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Development of AIM/Enduse in world regions

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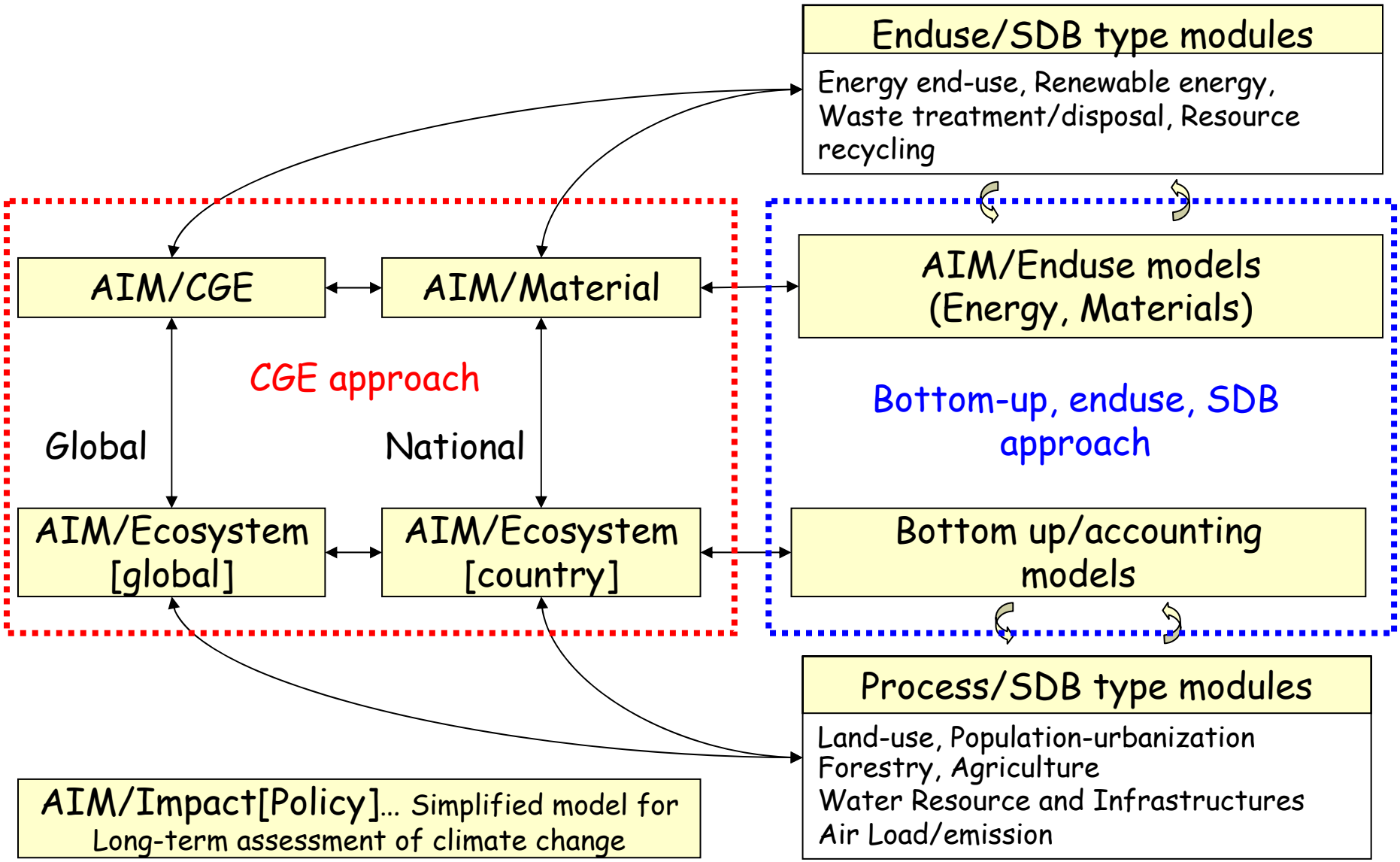
Overview of AIM family



Feature of AIM/Enduse[Global]

Regional scale: **21 global regional aggregations**

⇨ **but, improve detail data in a national level**

Temporal scale: **2000 (Base year) – 2020 (Target year)**

⇨ **but, plan to extend upto 2050**

Gas classifications: **CO_2, CH_4, N_2O, HFC, PFC, SF_6, (CFC, HCFC)**

⇨ **but plan to consider SO_2, NOx, PM, BC/OC**

Sector classifications: **Multiple sectors**

Sector coverage

Sector classifications:

- Power generation sector	: Hibino
- Industry sector	: Hibino
- Residential sector	: Miyashita
- Commercial sector	: Miyashita
- Transport sector	: Akashi
- Agriculture sector	: Pandy → Hanaoka
- CH_4 & N_2O emissions	: Nair → Hanaoka
- F-gas emissions	: Hanaoka
- Energy supply & price	: Fujino

Geographical coverage

Region	Code
1) Japan	JPN
2) China	CHN
3) India	IND
4) Indonesia	IDN
5) Korea	KOR
6) Thailand	THA
7) Other South-east Asia	XSE
8) Other South Asia	XSA
9) Middle East	XME
10) Australia	AUS
11) New Zealand	NZL
12) Canada	CAN
13) USA	USA
14) EU-15 in Western Europe	XE15
15) EU-10 in Eastern Europe	XE10
16) Russia	RUS
17) Argentine	ARG
18) Brazil	BRZ
19) Other Latin America	XLM
20) Africa	XAF
21) Rest of the World	XRW

Asia regions in detail

Preliminary Results

Results presented at

Informal Experts Meeting on Modeling Activities dealing with Climate Change

organized by Ministry of Foreign Affairs, in September 2004

We focused on:

to estimate marginal abatement costs and evaluate GHG mitigation potentials in world regions in 2020.

