



# Impact Assessment of China's Climate Target towards 2020



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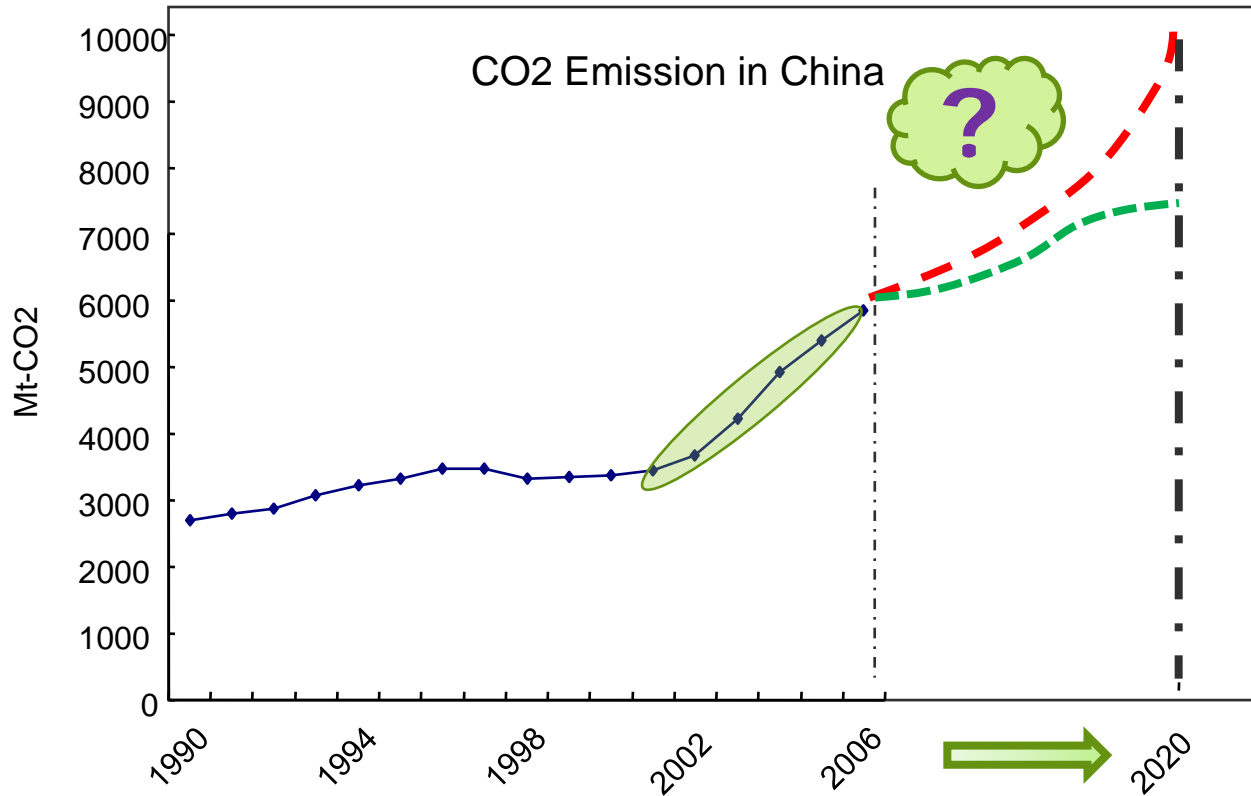


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# Background



- China has announced its climate target: reduce carbon intensity 40-45% by 2020 as compared to 2005 levels.
- What does it imply?

