Perspective of CDM collaboration between China and Japan:
A case study for Steel Industry

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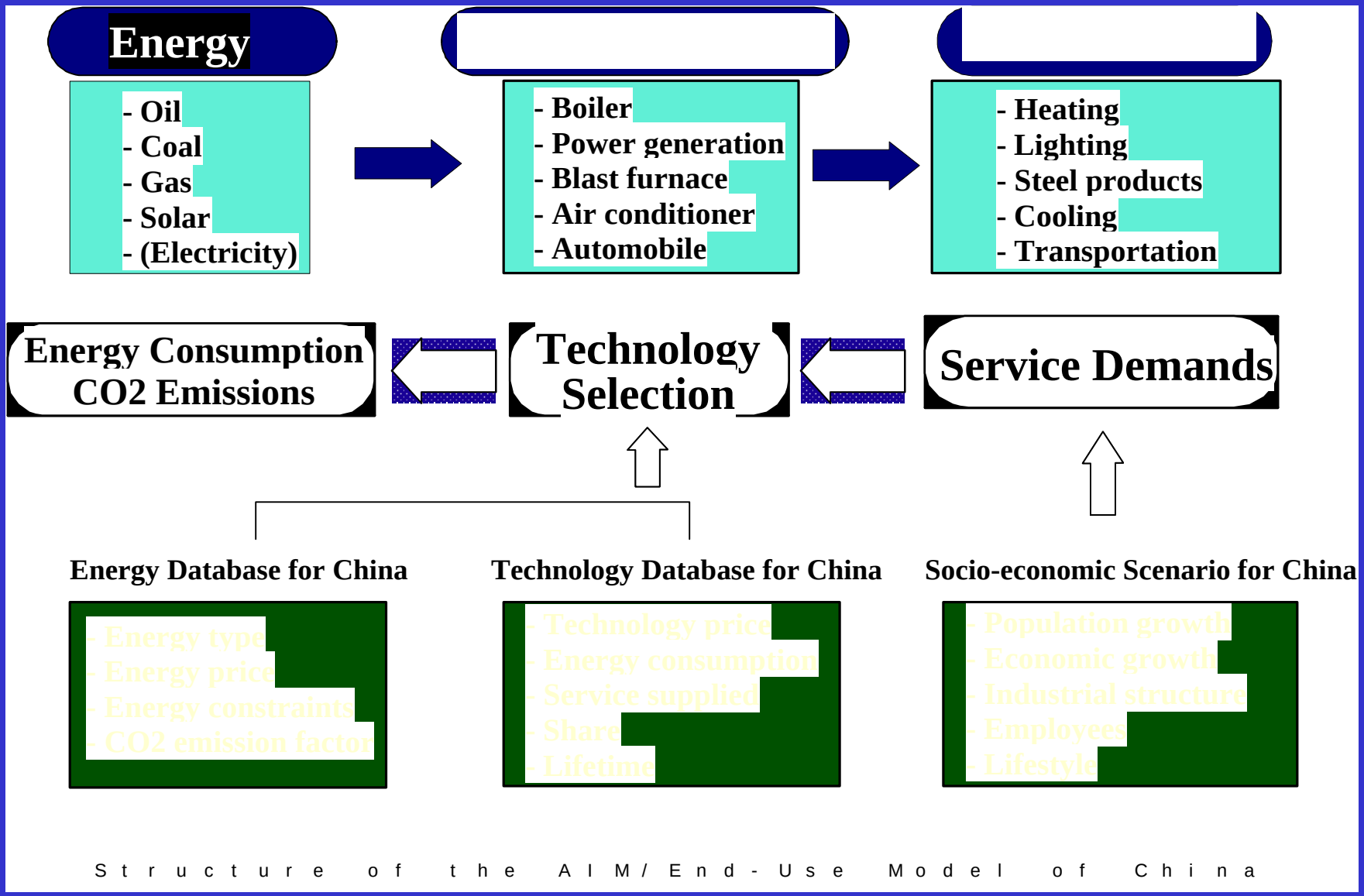
Objectives

- Explore the possible potential for CDM implementation in steel industry in China
- Identify the effect of various factor of CDM on the implementation, such as baseline selection, CO2 price, and investment
- Discuss the affect of various price of CO2 emission reduction credit on the investment, criteria to select possible technologies to be candidate for CDM project and identify the possible technologies

