APEC EGNRET 52, Hong Kong, China

Waste to Energy in Urbanized Cities

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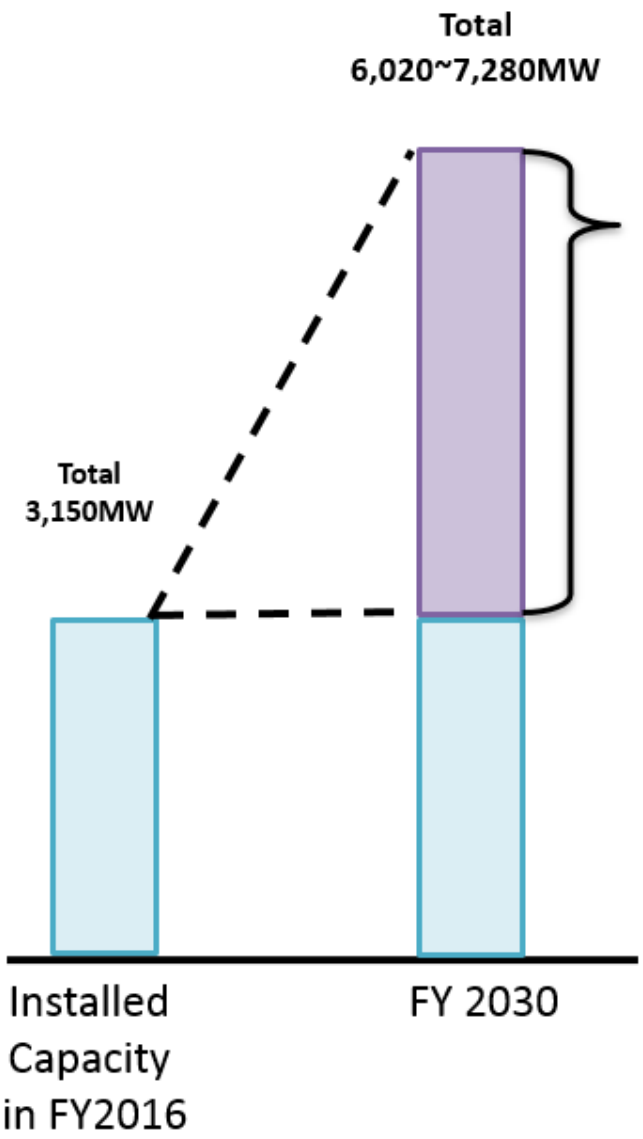
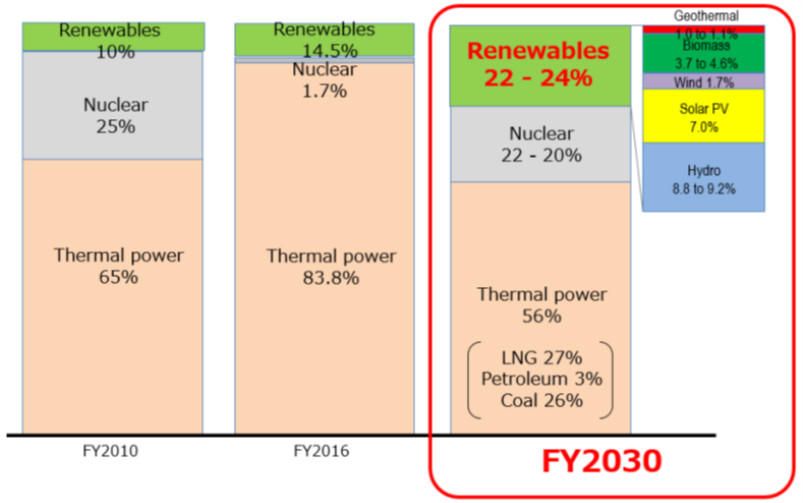
Waste to Energy in the 2030 Energy Outlook of the Master Plan





	Installed capacity	By 2030
Unused Timbers	320MW	240MW
General wood	490MW	2,470-4,000MW
Construction material waste	450MW	370MW
Waste / not wood	1,870MW	1,240MW
Biogas	50MW	160MW
Total	3150MW	6,020~7,280MW

Source: METI

FIT for Waste to Energy

			Purchase prices (JPY/kWh)			Purchase period
			FY2018	FY2019	FY2020	
Solar	Less than 10 kW		26	24	-	10 years
	when output control system are required		28	26	-	
	Less than 10 kW (+ energy storage system)		25	24	-	
	when output control system are required		27	26	-	
	10-2,000 kW		18	-	-	20 years
	2,000 kW or more		auction	-	-	
Wind	Onshore	Less than 20 kW	20	19	18	20 years
		20 kW or more				
		replace	17	16	16	
	Offshore	Bottom mounted	36	36	-	
		Floating	36	36	36	
Geothermal	Less than 15,000 kW		40	40	40	15 years
	replace whole equipment		30	30	30	
	replace above-ground equipement		19	19	19	
	15,000 kW or more		26	26	26	
	replace whole equipment		20	20	20	
	replace above-ground equipement		12	12	12	
Hydro	Fully new facilities	Less than 200 kW	34	34	34	20 years
		200-1,000 kW	29	29	29	
		1,000-5,000 kW	27	27	27	
		5,000-30,000 kW	20	20	20	
	Utilize existing headrace channels	Less than 200 kW	25	25	25	
		200-1,000 kW	21	21	21	
		1,000-5,000 kW	15	15	15	
		5,000-30,000 kW	12	12	12	
Biomass	Liquid Biofuel	Less than 20,000 kW	24	Auction	-	20 years
		20,000 kW or more	21	Auction	-	
	Wood (general)	Less than 20,000 kW	24	24	-	
		20,000 kW or more	21	Auction	-	
	Forest residues	Less than 2,000 kW	40	40	40	
		2,000 kW or more	32	32	32	
	Wood waste from buildings		13	13	13	
	Municipal waste		**17**	**17**	**17**	
	Biogas		39	39	39	

