

# Assessment of Guangdong Carbon Emission Trading with AIM/CGE Model

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## Introduction

- Guangdong contributes over 11% of China's GDP and consumes 8% (19.6 million tons of coal equivalents) of China's energy in 2007.
- Guangdong has committed to reduce its carbon intensity per unit of GDP by 19.5% in 2015 from 2010 level and decided to implement carbon emission trading system across industry sectors.
- At the first stage, four sectors are selected for emission trading, including power, cement, oil refinery, iron and steel sectors which contribute to 58% of total CO<sub>2</sub> emissions in Guangdong.

## Methods

- This study uses the dynamic provincial CGE model developed by NIES to assess carbon trading policy under the constraint of carbon intensity reduction target towards 2020.
- This model is a two-region recursive dynamic CGE model and selects 2007 as the base year and include 33 sectors.
- Five scenarios are constructed considering two dimensions (Table 2): scenario SAV has weaker target whereas LCE has more stringent target (Fig. 1). In addition, scenarios SAVET and LCET allow emission trading.

## Future scenario

- All the datasets are converted to the base year of 2007.
- The projections on population and GDP are based on the 12th five-year economic development plan and research assumptions.

Table.1 Key assumptions

	2010	2015-2020
Population (thousand)	97302	0.5%
GDP (billion Yuan)	3994	7.8%

Table.2 Scenario setting

	Scenario	Carbon constraint		CM
		Intensity target 2010-20	Sector emission cap 2015-20	Emission trade
1	BaU	×	×	×
2	SAV	-33%	Power sector : 1% annual increase, other three sectors: 2% annual increase	×
3	SAVET	-33%		√
4	LCE	-40%	Fixed to 2015 level	×
5	LCET	-40%		√

## Results

### Impacts of intensity target

- The more stringent the target is, the more GDP loss there would be (Fig.3).

### Impacts of emission trading

- Without emission trading, carbon price of oil refinery and iron & steel sectors would be relatively high and that of power sector would be low (Fig 2).
- With carbon trade the sector abatement costs of cement, oil refinery and iron & steel sectors would decrease (Fig 2).
- Power sector is the seller due to renewable energy development, whereas other three sectors are buyer (Fig. 4).