Methodology

- Potential: AIM/Enduse by combining Japanese data and Chinese data
- Cost analysis: sectoral level technology based analysis

Medium-term emission scenarios: framework of AIM/End use

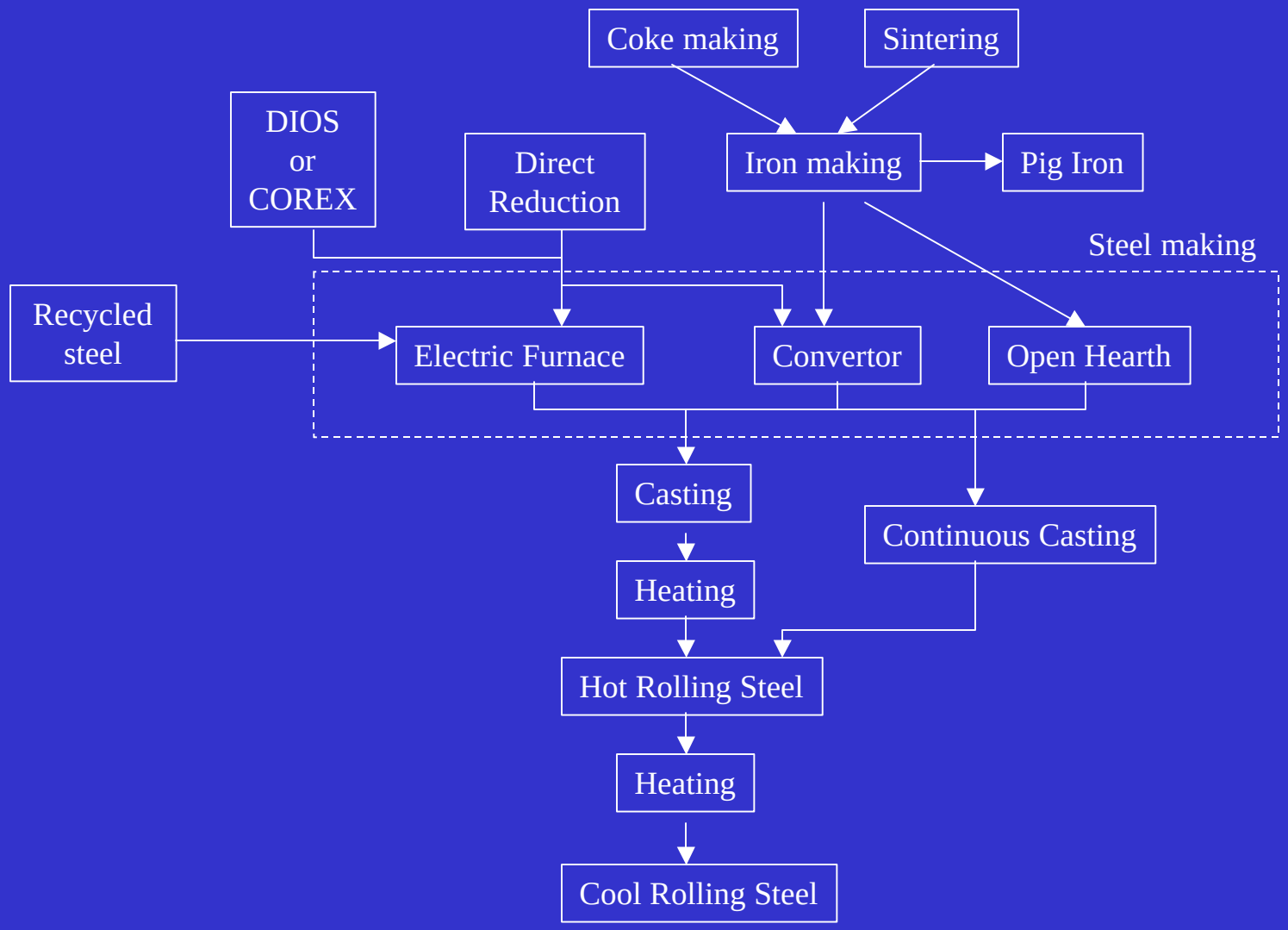


Structure of the AIM/End-Use Model of China

Sectors in AIM/End use of China

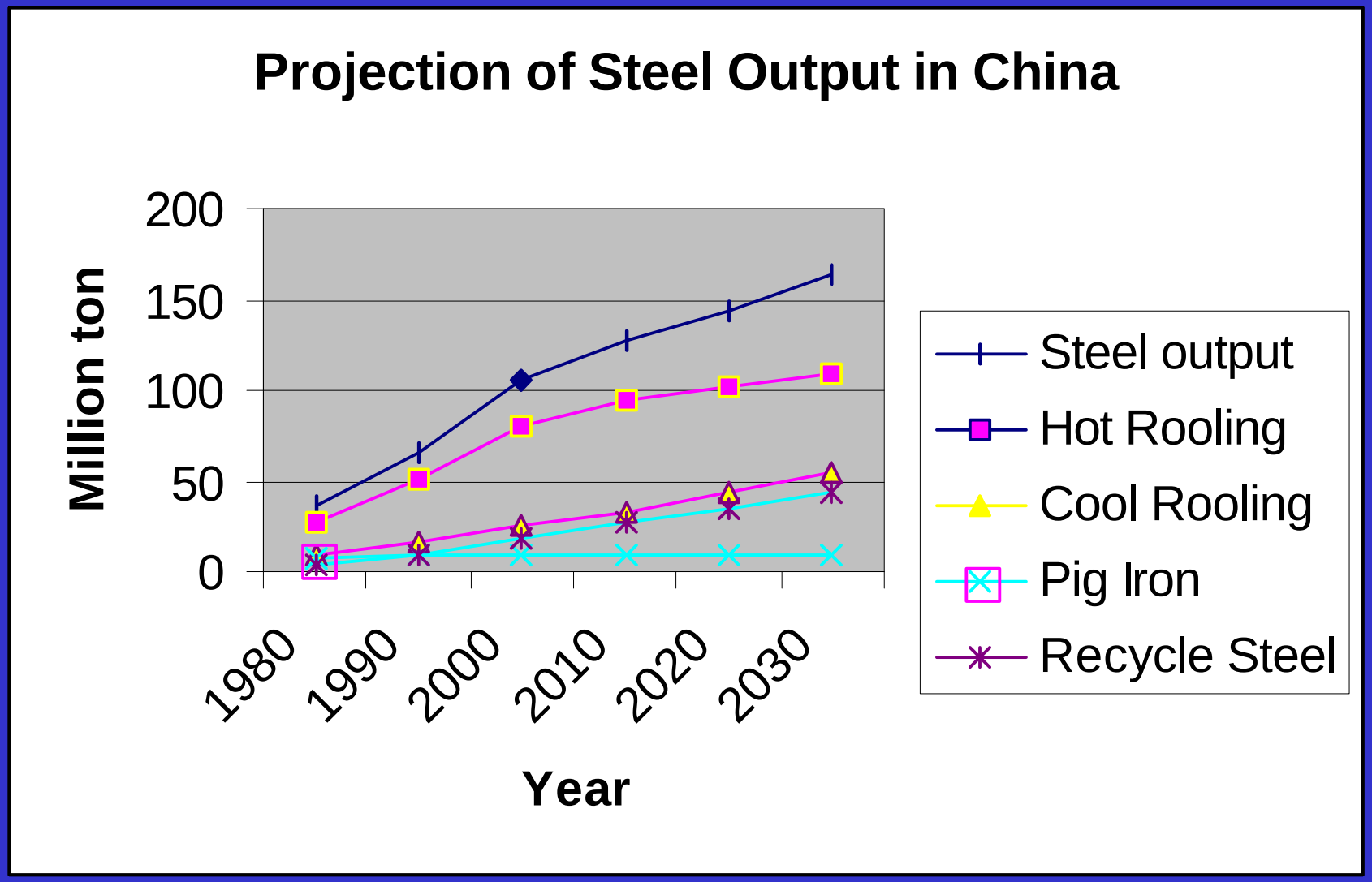
Sector	Sub-Sector	Simulation for 2010	Simulation for 2030
Agriculture		v	
Industry	Iron and Steel	v	v
	Copper	v	v
	Aluminum	v	v
	Zinc&Lead	v	v
	Cement	v	v
	Glass	v	v
	Brick	v	v
	Lime	v	v
	Ammonia	v	v
	Ethylene	v	v
	Soda Ash	v	v
	Caustic Soda	v	v
	Fertilizer	v	
	Calcium	v	
	Paper Making	v	v
	Textile	v	
	Casting	v	
	Heat Treatment	v	
	Forging	v	
	Cutting	v	
	Other Industry	v	
Energy Conversion	Power Generation	v	
	Refinery	v	
Transport		v	v
Commercial Sector		v	v
Residential Sector	Urban Resident	v	v
	Rural Resident	v	v