- **Region-wise** mitigation potentials and costs
- **Sector-wise** mitigation potentials and costs

Outline of simulation

- Target Year: **2020**
- Discount rate:
  (1) **5% (private & public)**
  (2) **33%(private), 10% (public)**
- Simulation cases
  - ✓ **Reference case (technology-frozen case)**
    i.e.) the case under existing technology options with the same technical and economic characteristics as in 2000
  - ✓ **Advanced technologies case**
    i.e.) the market selections of realistic advanced technologies

Reduction potentials and abatement costs

Reduction potentials in 2020

Mt-CO2

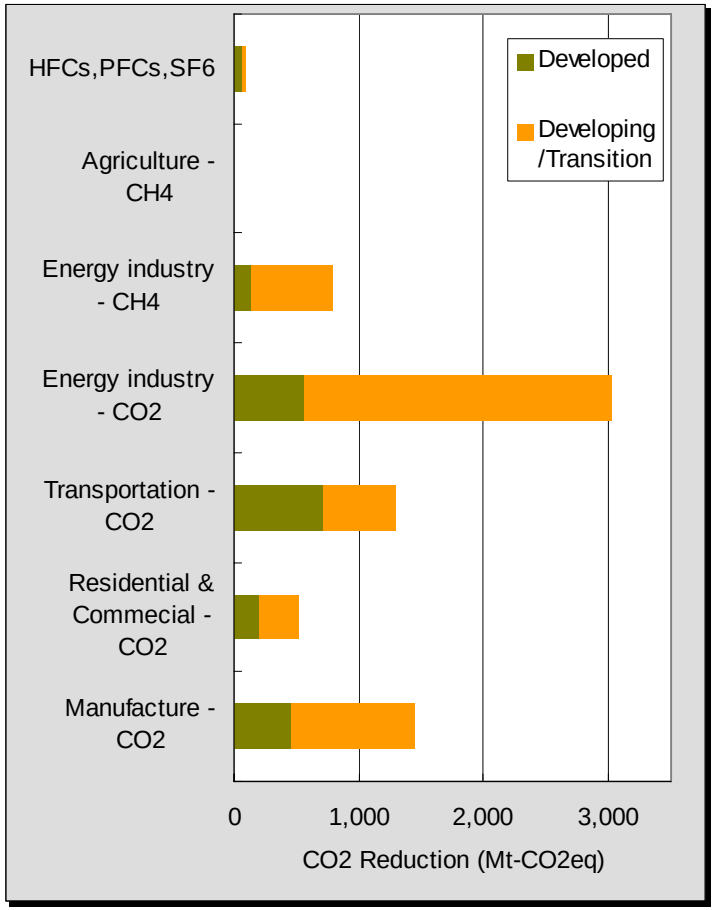
Discount rate		5%			33%(Private), 10%(Public)		
Marginal abatement cost 2000US$		< 0	< 100	< 300	< 0	< 100	< 300
CO2	Steel	395	571	642	338	486	546
	Other manufacture	1,045	1,850	1,855	196	1,195	1,898
	Indutry total	1,440	2,421	2,496	533	1,682	2,444
	Residential	210	330	351	22	110	281
	Commercial	307	474	483	56	275	373
	Transportation	1,298	1,826	2,481	448	542	1,233
	Agriculture	0	0	0	0	0	0
	Others	0	0	0	0	0	0
	Power generation	3,026	3,366	3,526	3,010	3,082	3,463
	Total	6,282	8,417	9,337	4,069	5,690	7,795
CH4	Agriculture	0	42	330	0	32	152
	Energy	797	2,005	2,005	478	2,001	2,005
	Total	797	2,048	2,335	478	2,033	2,158
N2O		-	-	-	-	-	-
HFCs,PFCs,SF6 (4%)		84	796	859	-	-	-
Total		7,163	11,260	12,531	4,548	7,723	9,953

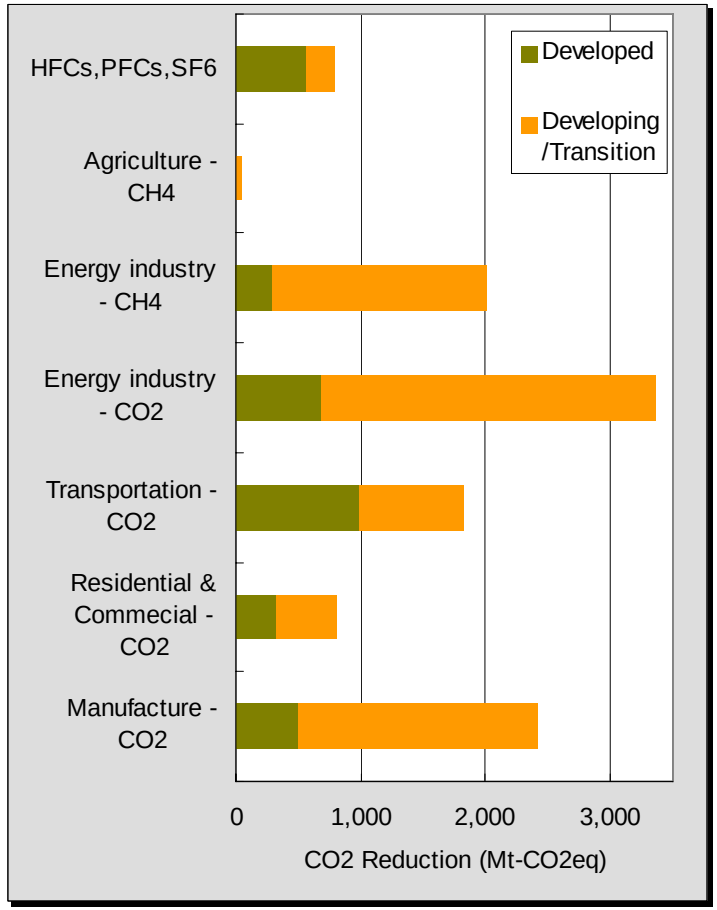
in the year 2020

Regional Breakdown: Reduction potentials

in the year 2020

Discount rate = 5%





< US$ 0, 2020

2.1 Gt-CO2 and 5.0 Gt-CO2

(Developed and Developing/Transition)