# Research Question

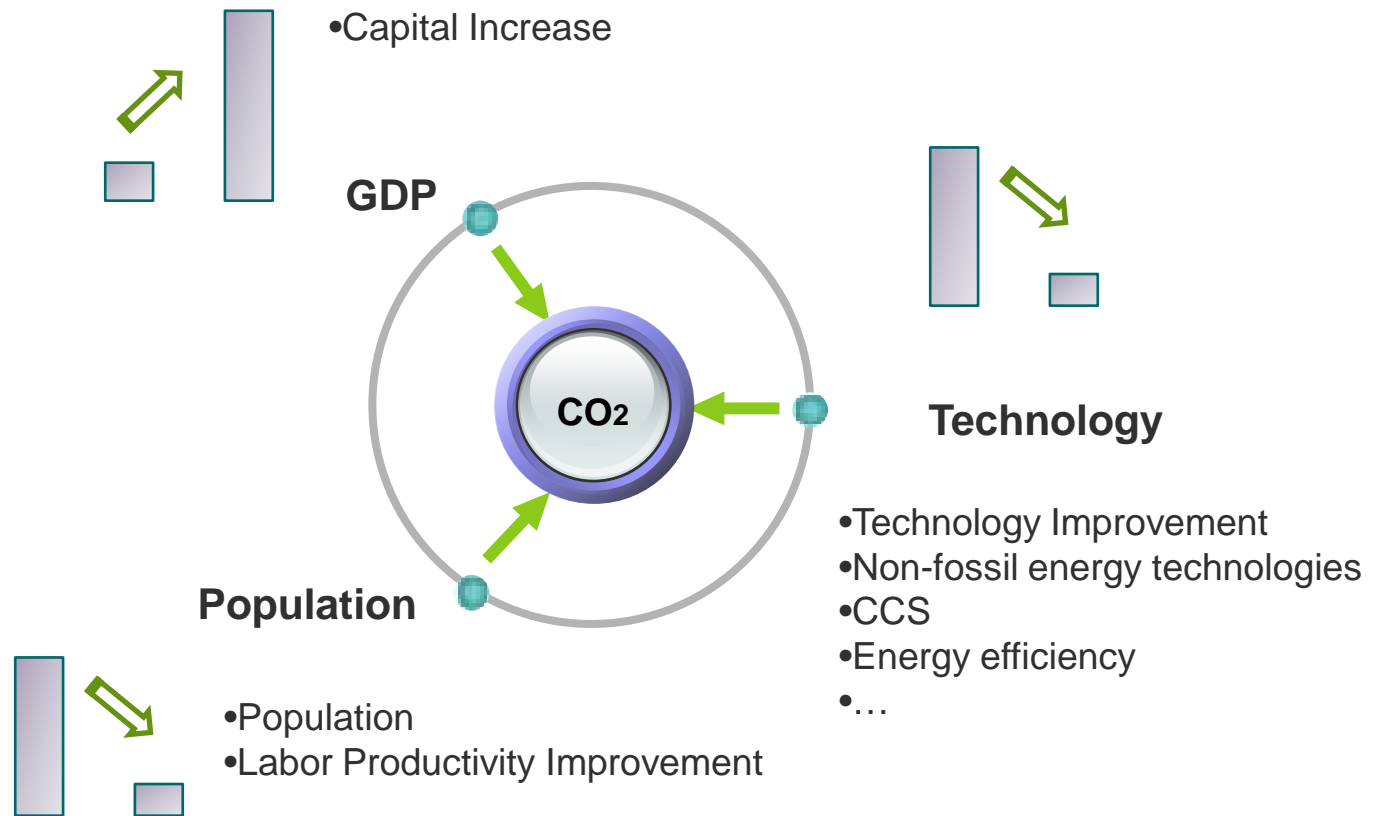
## ❖ Three underlying questions

- A. How to achieve the target?
- B. What are carbon reduction potentials sector by sector?
- C. Where will the impacts of carbon reduction lie?

# Methodology

- ❖ AIM/CGE[Country];
- ❖ Static CGE Model;
- ❖ 40 Sectors;
- ❖ With technology details in power sector;
- ❖ Base year 2005, target year 2020.

# How to achieve the target



- Driving force: GDP, Energy Intensity, and Carbon Intensity.

