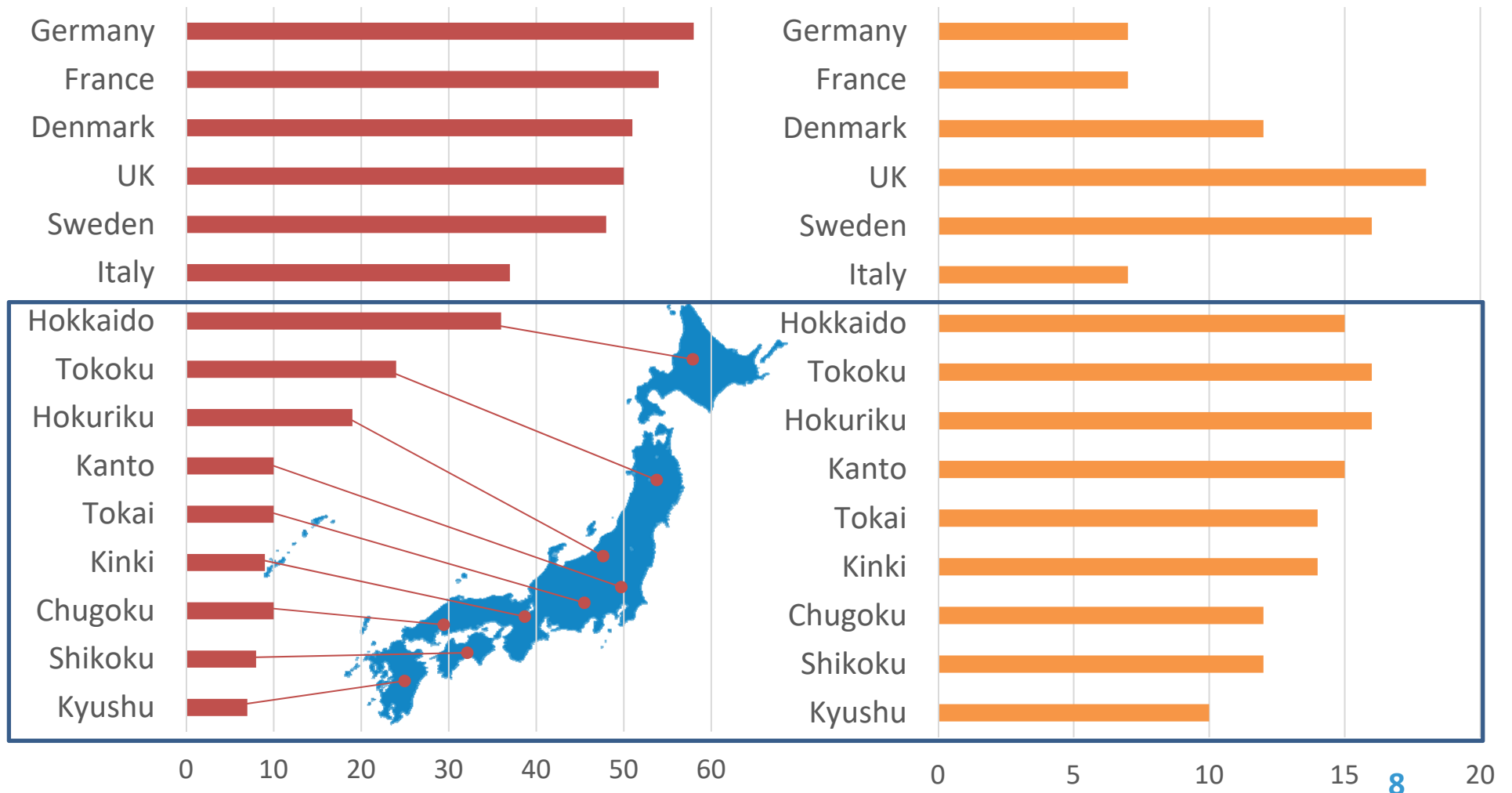


- 3/4 of existing houses are almost not insulated
- Very loose building code for insulation
- 90% of window frame is made of Aluminium, which transfer heat very much
- There's small hope in cold areas; relatively good insulation

Challenge (2). Small heat demand

Space Heating GJ/household·year

Hot water GJ/household·year



Relatively high demand for hot water



- Every households, including flats in an apartment have bath tube
- Public bath can be found everywhere in Japan
- Hotels too have such a large bath, not only individual bath in each room
- Temperature of hot spring is not always high enough for bathing; In many cases boilers are used for additional heating

Challenge (3). Lack of experts & experienced manufacturers



- Distribution pipes are separated for space heating / hot water
- Pipes and pumps as the same number as customer buildings (or more); huge investment and heat loss



- Manual cleaning of the boiler; once in 2 weeks the boiler needs to be stopped

Short summary of current situation



- DH has been minor option, but the interests are growing little by little especially as a new way of renewable utilization
- Heat demand for space heating is small, even in areas that are colder than many of European countries
- Other barriers for DH development in Japan are:
Poor insulation of buildings and lack of experiences

Steps for DH development



Suitable site for DH are:

- cold area in which houses are relatively well insulated
- consisting of large customers located close one another

Keys for successful practices are:

- Continuous effort for keeping up with up-to-date information
- Cooperation with leading countries

Improvement of external conditions:

- Insulation standard is expected to be stricter in 2020
- Awareness would be raised by establishing successful practices

Further development



Thank you so much!

If you're interested in DH market in Japan, please jump in - there are challenges ahead, but potential is also high!