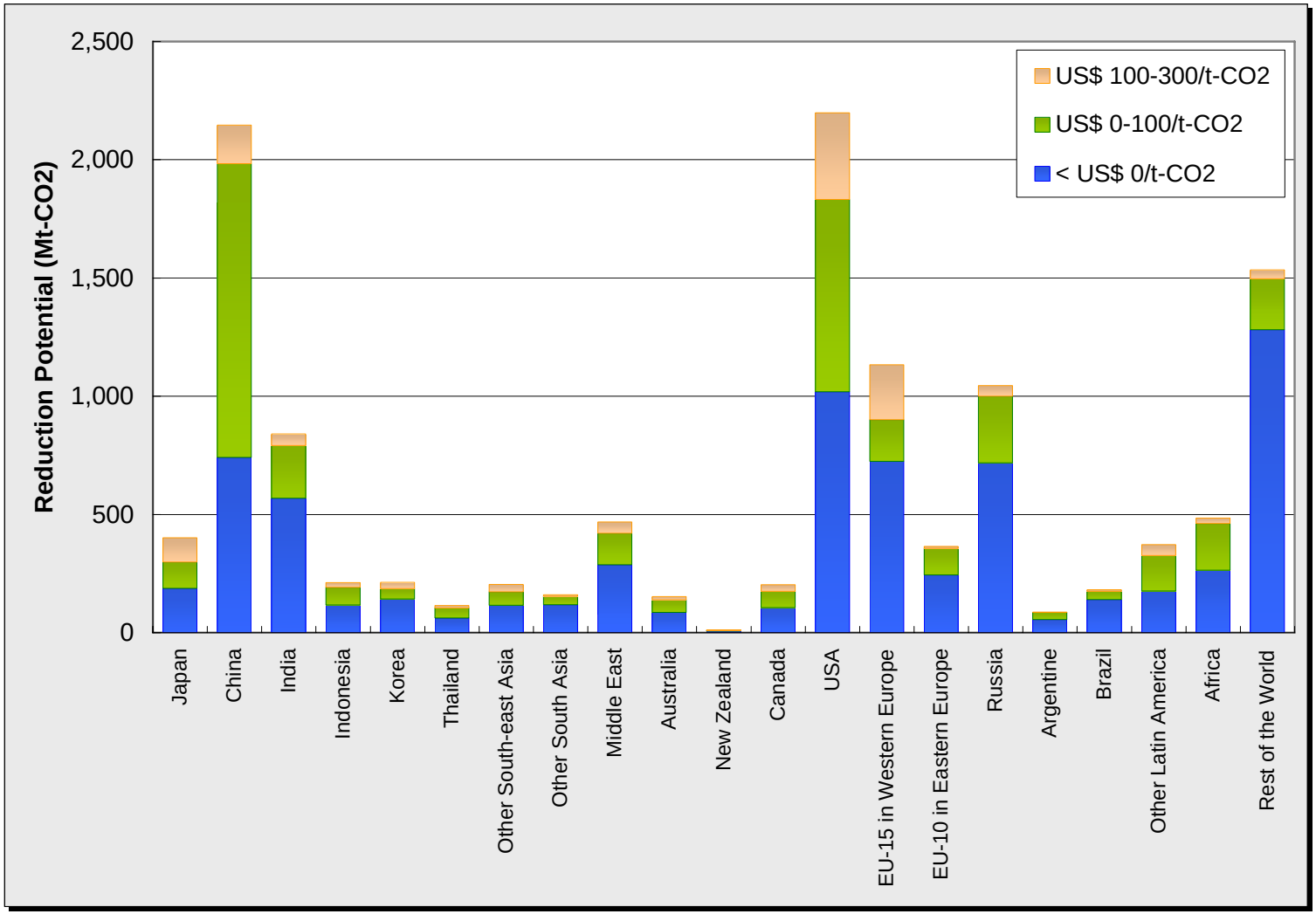
< US$ 100, 2020

3.4 Gt-CO2 and 7.9 Gt-CO2

(Developed and Developing/Transition)