# Scenario

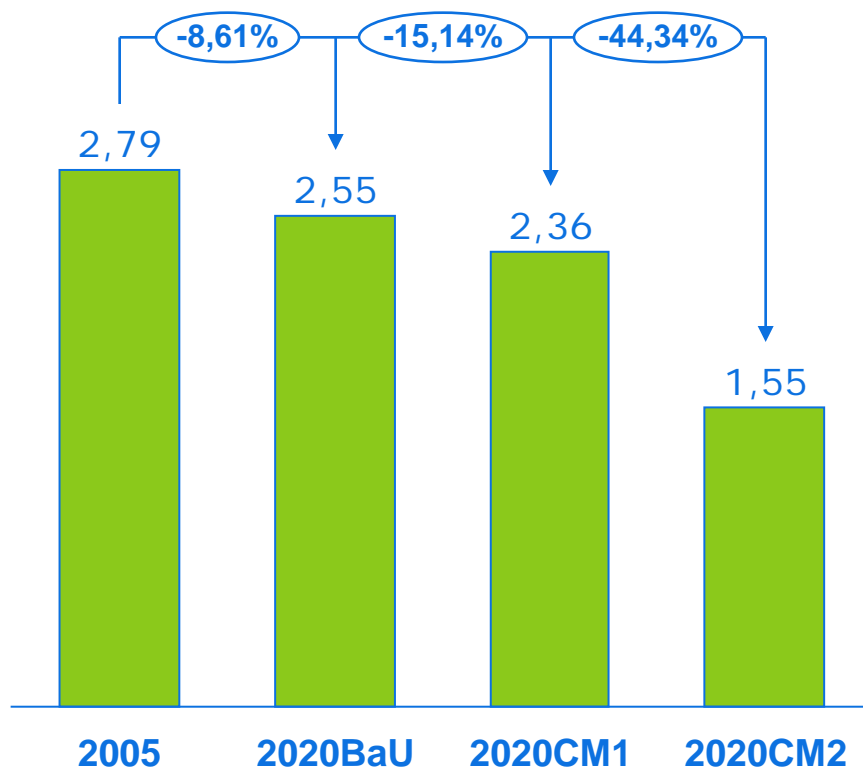
	2005	BaU	CM1	CM2
<b>Carbon Limit</b>	x	x	x	✓
<b>Non-fossil energy</b>	base	Stable	Increase as planned	Increase as planned
<b>Energy efficiency</b>	base	Improvement: 2% per year		
<b>Technology Improvement</b>	base	Agriculture: +1% per year Industry: +3% per year Service: +2%		
<b>Capital change</b>	base	2.8 times increase in 2020		
<b>Population</b>	base	1.13 times of 2005		
<b>Labor productivity</b>	base	+5% per year		
<b>GDP growth</b>	base	+8.3% per year		

# Scenario: Technology for power generation

Fuel	Technology	2005 (GW)	2020 (GW)
Coal	SubST		
Coal	SupST		
Coal	SSupST		
Coal	FBC		
Coal	IGCC		
Oil	Oil		
Natural gas	Natural gas		
Resource	Hydro	116	300
Resource	Nuclear	7	80
Resource	Wind	1.26	150
Resource	Biomass	2	30
Resource	Solar	0.07	2