Steel production process in China



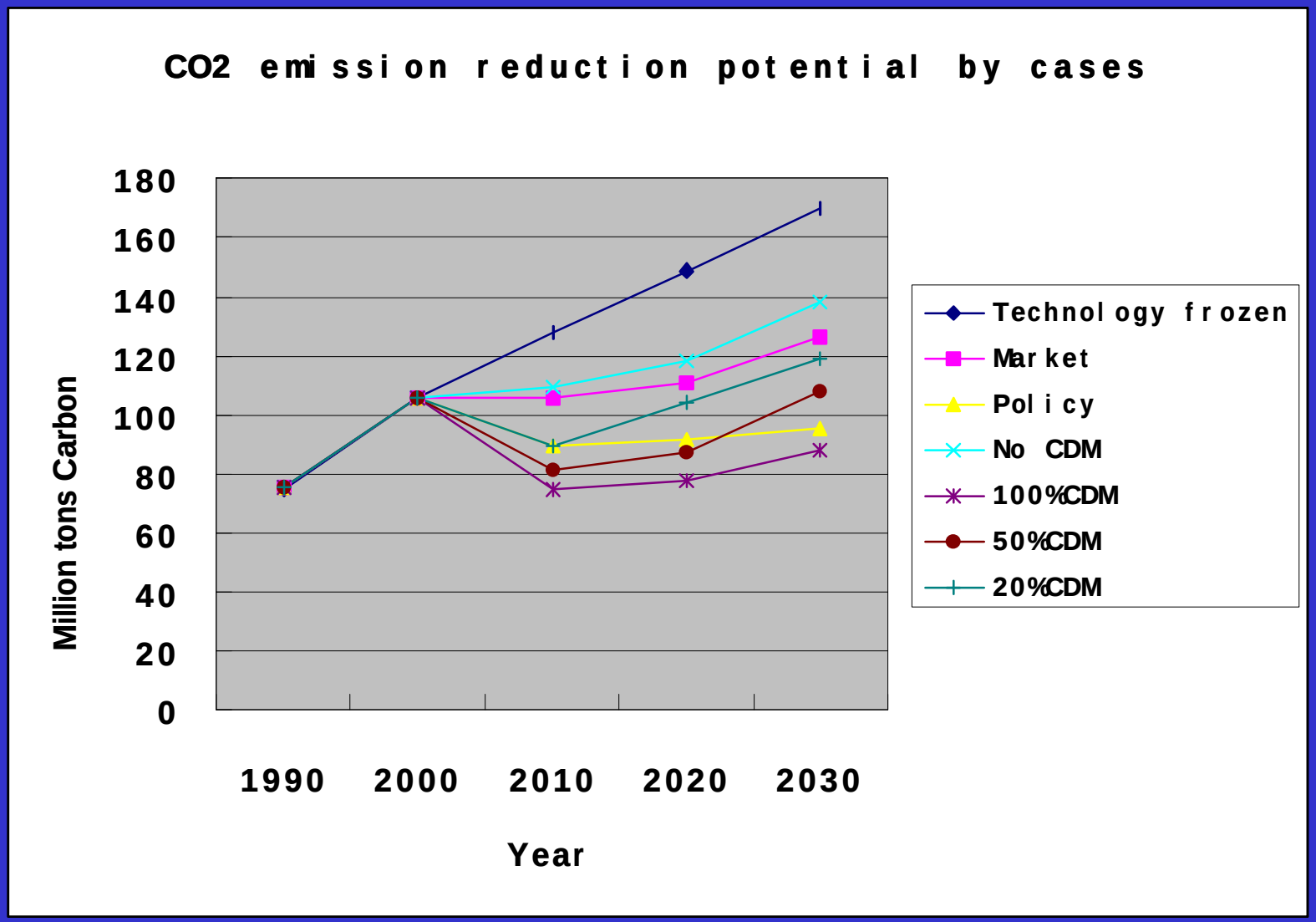
Technology List

Process	*Technology*	*Process*	*Technology*
Coking	Small Size Coke oven	Electric Furnace	AC-electric arc furnace
	Large Size Coke oven		Large Size AC-electric arc furnace
	Coke oven in Japan		DC-electric arc furnace
	Advanced Coke oven in Japan		**AC-electric arc furnace in Japan**
coke quenching	coke wet quenching		DC-electric arc furnace in Japan
	coke dry quenching	Casting	Primary Casting Machine+Heating Furnace
Sintering	Small Size Sintering machine		Advance Primary Casting Machine+Heating Furnace
	Large Size Sintering machine		Continuous Casting
	Sintering machine in Japan		Advance Continuous Casting
Blast Furnace	Small Size Blast Furnace	Hot Steel Rolling	Steel Rolling Machine
	Large Size Blast Furnace		Large Steel Rolling Machine
	Large Size Blast Furnace Used in Industrialized Countries		**Steel Rolling Machine in Japan**
	Blast Furnace with Wet TRT		**Direct Steel Rolling Machine**
	Blast Furnace with Dry TRT	Cool Steel Rolling	Steel Rolling Machine
Coal Power Injection	With out Coal Powder Injection		Large Steel Rolling Machine
	Coal Powder Injection by 100kg/t		**Steel Rolling Machine in Japan**
	Coal Powder Injection by 250kg/t		Direct Steel Rolling Machine