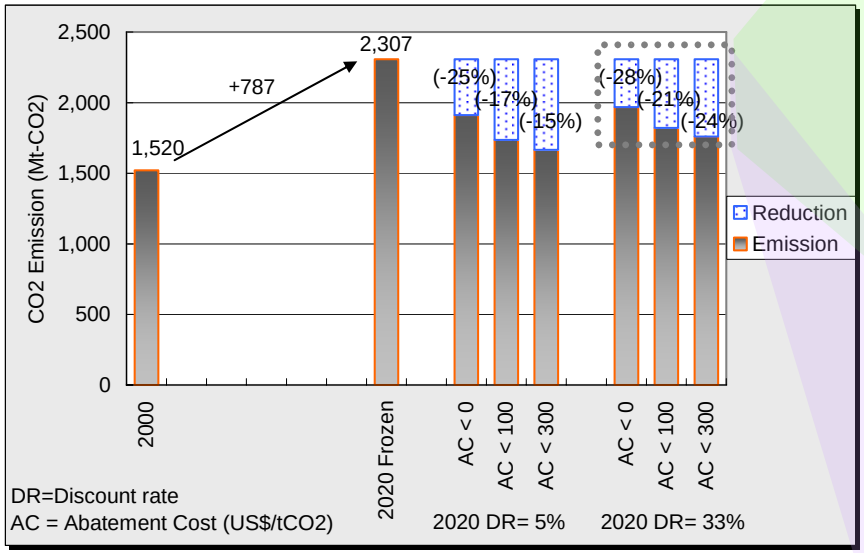
Reduction potentials in 21 regions

in the year 2020 **Discount rate = 5%**

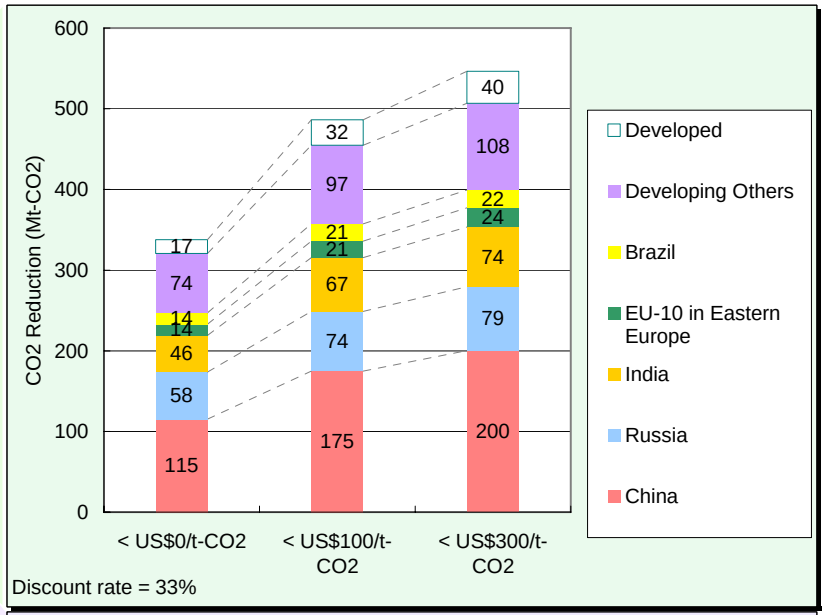


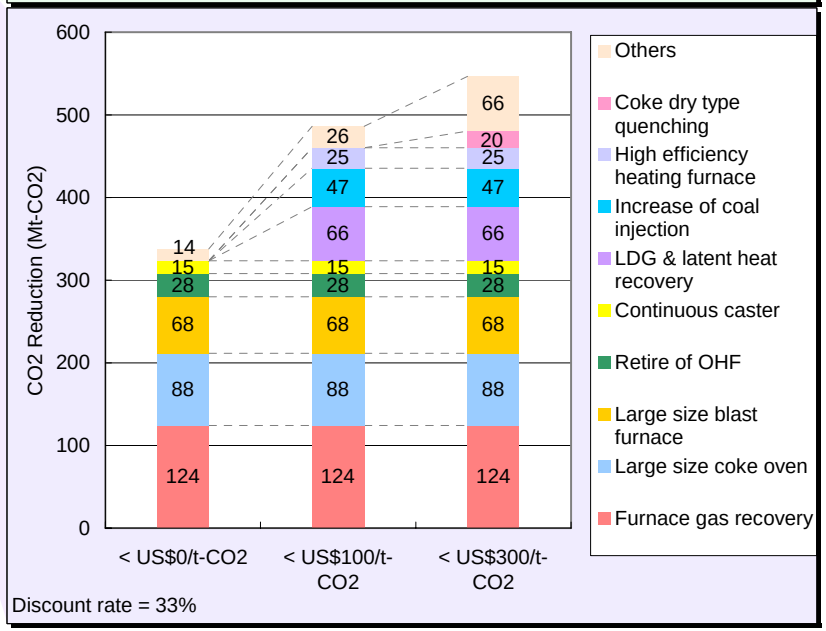
Reduction potentials in steel sector

Steel production contributes to the largest CO2 emissions share in industry sector



Discount Rate	Abatement Cost US$/tCO2	CO2 Reduction	
		Mt-CO2	vs frozen
33%	less than 0	338	15%
	less than 100	486	21%
	less than 300	546	24%
5%	less than 0	395	17%
	less than 100	571	25%
	less than 300	642	28%





Technology with large reduction potentials

under 100 US$ marginal abatement costs in 2020

Developed	(MtCO2)	Developing/Transition	(MtCO2)
High efficiency gasoline engine (VVLT, GDI etc)	632	Existing type of power plant (coal ,gas)	2,462
Existing type of power plant (coal ,gas)	546	Use of instrument air, low bleed pneumatic devices*	676
Inverter control for motor	216	Gas high efficiency industrial furnace	449
Fluorescent of incandescent type	143	Inverter control for motor	431
Domestic refrigeration: recovery	129	Coal bed methane ventilation oxidizer for heat**	232

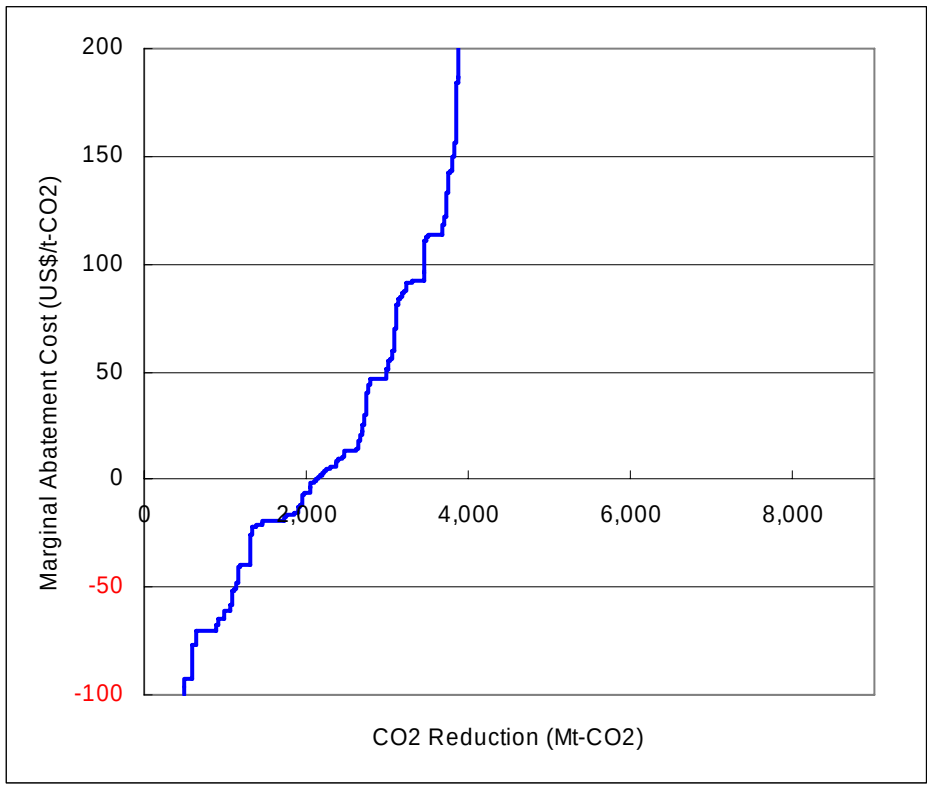
*** Recovery of CH4 leakage from natural gas pipeline and well**
**** Recovery of CH4 in coal mine**