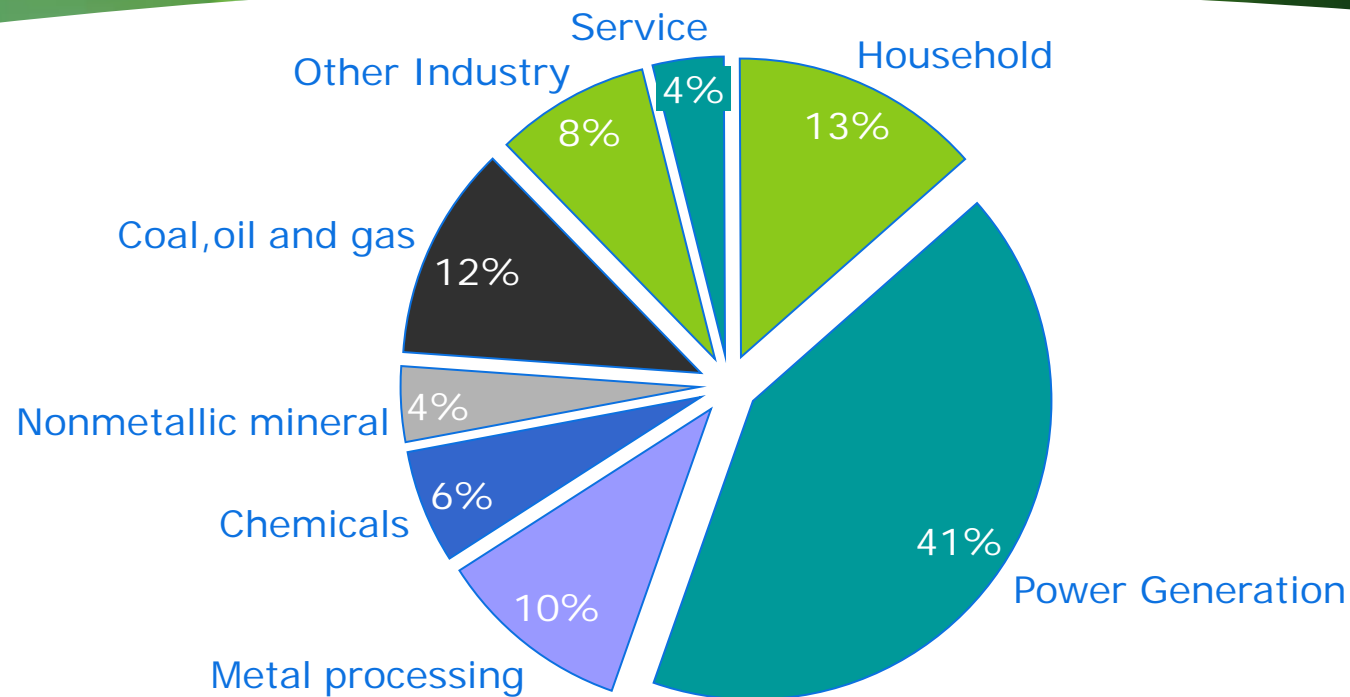
# Results: Carbon Intensity Change



## Carbon Intensity

- 8.6% reduction comes from energy efficiency improvement;
- 6.5% reduction comes from non-fossil energy;
- 29.2% reduction comes from CO<sub>2</sub> constraint (emission in CM2 is limited to 0.6 times of BaU);
- Carbon price: 55.3 dollar/ton.