- FIT can be applied only biomass content of the waste.
- Electricity from non biomass should be sold by individual agreement with electricity companies.
- Biomass ratio of the waste must be measured by verification organization every month. (can be audited)

Source: METI

Biomass power introduction before and after the FIT by sources

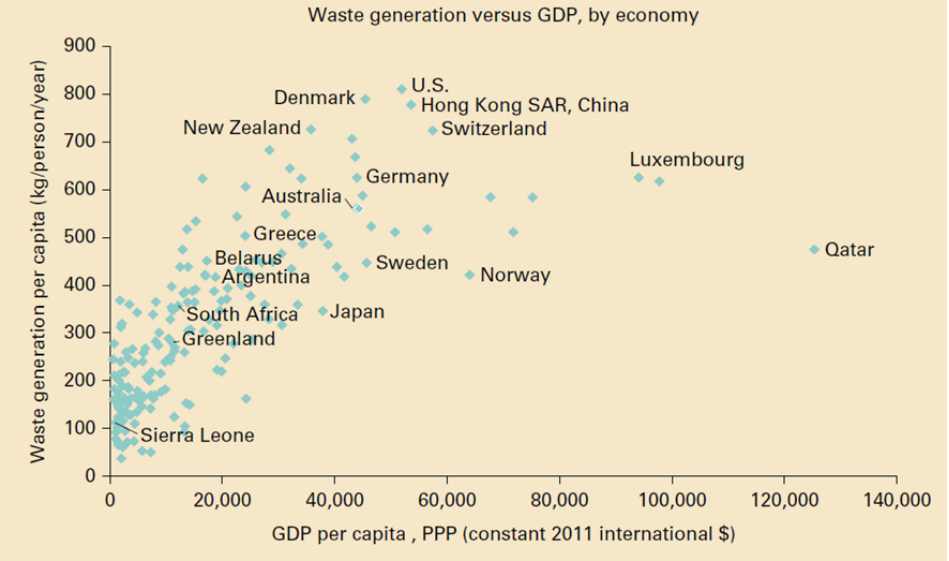
【Status of Biomass power introduction (as of September 2018)】

Type	Installed capacity (Started operation)		Accreditation facilities Capacity	Target By 2030
	Before FIT	After FIT		
	Until July 2012 Total	July 2012~ Sept 2018 Total	July 2012~ May 2016 Accreditation capacity	
Undressed Timbers	2 0MW	335MW	493MW	240MW
General wood/ agricultural residue	160MW	725MW	7,797MW	2,740~4,000MW
Construction/ recycle material waste	440MW	13MW	87MW	370MW
MSW(Municipal Solid Waste), others	1,680MW	240MW	327MW	1,240MW
Biogas	20MW	51MW	79MW	160MW
TOTAL	2,300 MW	**1,364 MW**	**8,785MW**	**6,020~7,280MW**

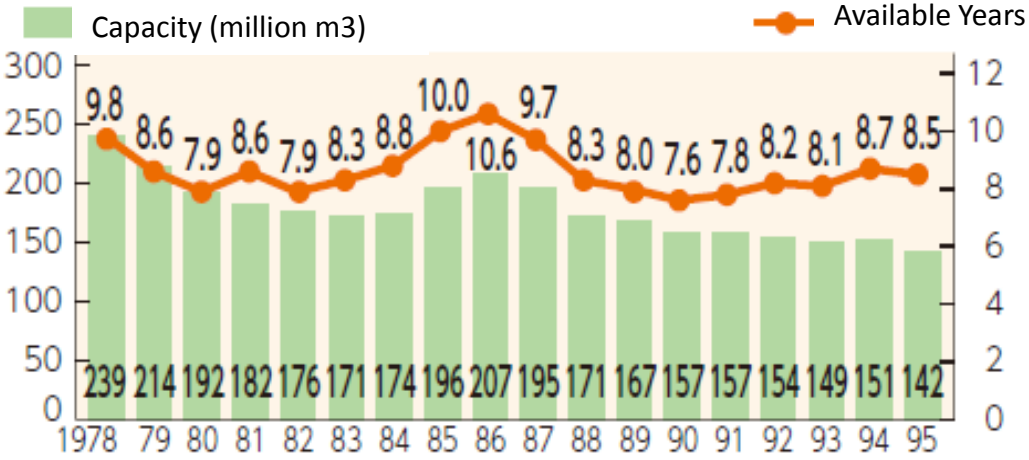
Source: METI

Landfill capacity for Waste

- Amount of Waste and GDP is correlated
- Growth of urbanized cities will face the issue of place for landfill