(Discount rate = 5%)

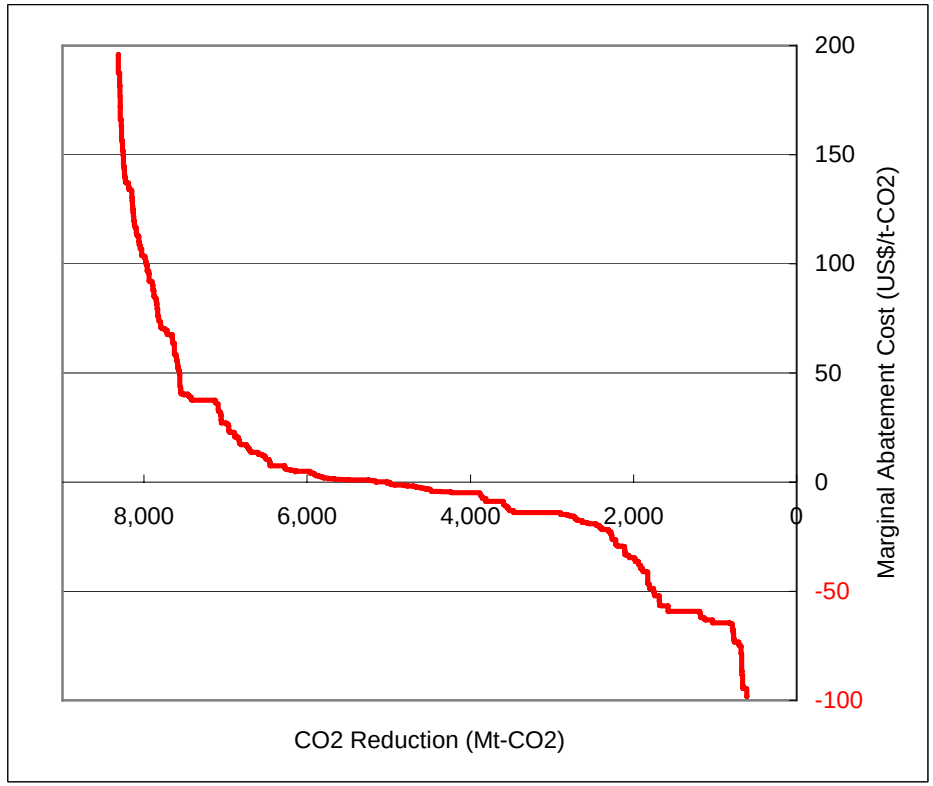
Marginal abatement cost of developed and developing countries in 2020

(Discount rate = 5%)

