

Japan

-Make Self-Sufficient Society-

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Lifestyle & Mindset

- local community with a Strong relationship
 - There is a community-based life because of becoming compact city.
 - People become to have much concern about social problem. So, many people become to join the volunteer.
- IT & Environment
 - Advanced information technology will realize more realistic and convenient communication with a distant place.
 - People spontaneously act friendly for the environment.
- Local production for local consumption
 - Easy to take basic necessities of life



Economy & Industry

- Vitalization of local industry
- improvement of food self-sufficiency ratio
 - At the view point of food security, attraction of agriculture will increase.
- In 2050, Japan maintains its influence on the global economy and increases industrial production steadily.



Population & Household

- Population will decrease because of the trend of a decline in the number of birth.

2000
127mil.



2050
102mil.

- Average family members will decrease.
- Number of household is same level in 2000.



Transportation

- Rate of public traffic will increase.
 - In the urban area, people use carsharing, LRT, bicycle, and so on.
 - people seldom use car for transportation between cities.
- In stead of gasoline car, H₂ car or electric car will be used.
- Import (mainly agricultural part) will decrease.



Landuse & Infrastructure

- Compact city
 - Increase urban population
 - There are necessary service that are accessible on foot.
- Rich natural environment
 - Forest spreads to rural area which isn't used for anything.
- Natural energy
- Positive introduction of efficient equipment

Industrial Sector

- Agriculture & food industry growth rate is 2%
- Other industry growth rate is 1%

	UNIT	Base Year(2000)	REF
Agriculture	Bil. Y	12.16	19.80
Mining	Bil. Y	1.37	1.37
Construction	Bil. Y	77.05	76.67
Food	Bil. Y	35.75	58.22
Textile	Bil. Y	3.04	1.82
Other chemicals	Bil. Y	27.09	16.23
Other ceramic	Bil. Y	8.33	4.99
Non Ferrous	Bil. Y	6.19	3.71
Metal & Machine	Bil. Y	142.39	85.28
Other Manufacture	Bil. Y	42.38	25.38
Paper & Pulp	Mil-t	31.83	19.06
Petrochemicals	Mil-t	7.61	4.56
Cement	Mil-t	82.37	49.34
Steel	Mil-t	106.90	64.03

Residential Sector

Future energy service demand (REF)

	Service	Change rate of parameters					Change rate of Service	Service
	Base Year	Number of Household α_1	Holding rate α_2	Operating hours α_3	Strength α_4	Service Loss α_5		2050
	$\Sigma(1+\alpha_i)-1$							
Space heating	23.33			-10%	-10%	-10%	-27%	17.01
Space cooling	10.71			-10%	-10%	-10%	-27%	7.80
Hot water heating	10.25			-33%			-33%	6.87
Refrigerators and freezers	3.55			52%			52%	5.38
Cloth dryer	0.67						0%	0.67
Cooking	1.91			-50%			-50%	0.95
Cloth washers	0.22						0%	0.22
Dish washers	0.22						0%	0.22
Other energy uses	0.00						0%	0.00
Miscellaneous electric energy	4.66			48%			48%	6.89
Lighting	3.55			52%			52%	5.38

Commercial Sector

Future energy service demand

	Service	Change rate of parameters					Change rate of Service	Service
	Base Year	Total floor space	Holding rate	Operating hours	Strength	Service Loss		2050
		a1	a2	a3	a4	a5	$\Sigma(1+a_i)-1$	
Space heating	15.5348655			-10%	-10%	-10%	-27%	11.32
Space cooling	7.79887			-10%	-10%	-10%	-27%	5.69
Hot Water	11.29504			-33%			-33%	7.57
Lighting	9.1427			52%			52%	13.86
Cooking	1.40832			-50%			-50%	0.70
Refrigerators and freezers	2.35098			52%			52%	3.56
Electric Equipment	9.1427			48%			48%	13.52
Other energy uses	2.35098			48%			48%	3.48

Transportation Sector

Future Transportation Demand

Passenger transportation	Base Year (2000)		2050	
	volume of transportation (B p-km)	share (without air)	volume of transportation (B p-km)	share (without air)
walk	-	13%	-	20%
bicycle	-	8%	-	10%
Motorbike	6	0%	7	1%
Car	870	58%	552	40%
Bus	82	4%	94	10%
Railway	384	17%	183	20%
Air	202		202	

Freight transportation	unit	Freight transportation	
		Base Year (2000)	2050
Car	B t-km	313	309
Railway	B t-km	22	15
Water	B t-km	242	198
Air	B t-km	1	3