Steel Making	Small Size Converter		Cool Steel Mill
	Large Size Converter		Advance Cool Steel Mill
	Converter with Gas Recovery	Power Supply	Purchased Electricity
	Open Health Furnace		Power Generation in Plant
	DIOS		Electricity from Coke Dry Quenching
	COREX		Electricity from TRT


Projection of Steel Output in China
Million ton
200
150
100
50
0
1980
1990
2000
2010
2020
2030
Year
Steel output
Hot Rooling
Cool Rooling
Pig Iron
Recycle Steel

AIM/Enduse Framework

- No CDM case, technology from Japan will not be selected in the simulation. Technology of China will be selected based on market
- 100% technology substitution through CDM by 2010. Selected technology from Japan could be introduced by 2010 by 100%.
- 50% technology substitution through CDM by 2010
- 20% technology substitution through CDM by 2010


CO2 emission reduction potential by cases
Million tons Carbon
180
160
140
120
100
80
60
40
20
0
1990
2000
2010
2020
2030
Year
Technology frozen
Market
Policy
No CDM
100%CDM
50%CDM
20%CDM

Parameters for CDM on coke dry quenching

Item	Unit	Parameters
CO2 Emission Reduction	Kg-C	61.3
Fixed cost increase	Yuan/ton Coke	32
Reduction cost A	Yuan	243
Saved energy/material cost	Yuan/ton coke	46
Reduction cost B with 3 year PBP	Yuan	197