left-right reversal

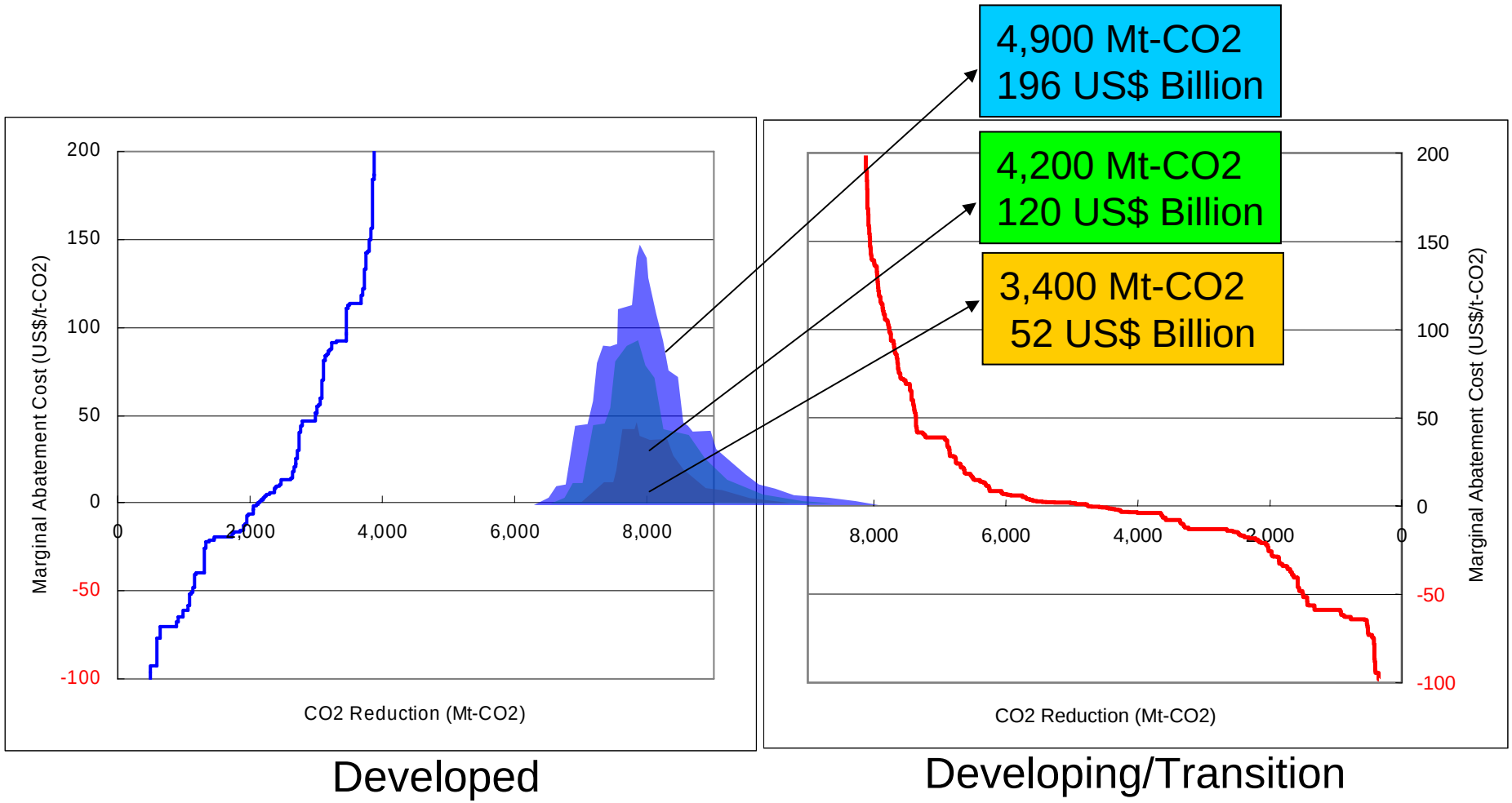


Developed



Developing/Transition

Marginal abatement cost of developed and developing/transition economies



(Discount rate = 5%)

Preliminary Findings: How much reduction could be possible?

- ✓ Global reduction potential in 2020:
  - 4.5 - 7.2 Gt-CO2eq in no-regret case
  - 7.7 - 11.3 Gt-CO2eq under 100 US$/t-CO2 marginal costs

  if we move into action and take countermeasures now.

- ✓ Regional reduction potential in 2020 (5% discount rate) :
  - in no-regret case:
  - 2.1 Gt-CO2eq and 5.0 Gt-CO2eq
  - under 100 US$/t-CO2 marginal abatement costs:
  - 3.4 Gt-CO2eq and 7.9 Gt-CO2eq

  in developed countries and developing/transition economies, respectively

It is essential to set up frameworks considering transfers of technologies and financial aid to the developing regions.

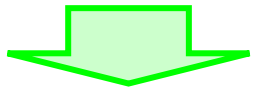
Remaining issues

1. Update of database such as new advanced technologies, grass-roots countermeasures.

This analysis was based on realistic technologies with current cost estimates. Therefore, it may be possible to reduce more if new advanced technologies become available in the future.

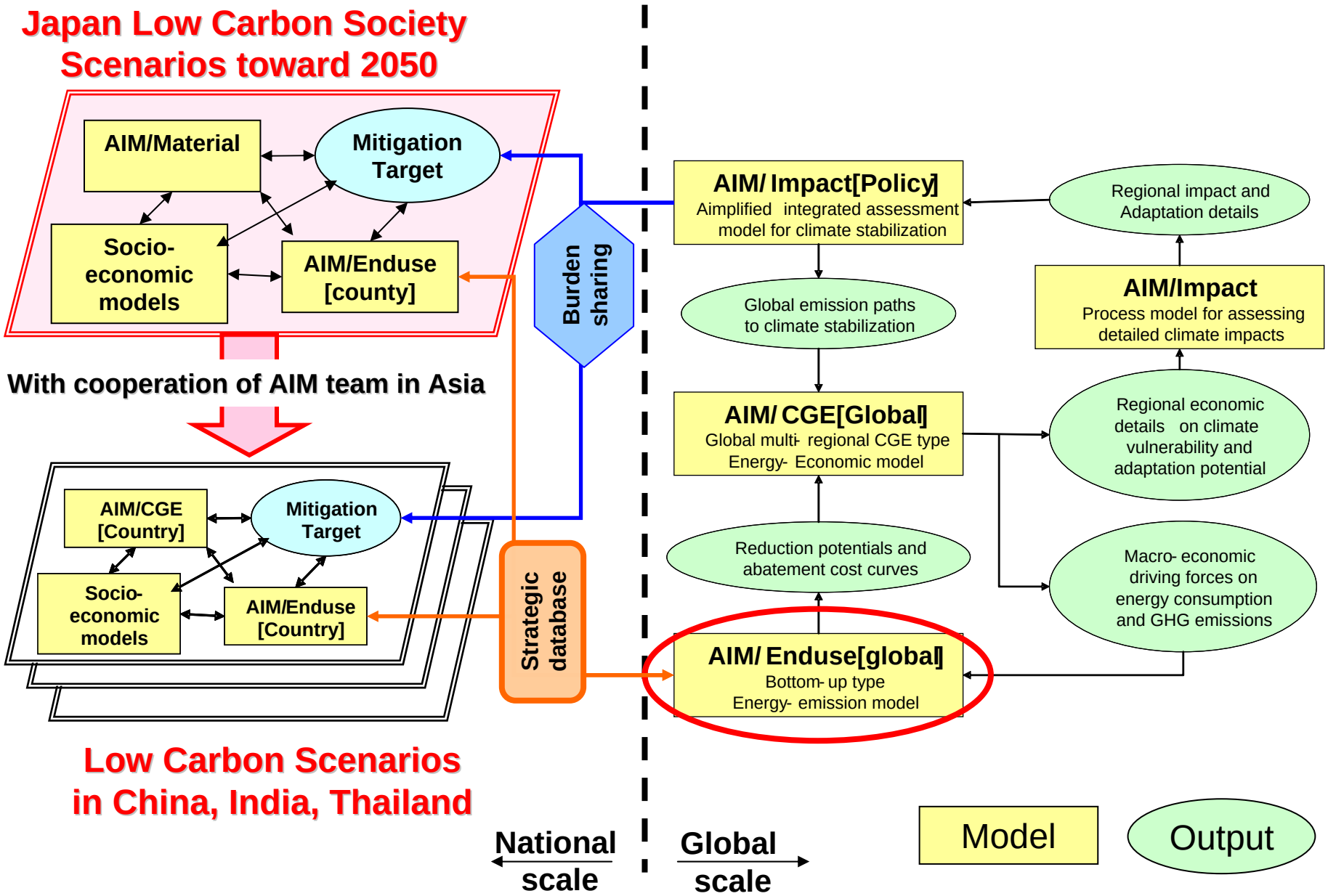
2. Future scenarios and determination of service demands of enduse services in each sector.

