Chapter 4

Possible future power mixes: Assessment using the E3ME and FTT:Power models

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1. Objective of the work

Qualitative analysis of the impact from possible future power mixes in East Asia (China, Japan, Korea, Taiwan) using E3ME and FTT:Power

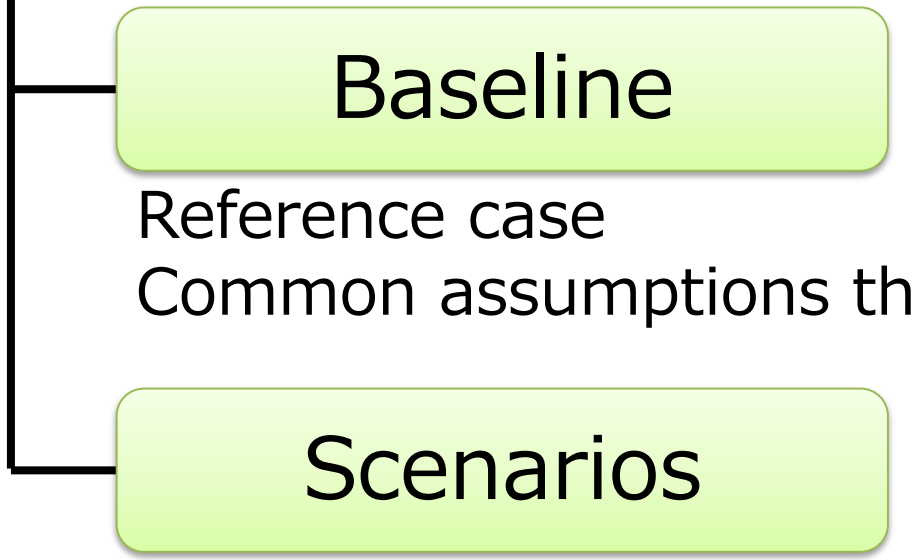
Looking into...

- Environment (CO_2 emissions)
- Economy (GDP, employment etc)

Scenarios are...

- Constraint on nuclear power
- Constraint on coal-fired power

2. Scenario assumptions



Reference case
Common assumptions through all scenarios

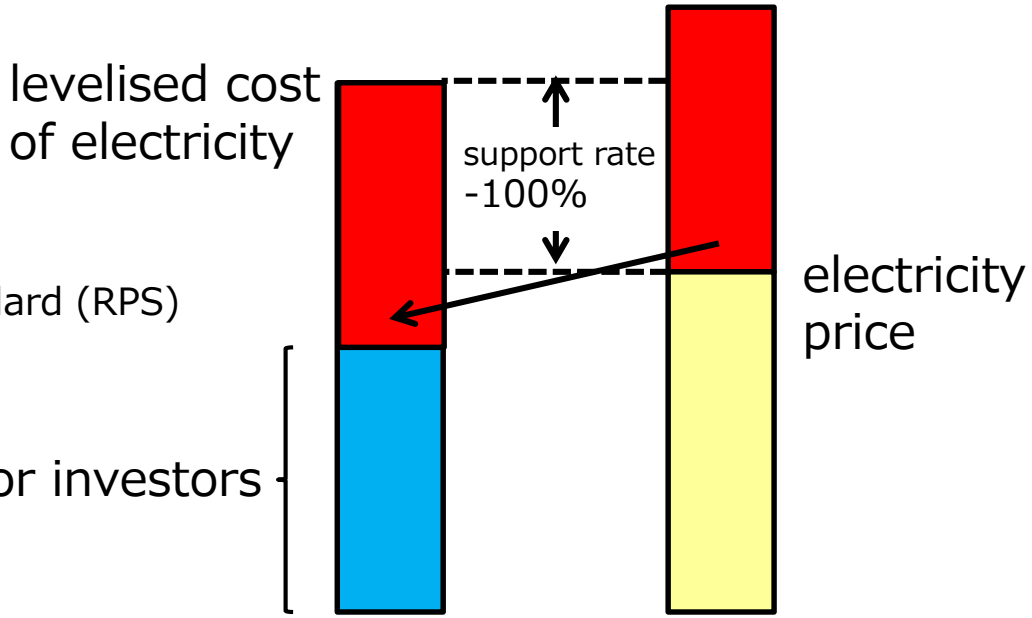
Baseline

Support for renewable energy

○Supported technology:
representing policies in each region

○Support scheme:
all treated as feed-in tarrif (FIT)

policies in each region
- China: FIT with bidding
- Japan: FIT
- Korea: renewable portfolio standard (RPS)
- Taiwan: FIT