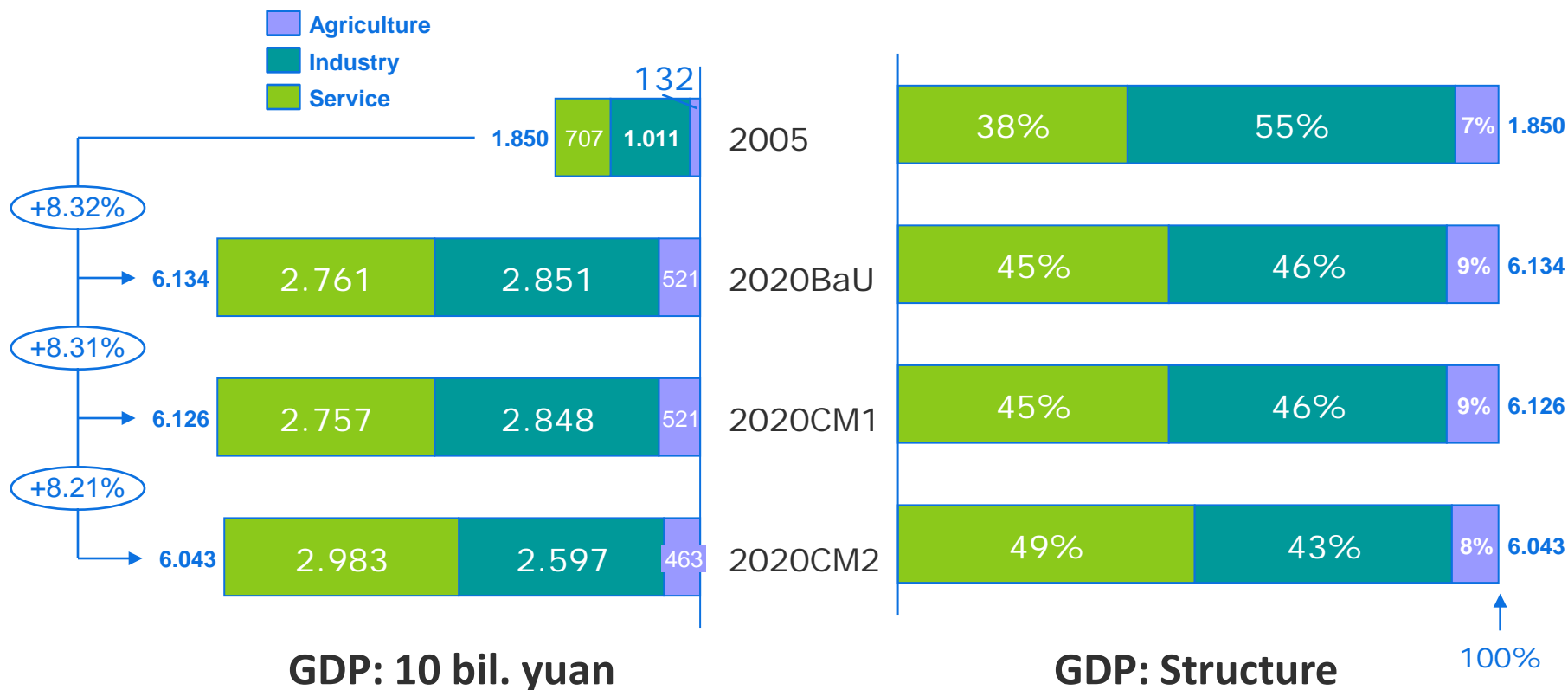
# Result: Carbon reduction potential



## Sectoral Contribution to CO<sub>2</sub> Reduction

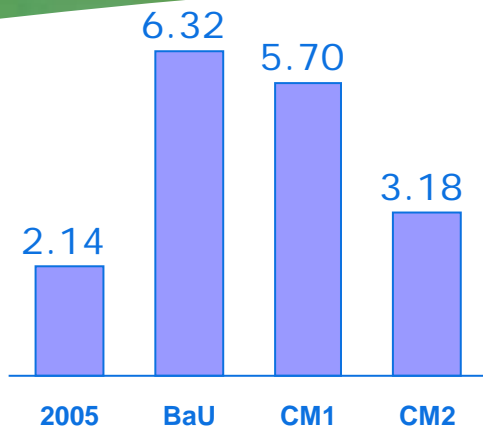
- Total reduction compared t BaU: 6.25 bil. ton CO<sub>2</sub>
- The bulk of CO<sub>2</sub> abatement comes from power sector, household, metal processing and energy demand reduction;
- Reduction from service sectors is minor.

# Impact: GDP growth and loss

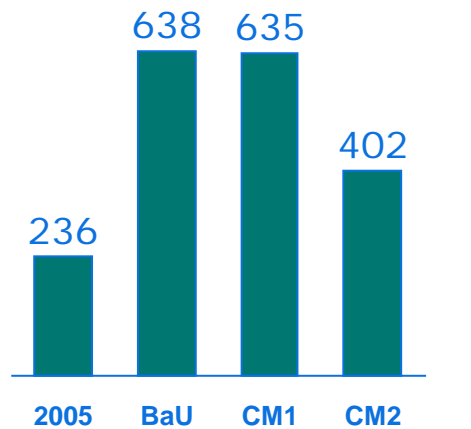


- GDP growth rates are 8.2%-8.3% per year in all cases;
- Economic structure shifts to service industry in BaU and CM2;
- GDP loss in CM1 is 0.122%, in CM2 is 1.48%.