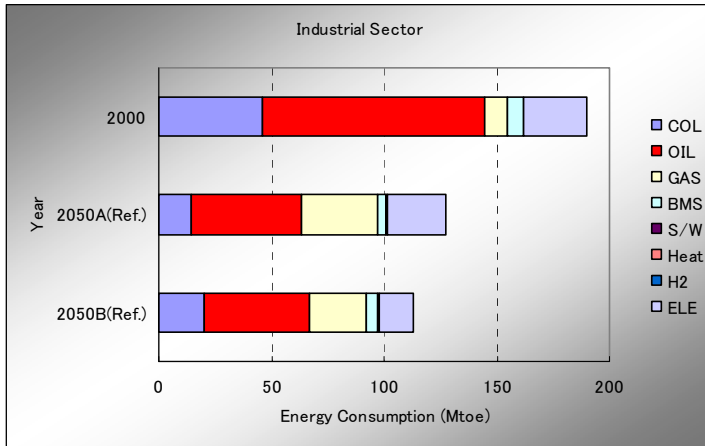
Some assumption

Doraemon Scenario = Scenario A

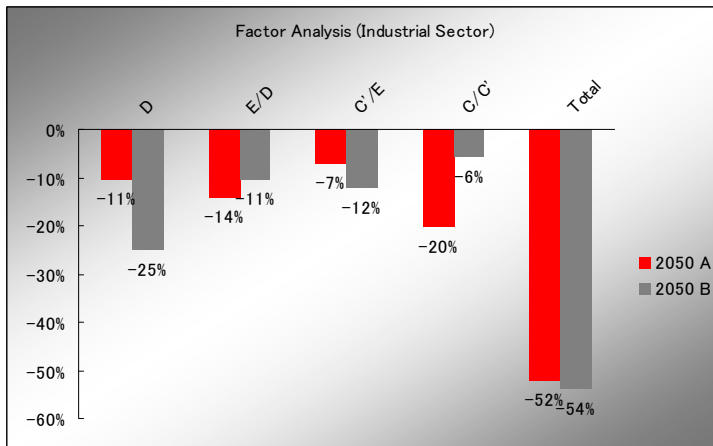
Our Scenario = Scenario B

- Energy efficiency
 - Both scenarios are equivalent
- Energy service share
 - People is not supposed to use biomass in our scenario, so both scenarios are almost equivalent
- Power generation sec.
 - Scenario A
 - The share of nuclear is big
 - Scenario B
 - The share of thermal power is big

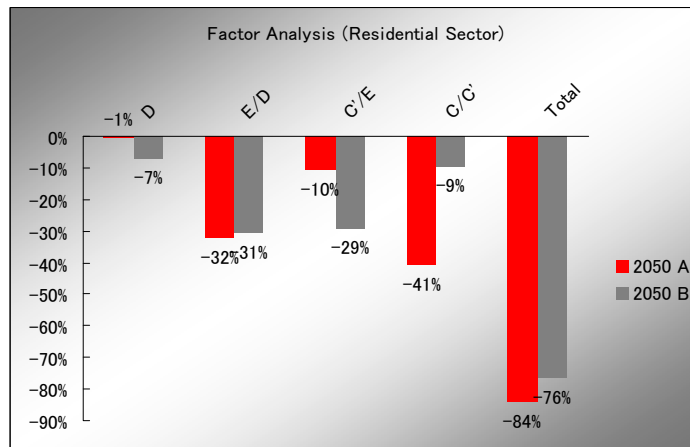
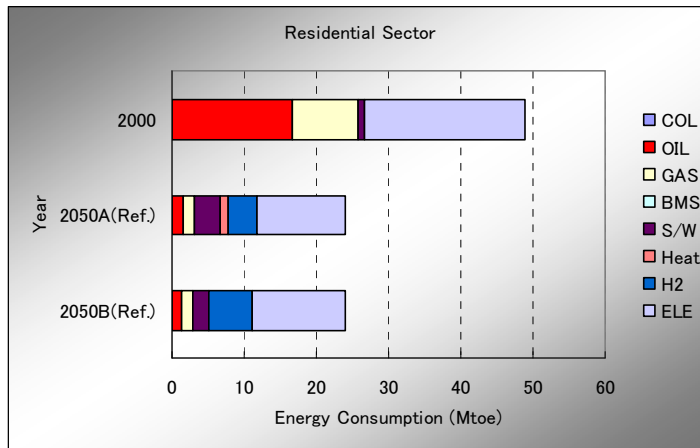
Result (Industrial Sec.)