Baseline

Exogenous capacity

○Nuclear power:
investment choice is purely political issue
→setting capacity according to plans in each region

○Oil-fired power:
IEA member country (JA, KR) won't add new cap.
same for Taiwan

※(Total demand – generation from above) would be solved with FTT:Power

Scenarios

Assumptions: analyse until 2030
hold all assump. in the baseline

S1 : Constraint on nuclear power

CN, KR: not allowing the increase of
capacity share of nuclear from 2015
JA: 0 share of nuclear from 2015
(TW is decreasing its share of nuclear in baseline)

※Capacity and generation from nuclear in CN and KR
are endogenously determined in S1

S2 : Constraint on coal-fired power

not allowing the increase
of capacity share of coal in each region from 2015

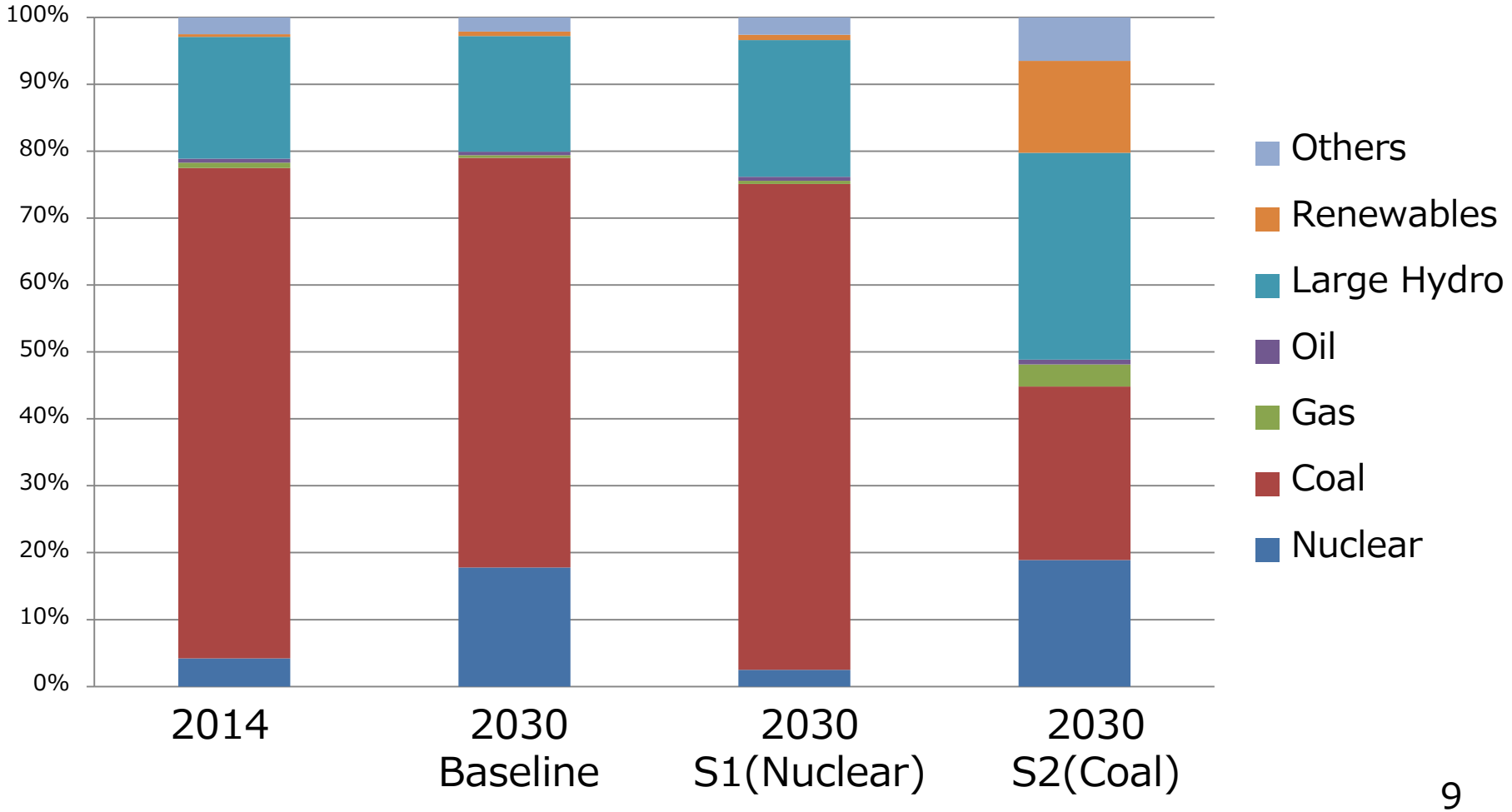
4. Results

- Individual implementation
- Simultaneous implementation

looking in to the effect of harmonising policies

Individual results (1)

China genaration share by tech. (%)



Individual results (2)