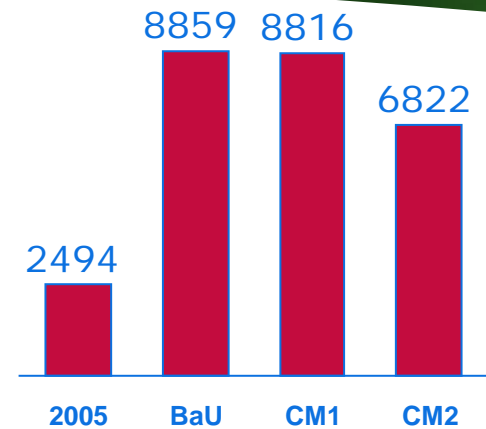
# Impact: Energy Demand



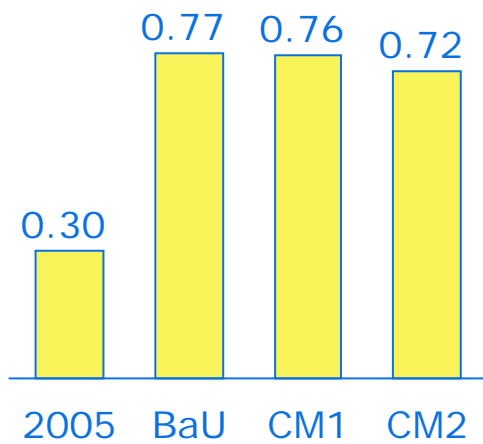
Coal [bil. ton]



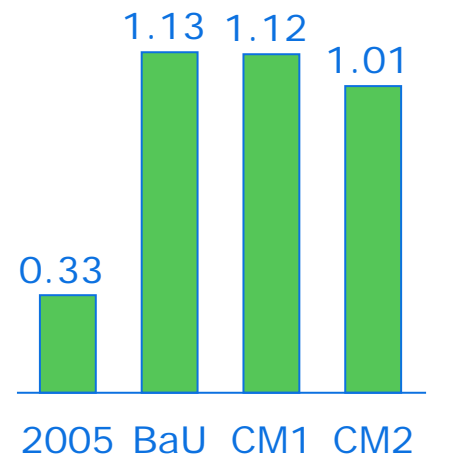
Coke [mil. ton]



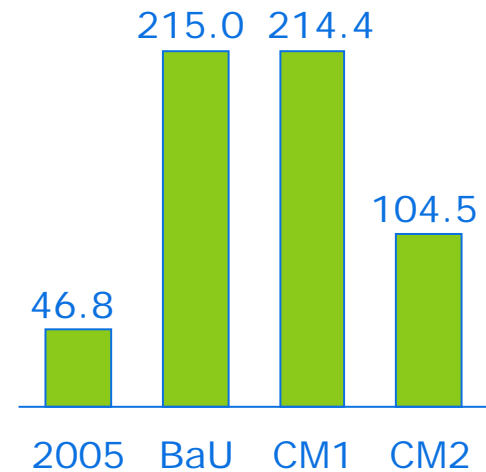
Electricity [bil. kwh]



Crude oil [bil. ton]