Source: WHAT A WASTE 2.0, World Bank



Source: Ministry of Environment, Japan

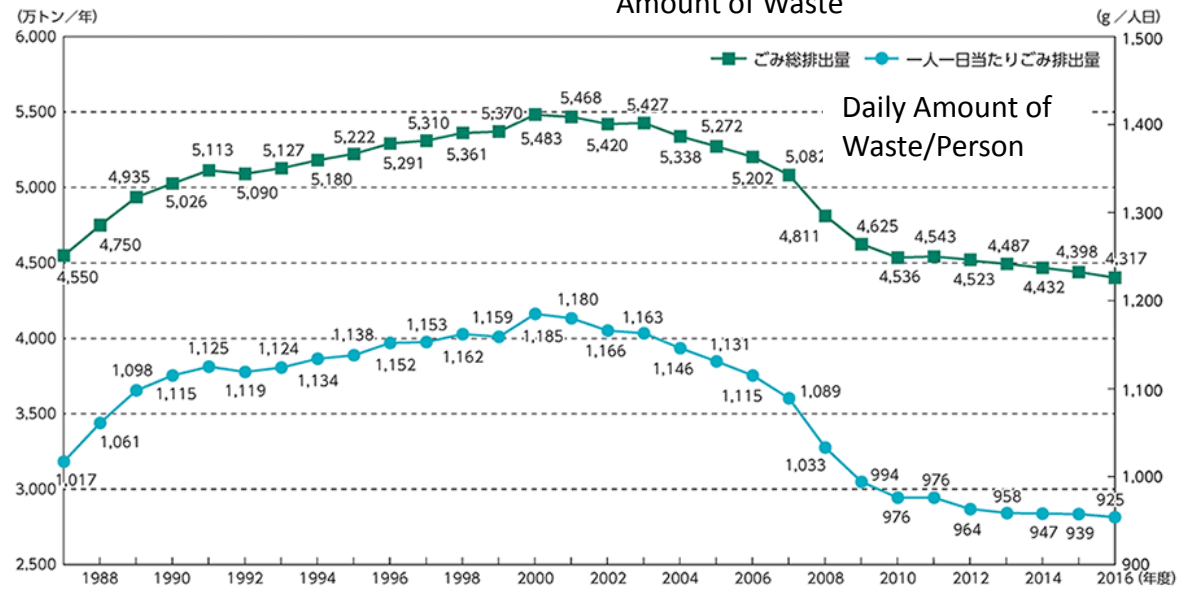
Landfill capacity for Waste

- Amount of Waste is reduced by 3R Policy (Reduce, Reuse, Recycle) of 2000
- Volume of Waste can be reduced 90-95% by Incinerator

(10 Thousand ton/Year)

Amount of Waste

(Gram/Person Day)

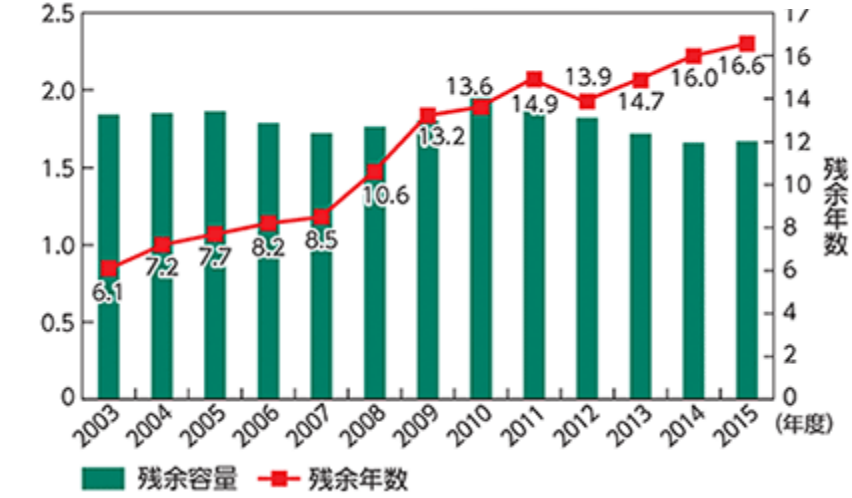


Source: Ministry of Environment, Japan

(億m³)

Capacity (100million m3)

Available Years



Source: Ministry of Environment, Japan

Waste to Energy Facilities

- Local Municipalities have responsibility of waste management in Japan
  The Facilities locate within each municipalities
  e.g. Tokyo 23 special wards(Central Tokyo) have 21 WtE facilities in the region

- Waste to Energy Facilities should comply high quality/high standard coping with unstable feed stock supply (The feedstock is Waste)
  *1st priority is Waste management / not benefit from selling electricity

Thank you for your attention!