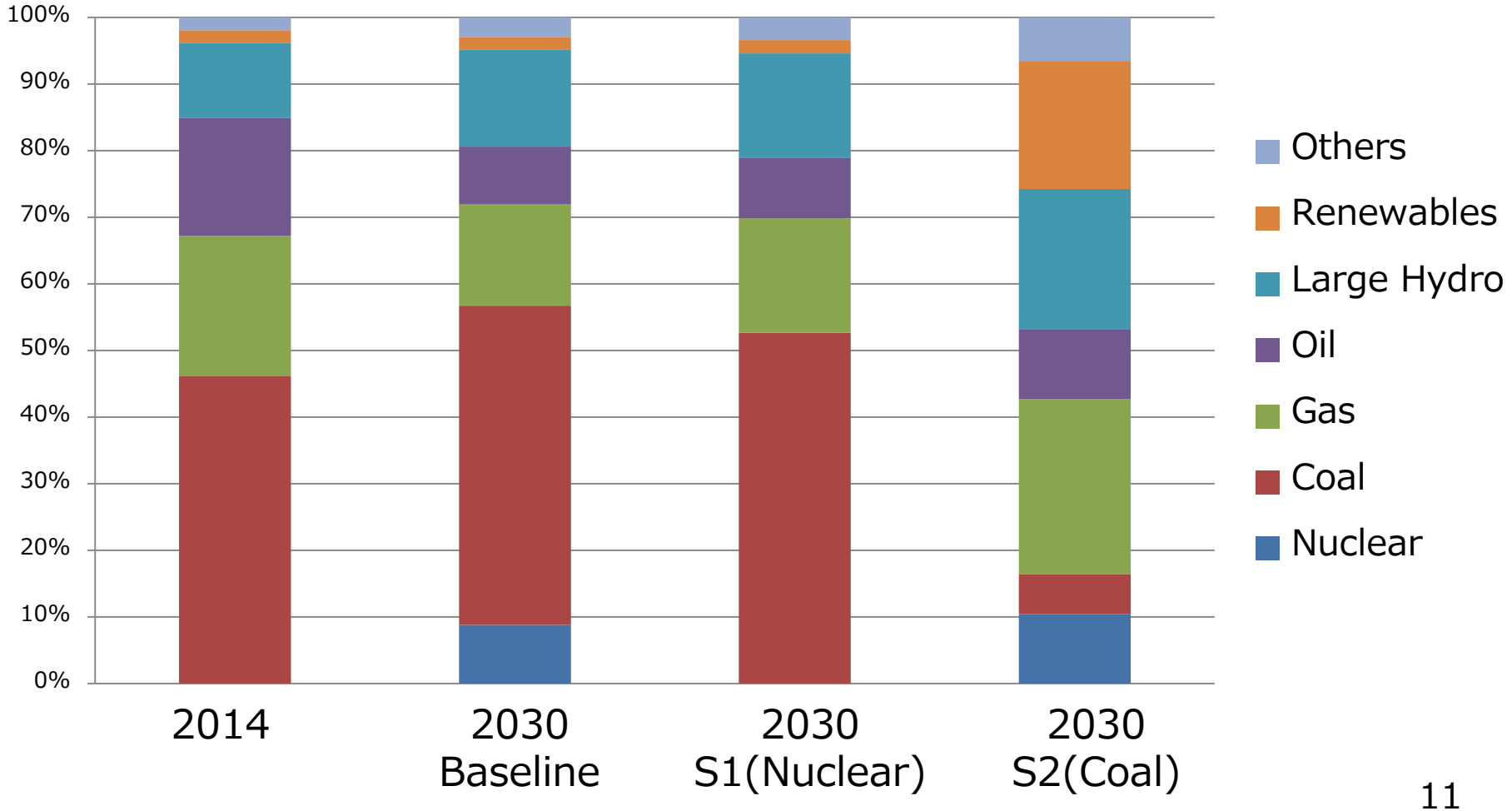
China

Economic indicators & CO_2 emissions
(difference from baseline, 2030, %)

	S1(Nuclear)	S2(Coal)
GDP	-0.16	1.75
CO_2	9.24	-21.76
Employment	0.02	0.09
Consumption	0.05	0.71
Investment	-0.17	5.25
Export	-0.03	0.30
Import	0.47	0.28
Consumer price	-0.09	0.42
Electricity price	-0.23	59.30
Nominal wage	-0.03	0.88
Electricity demand	0.06	-5.84

Individual results (3)

Japan genaration share by tech. (%)



Individual results (4)