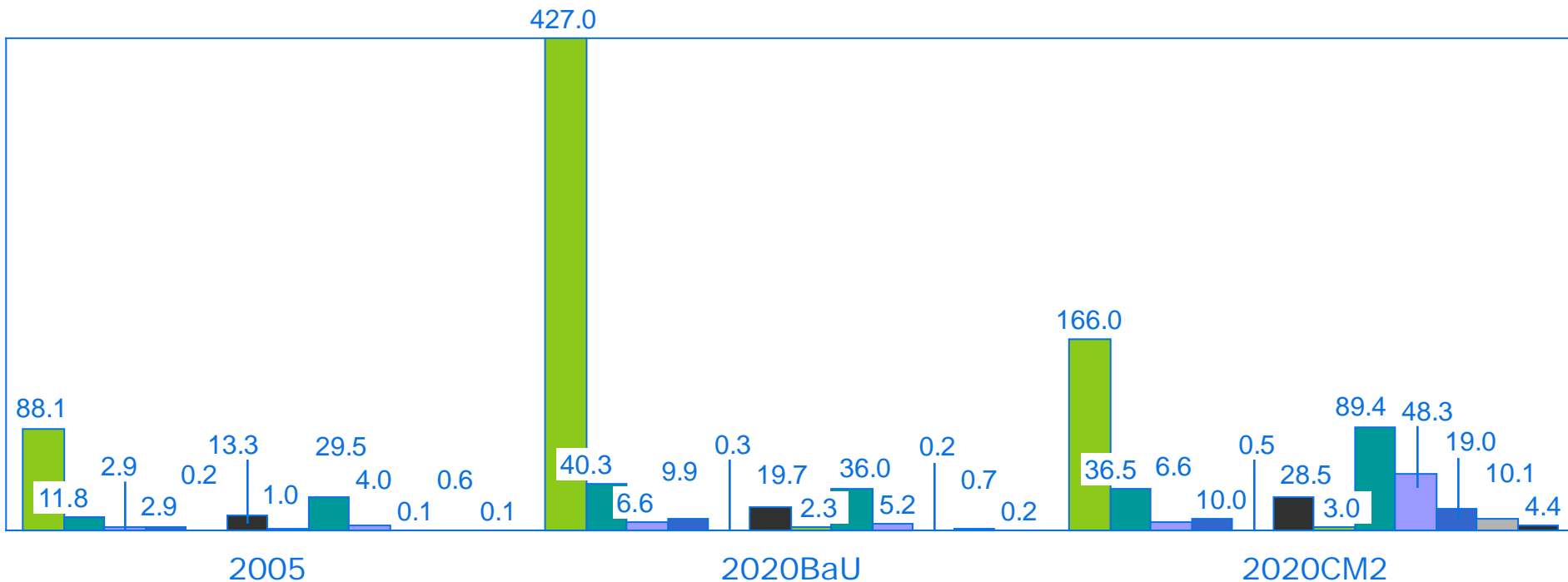


Petrol oil [bil. ton]



Natural gas [bil. m3]