- For scenario B, consumption of gas and that of electricity are relatively small, while consumption of coal is bigger

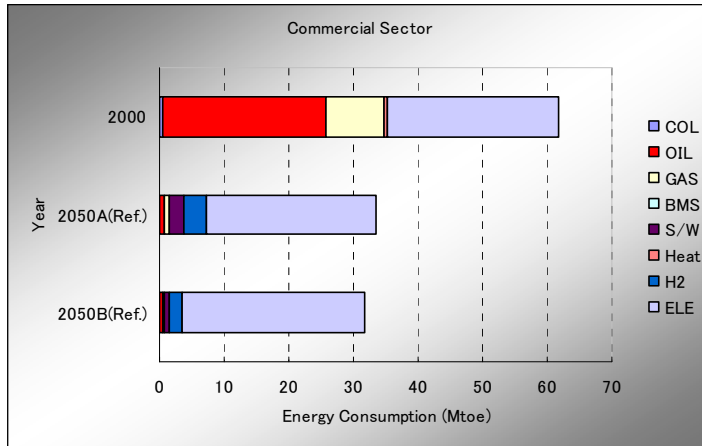


Result (Residential Sec.)

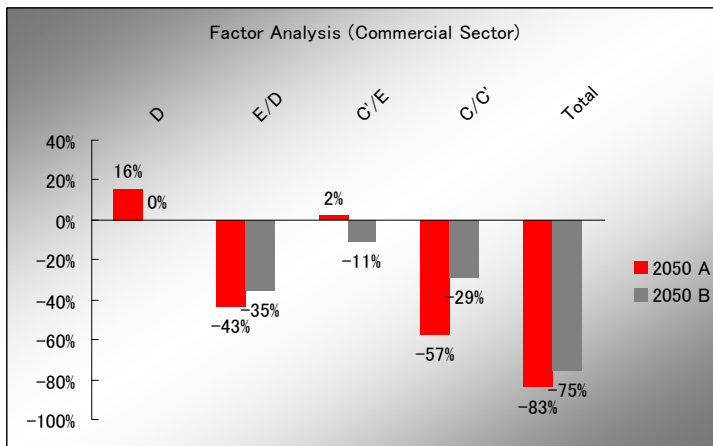


- Share of H₂ energy and renewable energy consumption will increase, while share of oil will decrease.
- CO₂ emission will be reduced dramatically by improvement of building function. (ex. heat insulating properties)

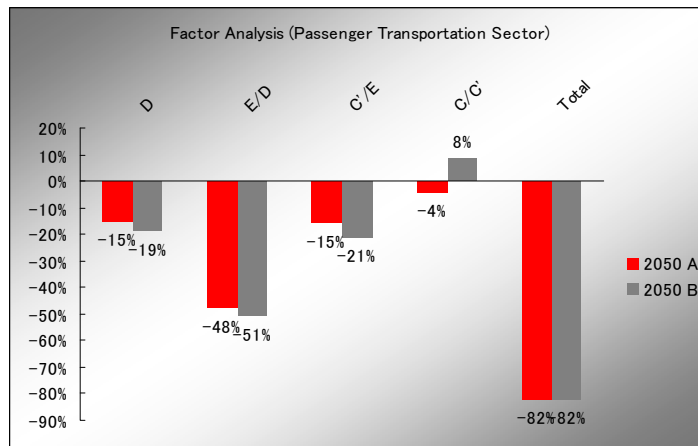
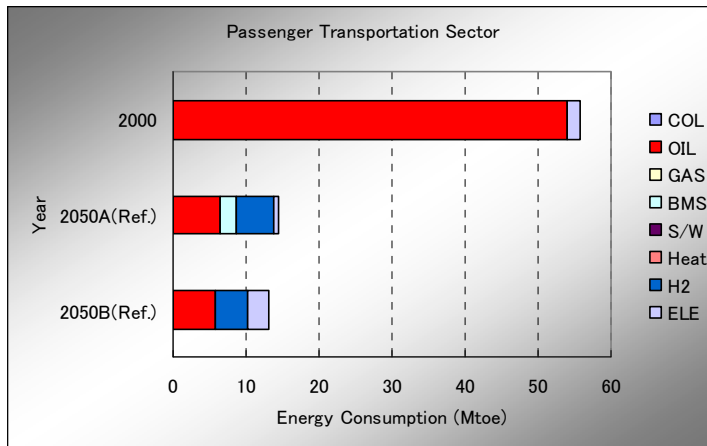
Result (Commercial Sec.)