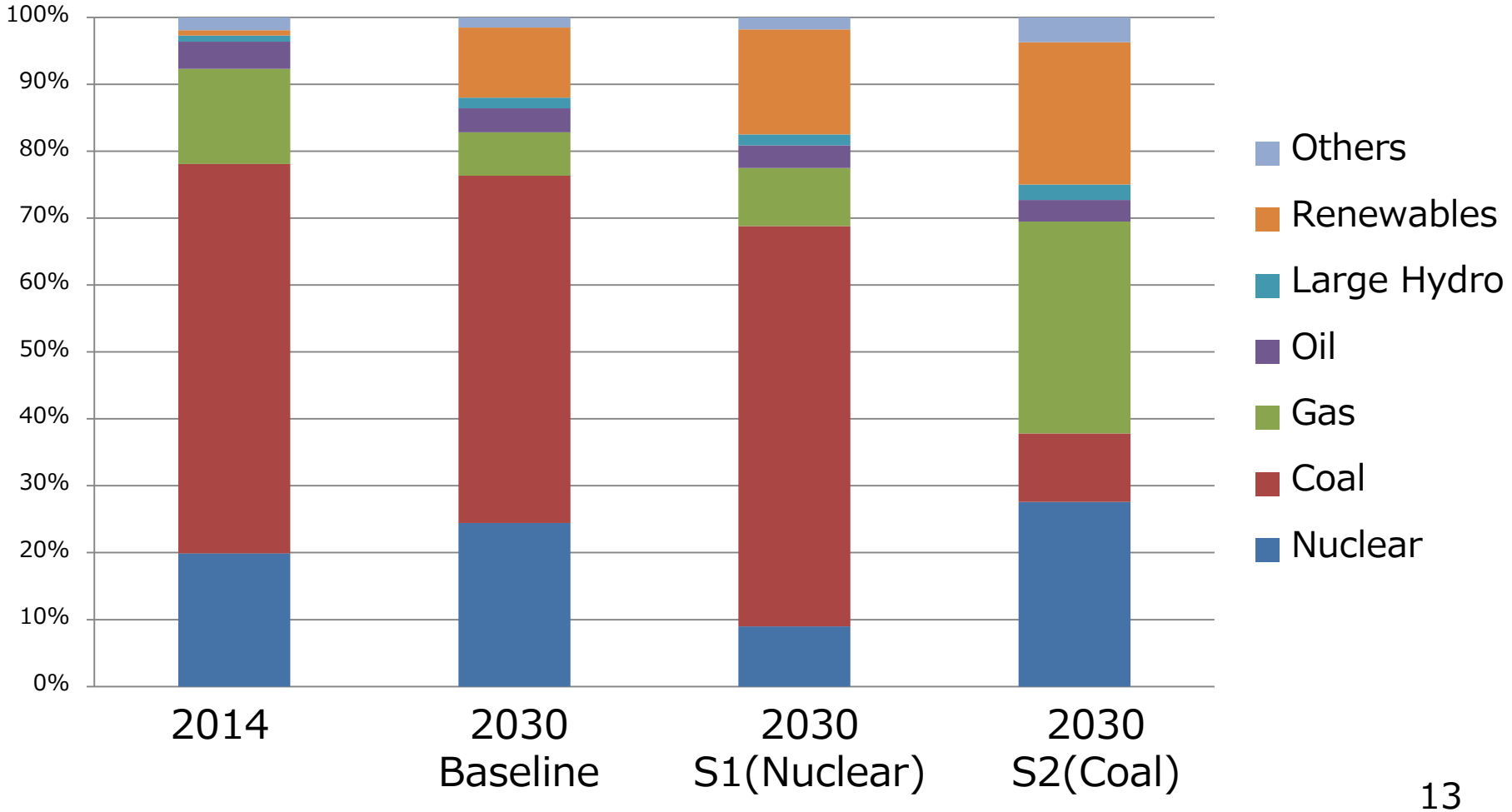
Japan

Economic indicators & CO_2 emissions
(difference from baseline, 2030, %)

	S1(Nuclear)	S2(Coal)
GDP	-0.57	-0.49
CO_2	2.93	-27.68
Employment	-0.18	-0.57
Consumption	-0.74	-2.59
Investment	-0.08	-0.61
Export	-0.05	0.01
Import	0.04	-4.69
Consumer price	0.79	2.86
Electricity price	14.46	59.16
Nominal wage	0.46	1.24
Electricity demand	-4.95	-15.44

Individual results (5)

Korea genaration share by tech. (%)



Individual results (6)