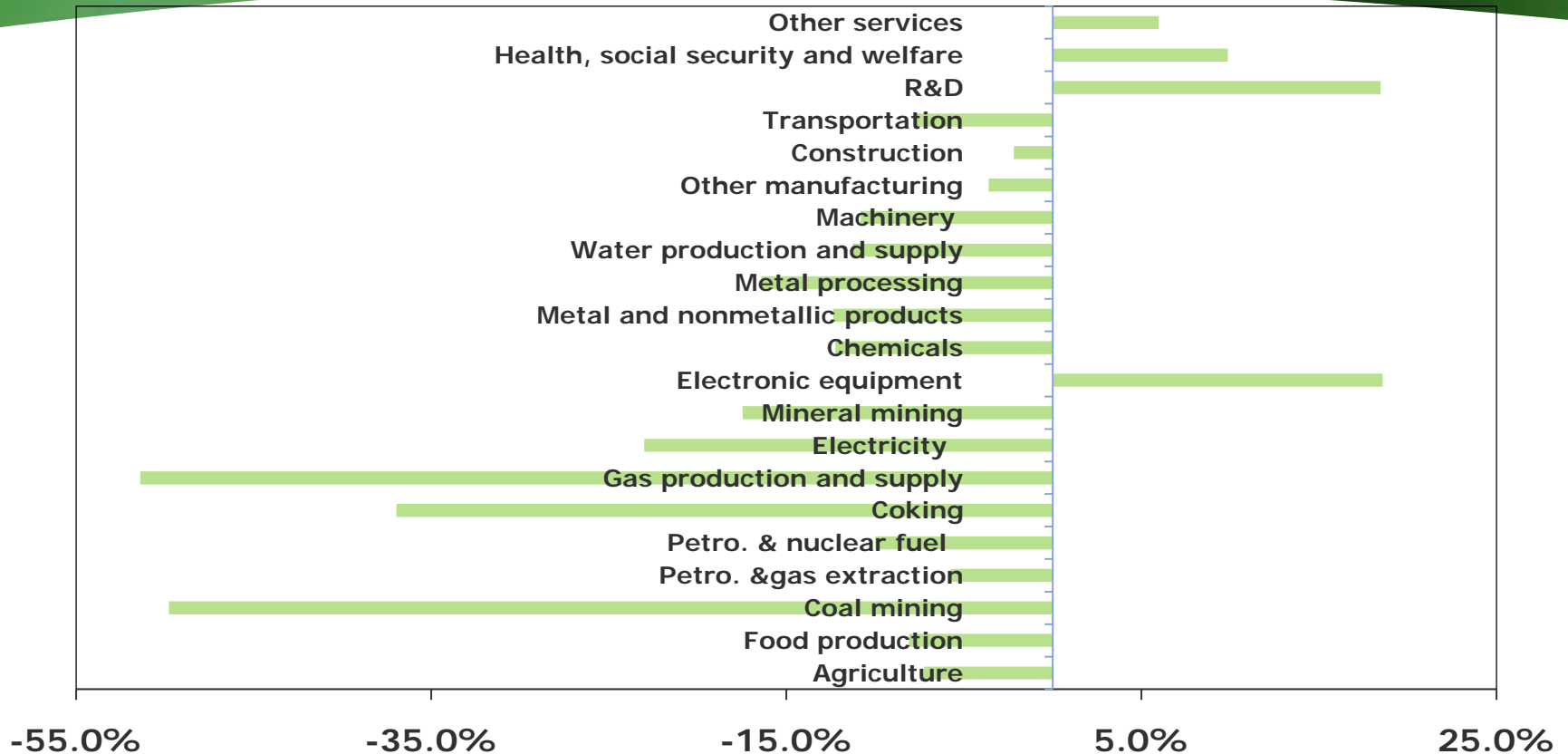
# Impact: power generation



**Power generation from different technologies**

- In BaU case, share of electricity from coal increases from 68.5% in 2005 to 88%;
- In CM2 case: share of electricity from coal drops to 52%, electricity from non-fossil fuels increases to 40.5%.

# Impact: sector output



## Increasing sectors

- Services
- Elec.machine, equip.& supplies

## Decreasing sectors

- Energy supply sector: coal, gas, electricity etc.
- Mining
- Metal processing, etc.

# Conclusion

## A. How to achieve the target?

- 8.6% comes from energy efficiency improvement of 2% per year;
- 6.5% comes from non-fossil energy use in power sector;
- 29.2% comes from carbon limitation.

## B. What are carbon reduction potentials sector by sector?

- power sector, household, metal processing and energy demand reduction.

## C. Where will the impacts of carbon reduction lie?

- Carbon price will be ca. 55.3 dollar/ton;
- GDP loss is 1.48%;
- Energy demand for coal, coke, natural gas and electricity will decrease greatly, while demand for oil will see minor decrease;
- Share of electricity from coal drops to 52%, electricity from non-fossil fuels increases to 40.5%.
- Output from Sectors of services and Elec.machine, equip.& supplies will increase, while energy intensive sectors will shrink, like energy supply sector, mining, and metal processing

# Future work

- ❖ Set more realistic assumption on energy efficiency improvement;
- ❖ Develop dynamic CGE model;
- ❖ Include other issues like land-use, water, and air pollutants;
- ❖ Downscale to provincial level;
- ❖ etc.





# Thank You !



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