3. Hard-linkage among sector models



We have been developing database and considering more appropriate methods how to determine service demands in each sector.

Current Major Projects



Further Cooperation among AIM team

In the near future, we appreciate cooperation:

- Update of Strategic Database

- Data of dwelling types in Residential sector

- Data of person trip in transport sector

- Data of BC

and so on,

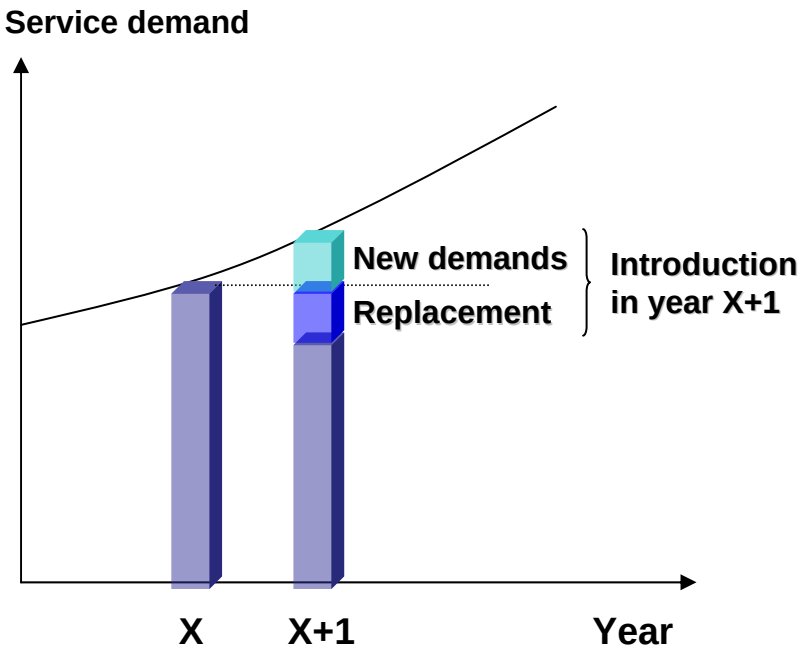
and so on,

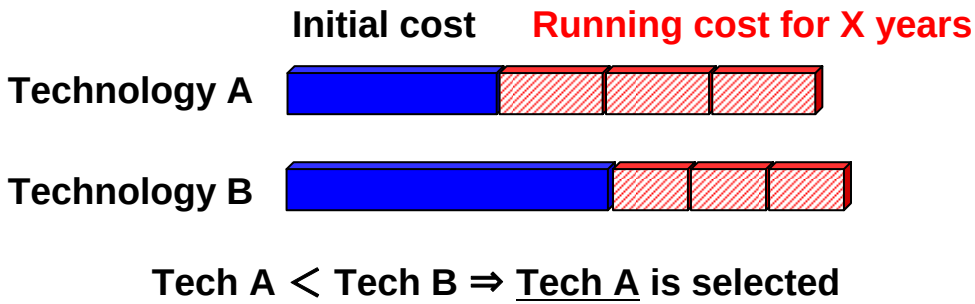
and so on…

Thank you very much for your cooperation!