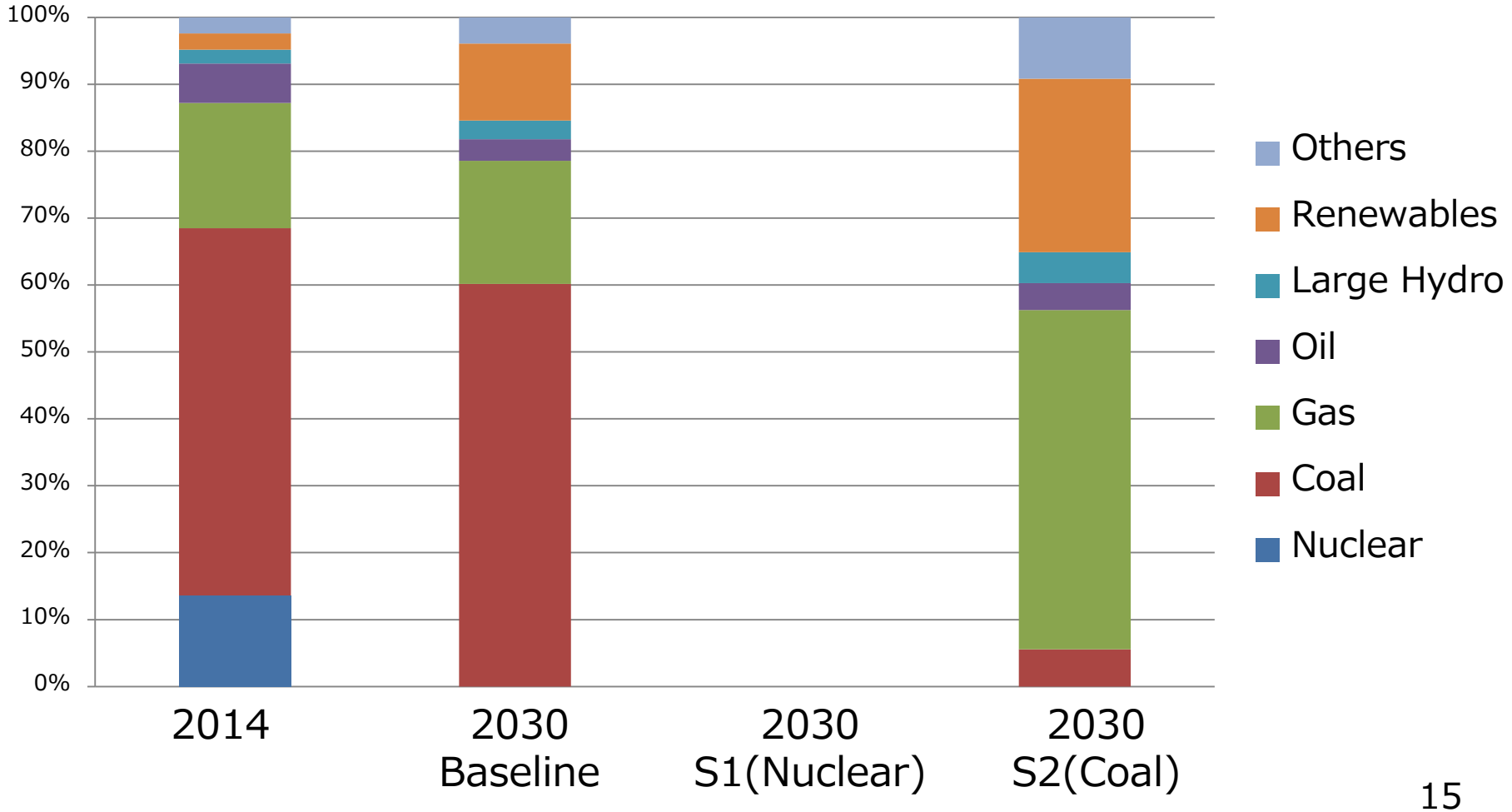
Korea

Economic indicators & CO_2 emissions
(difference from baseline, 2030, %)

	S1(Nuclear)	S2(Coal)
GDP	0.32	0.01
CO_2	10.68	-27.76
Employment	0.05	-0.02
Consumption	-0.29	-1.27
Investment	2.23	2.14
Export	0.02	0.29
Import	0.10	0.13
Consumer price	0.37	1.63
Electricity price	14.57	55.98
Nominal wage	0.11	0.97
Electricity demand	-3.06	-11.05

Individual results (7)

Taiwan genaration share by tech. (%)



Individual results (8)

Taiwan

Economic indicators & CO_2 emissions
(difference from baseline, 2030, %)

	S1(Nuclear)	S2(Coal)
GDP	-	-0.08
CO_2	-	-42.78
Employment	-	0.08
Consumption	-	-1.50
Investment	-	2.16
Export	-	0.80
Import	-	0.07
Consumer price	-	1.81
Electricity price	-	74.84
Nominal wage	-	1.00
Electricity demand	-	-14.79

Harmony of Policy

Comparison between individual implementation and harmony of policy in four regions

	S1 (Nuclear)		S2 (Coal)	
	Individual	Harmony in four regions	Individual	Harmony in four regions
CN	-0.16	-0.16	1.76	1.75
JA	-0.57	-0.57	-0.56	-0.49
KR	0.32	0.32	-0.12	0.01
TW	-	0.00	-0.28	-0.08

5. Conclusion

○Constraints on nuclear (S1)
increases CO2 emissions to some extent

○Constraints on coal (S1)
decreases CO2 emissions to some extent

○Direct regulation on coal may not be realistic
carbon pricing should have similar effect

5. Conclusion (cont.)

○Impact to the economies are small in each scenario
positive: fuel import decrease, investment increase
negative: higher electricity price

○Harmonised constraints have smaller negative effect to the economies than individual constraints
←especially for JA, KR, TW,
facing severe international competition


Thank you for your kind attention!