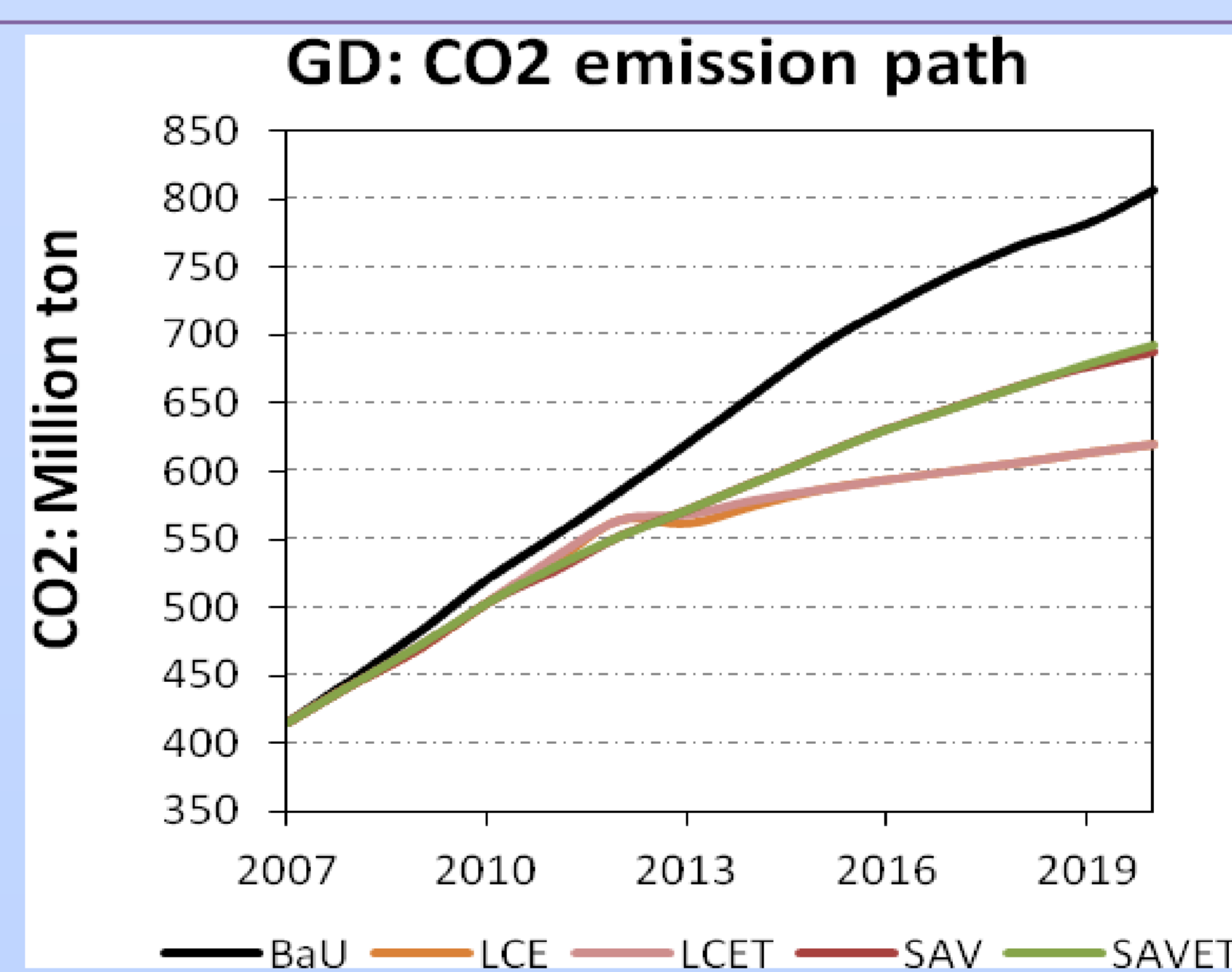


Fig.1: CO<sub>2</sub> emission pathway of Guangdong

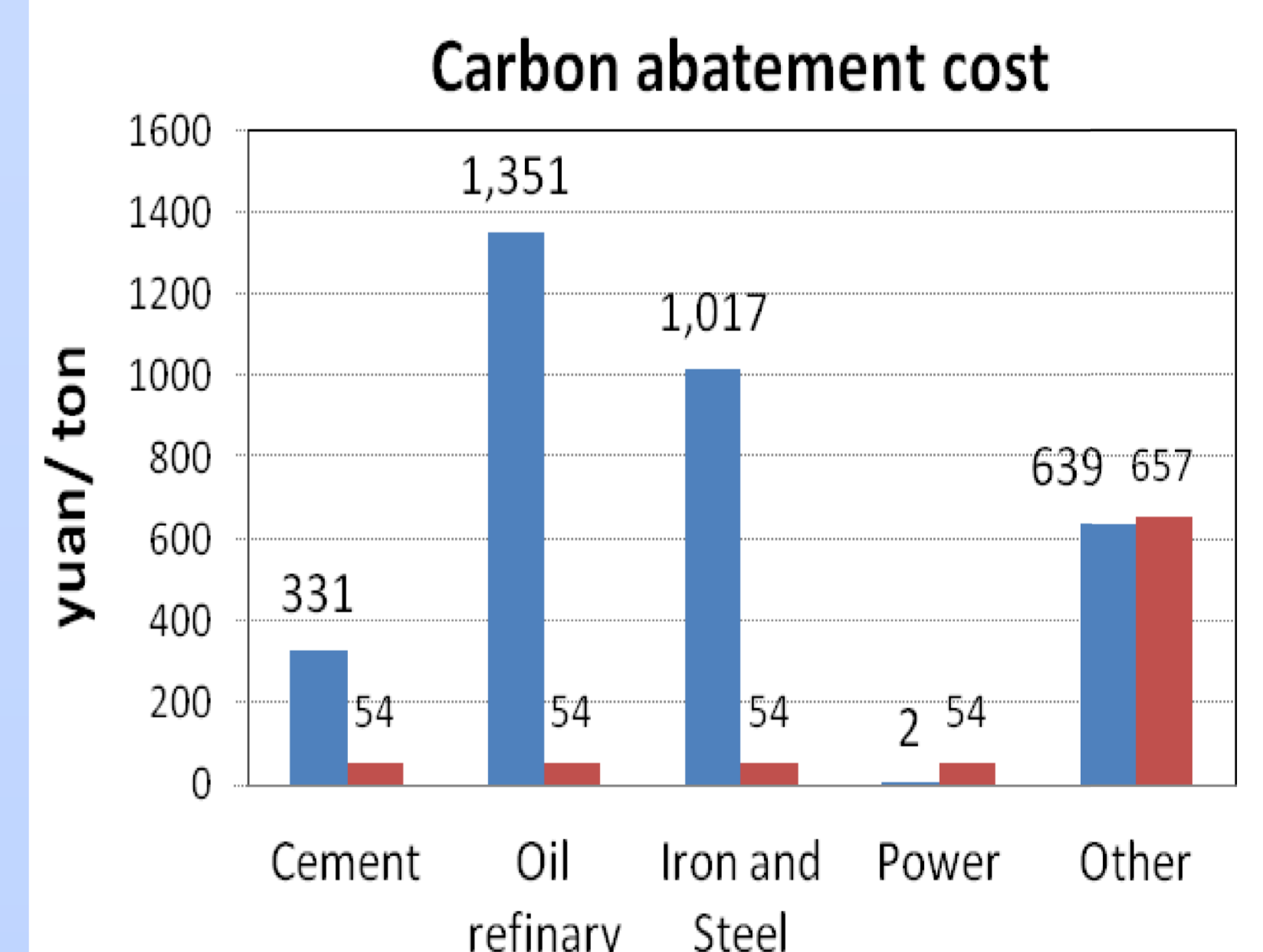


Fig.2: carbon abatement cost

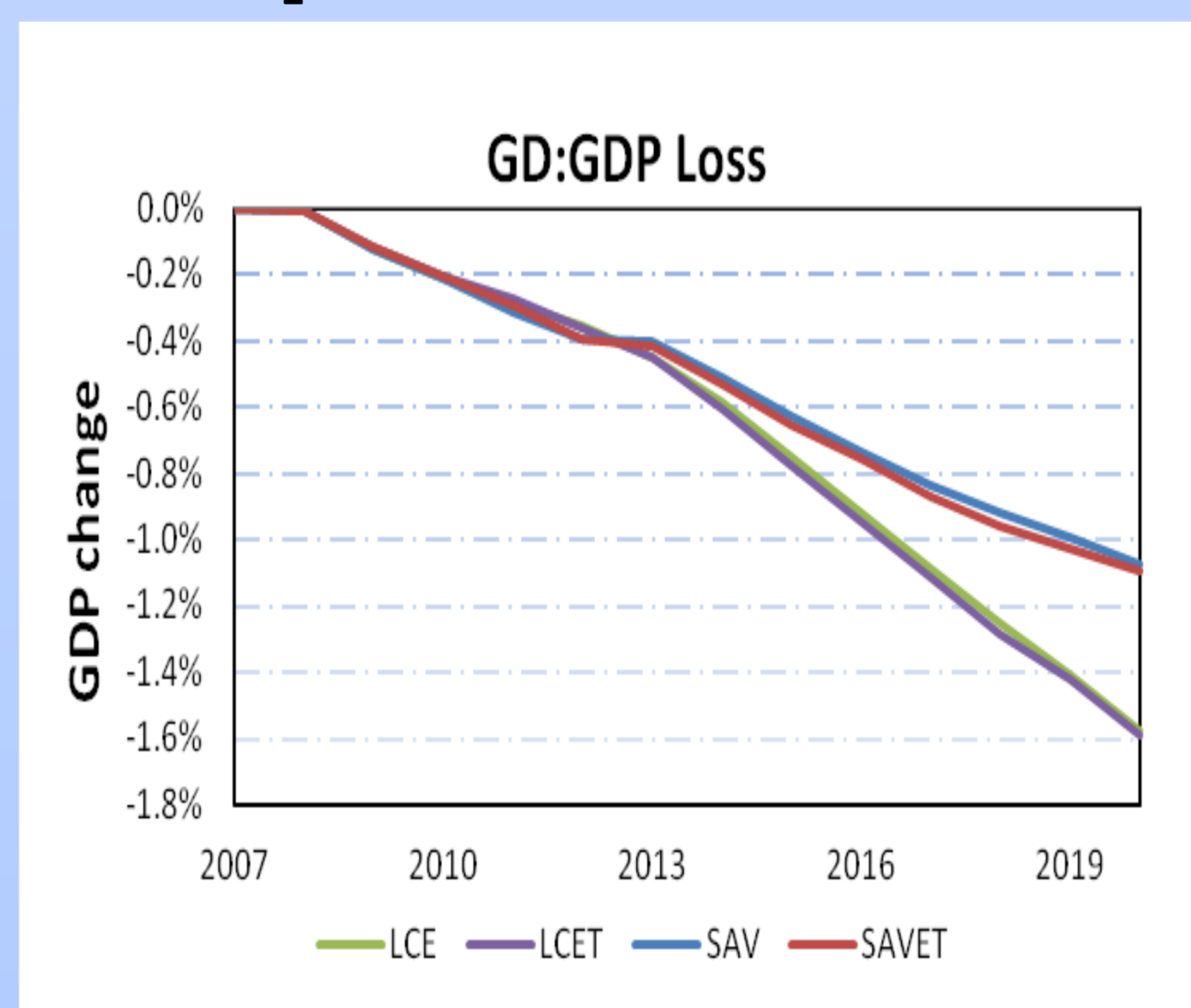


Fig.3: GDP loss of four policy scenarios

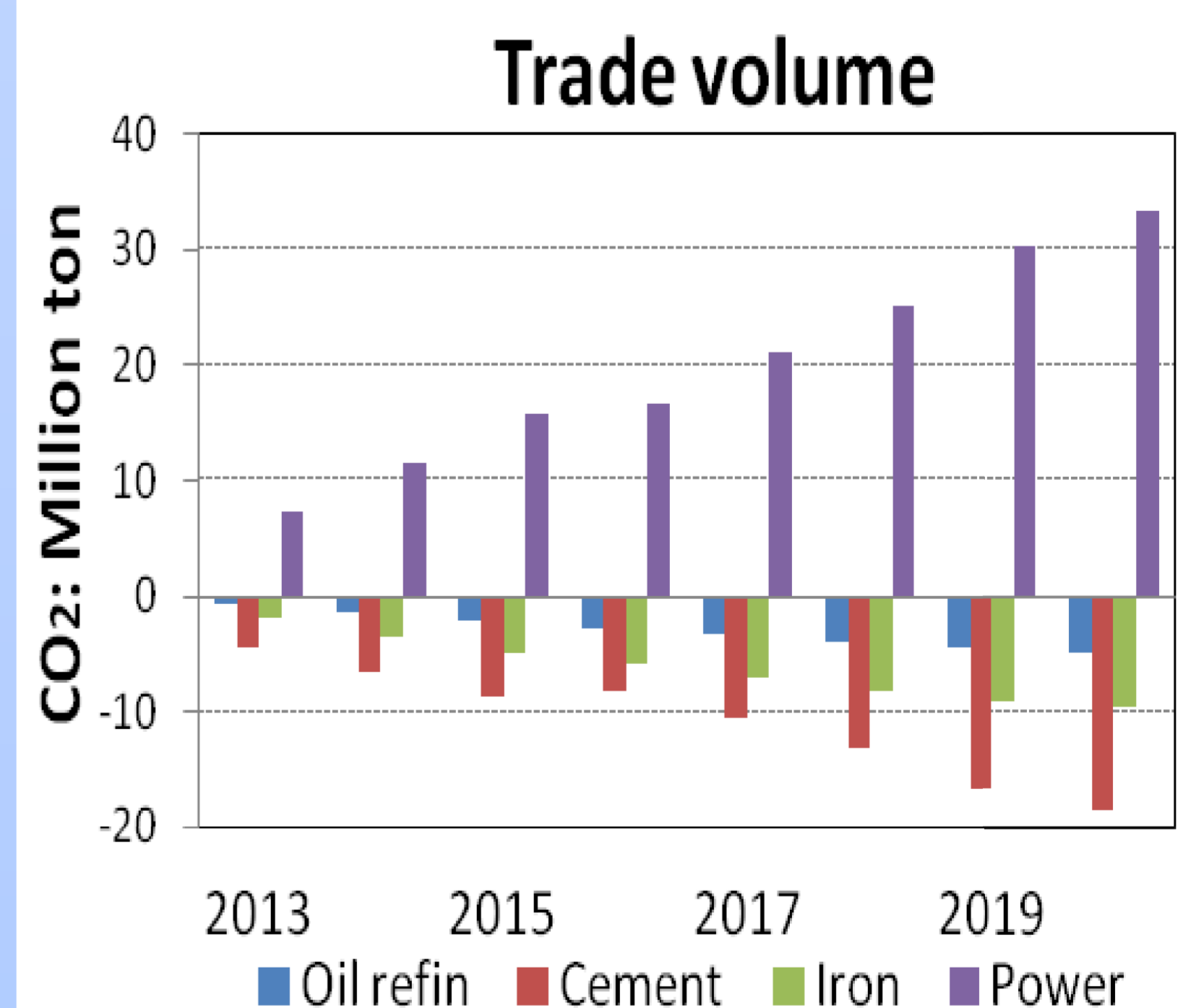


Fig.4: emission trading (positive means seller while negative means buyer)

## Conclusion

- This study evaluates the economic impacts of Guangdong's carbon emission trading system.
- Implementing carbon trade could reduce the abatement costs of cement, oil refinery, iron and steel sectors, and the costs of other sectors will increase.
- More stringent cap will cause more GDP loss, so it is important to consider how to set the sector cap for industry which will not harm the industry too much.

### References :

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