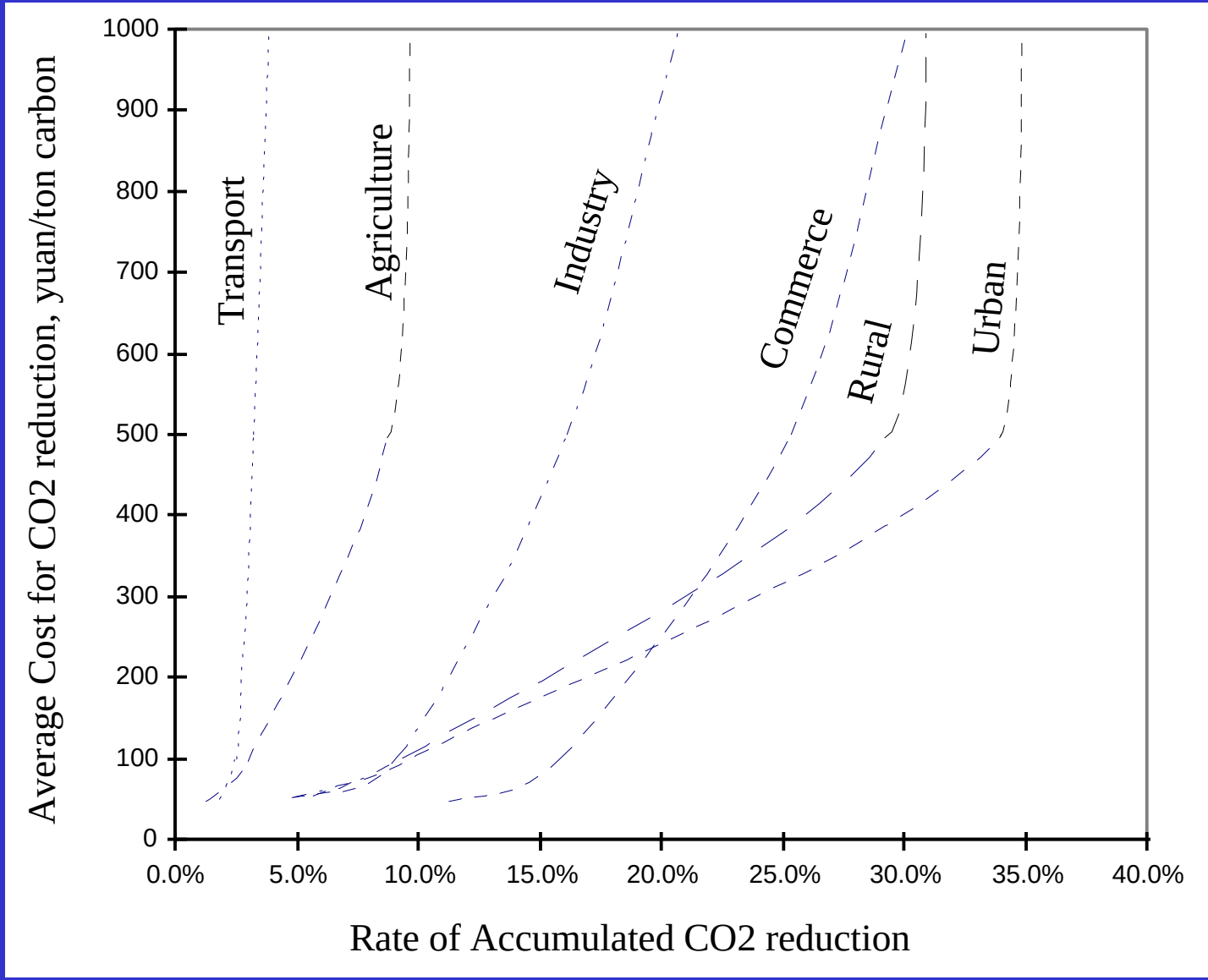
Comparison among various baselines

Item	Unit	Parameters
CO2 Emission Reduction	Kg-C	61.3
Fixed cost increase	Yuan/ton Coke	32
Reduction cost A	Yuan	350
Saved energy/material cost	Yuan/ton coke	86.3
Reduction cost B with 3 year PBP	Yuan	263

Small Coke Oven	48898	97796	244491	12648	-36249	-182944
Large Coke Oven	24942	49885	124713	36604	11661	-63166
Average Level	34524	69049	172624	27022	-7502	-111077
Coke dry quenching	12253	24506	61266	58618	46365	9606

Different price of CO2: baseline investment considered

	Additional B invest needed		
	100 yuan/t-C	200 yuan/t-C	500 yuan/t-C
Small Coke Oven	-21854	-70753	-217447
Large Coke Oven	-697	-25639	-100467
Average Level	-9160	-43685	-147259
Coke dry quenching	10873	1379	-38139


Average Cost for CO2 reduction, yuan/ton carbon
1000
900
800
700
600
500
400
300
200
100
0
0.0%
5.0%
10.0%
15.0%
20.0%
25.0%
30.0%
35.0%
40.0%
Rate of Accumulated CO2 reduction
Transport
Agriculture
Industry
Commerce
Rural
Urban