その他予備資料

Logic of technology selection

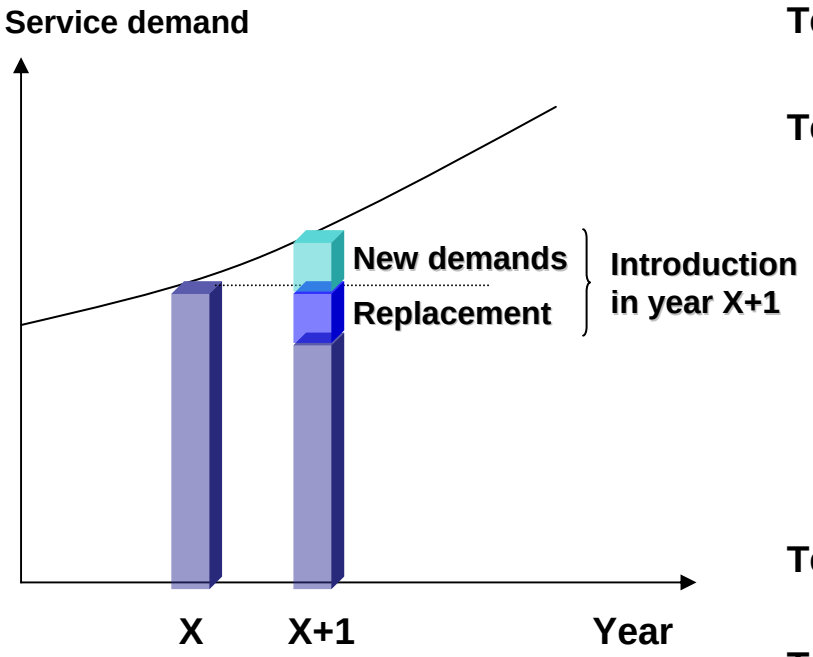


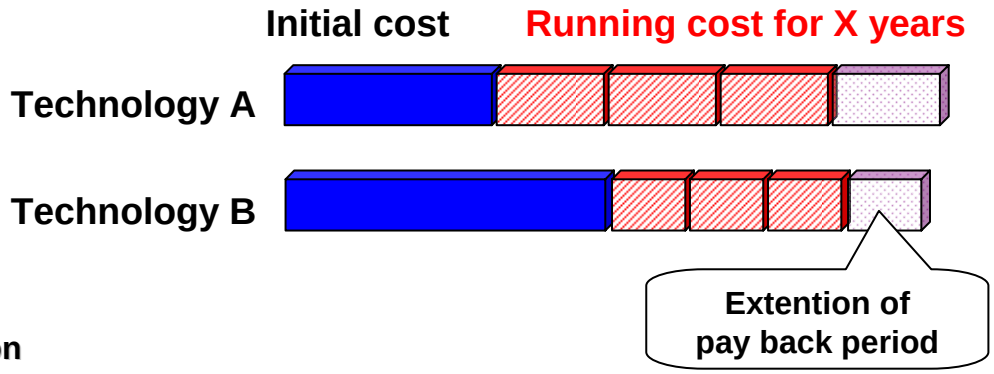


As private industries take into account high investment risk for energy conserving technologies, **a payback period of 3-years** is usually assumed.
e.g.)
the discount rate corresponding to 3-years payback is about 33% based on the assumption of 30 years lifetime for steel plants.

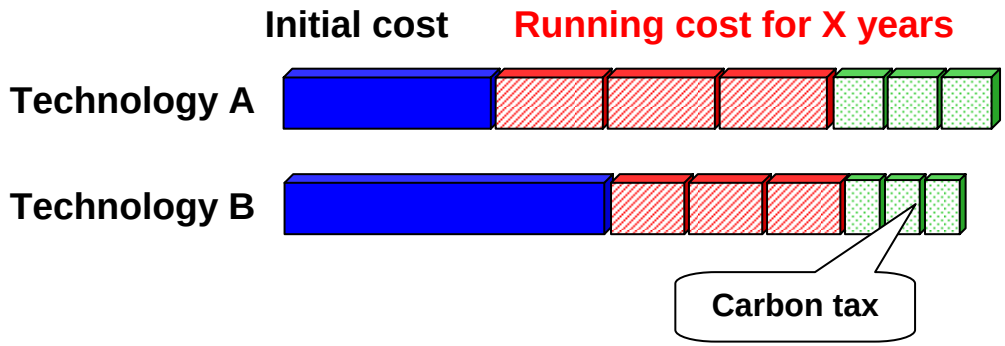
Logic of technology selection

(1) Replacement, new demands





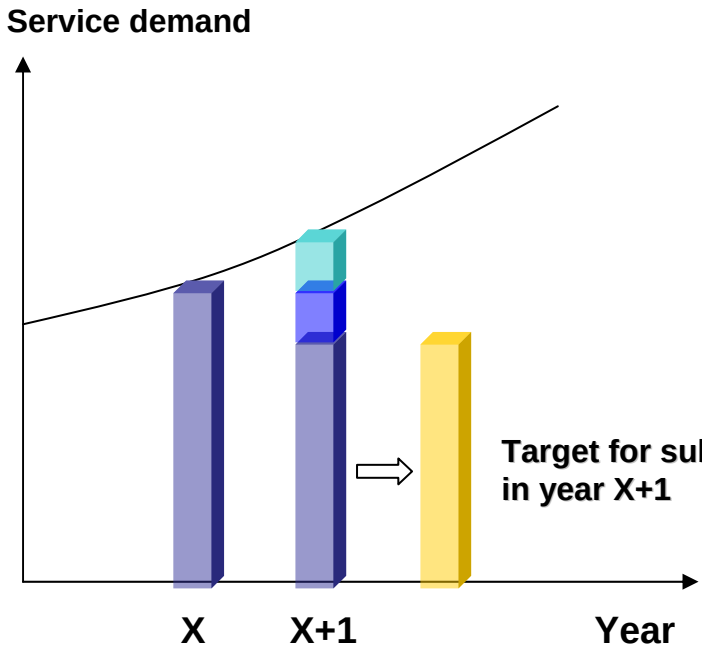
Tech A < Tech B ⇒ Tech B is selected

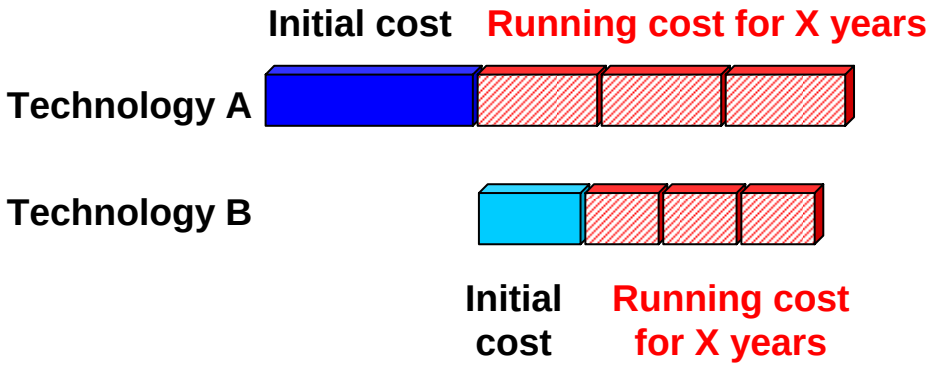


Tech A < Tech B ⇒ Tech B is selected

Logic of technology selection

(2) Substitution of existing technology





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