- Oil is almost not used in 2050
- For scenario B, energy consumption is smaller than scenario A, but CO₂ emission is bigger

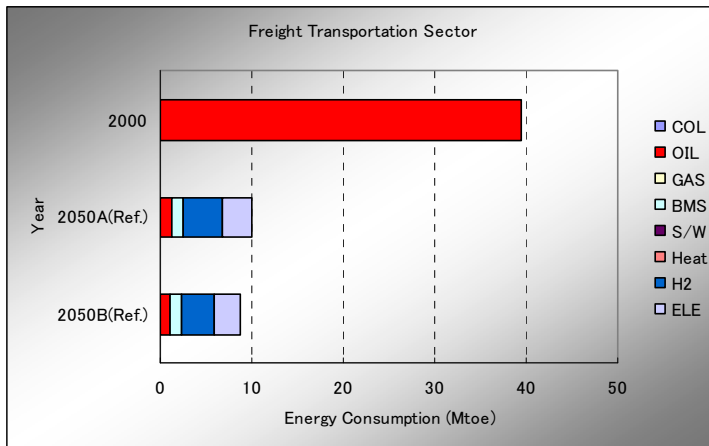


Result (Passenger Transportation Sec.)

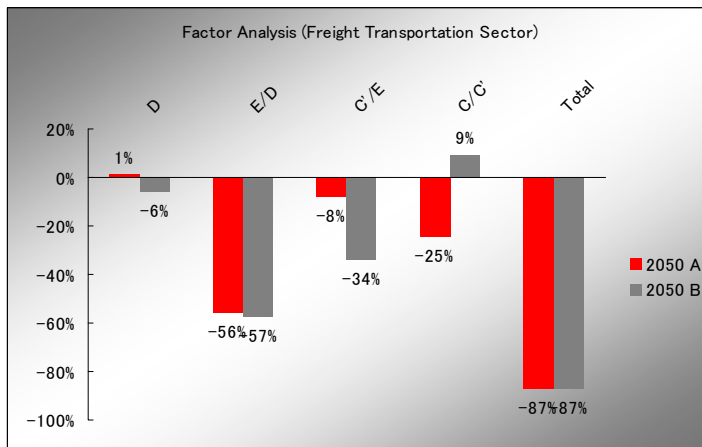


- People will not use cars much, so energy consumption in Passenger transportation sector is quite decrease
- H₂ energy will be developed and share of H₂ will be rise gradually

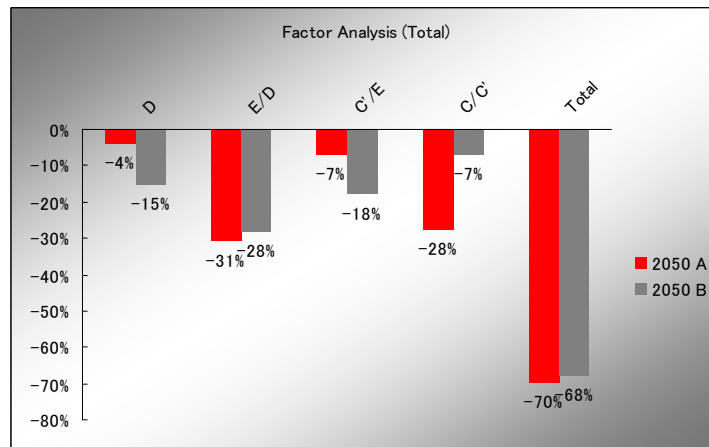
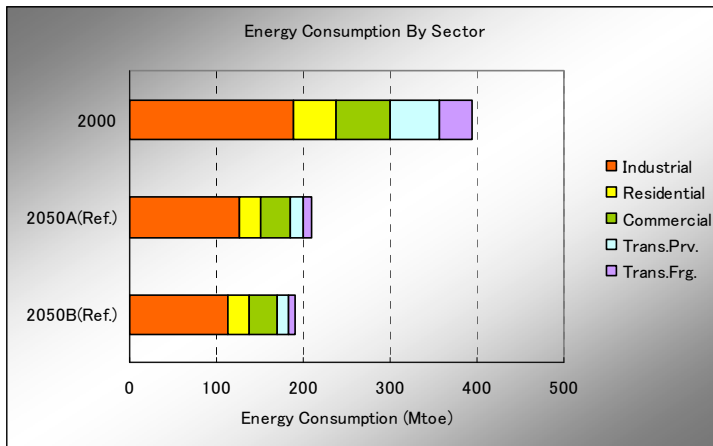
Result (Freight Transportation Sec.)



- Energy consumption of each scenario is not so different



Result (Total)



- For scenario B, energy consumption is smaller than scenario A, but CO₂ emissions is bigger
- For scenario B, **energy demand** and **CO₂ intensity** are lower than scenario A, but **change of CO₂ intensity** is higher. Therefore total CO₂ emission is not different

Conclusion

- We can achieve about 70% reduction of CO₂ in each scenario in 2050
- But the factors of reduction are different
- we are required to focus on not only one factor, but the others as well for LCS

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