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Assessing China's Waste Management Activities using a Computable General Equilibrium Model

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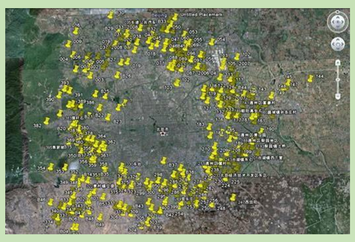
Background

- In the last 30 years, China's rapid economic development has been accompanied by serious environmental pollution problems. In 2007, the overall waste management cost is estimated to reach about 230.5 billion yuan and 0.8% of China's Gross Domestic Product (GDP).

Air pollution in Beijing

Water pollution in Dianchi Lake

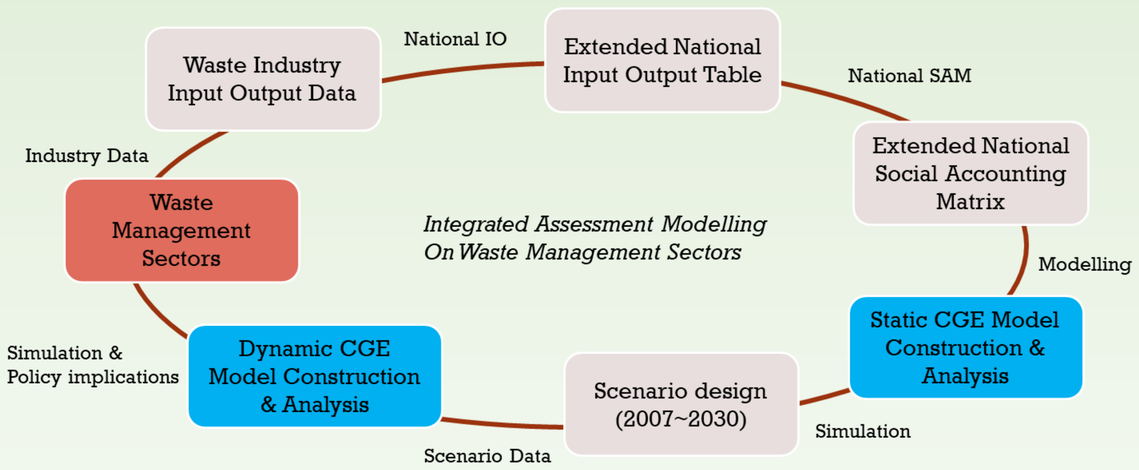


Dumping centers around Beijing

Research Scope & Purpose

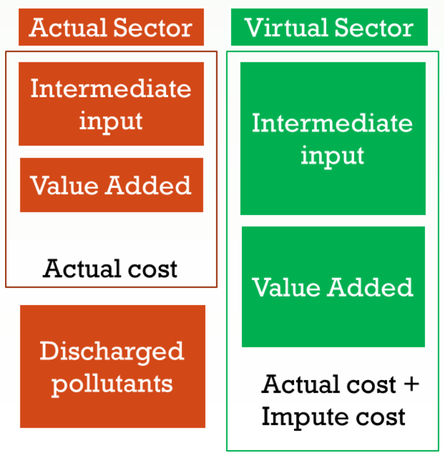
- Scope:
  - The current study focuses on the 3 major types of wastes: water wastes, gas wastes and solid wastes and 3 corresponding waste management sectors, not considering more detailed sectors/technologies.
  - Static analysis on 2007, and dynamic analysis on 2007~2030. (mainly due to data accessibility, all open data sources)
  - Country level analysis with 20 sectoral data.
- Purpose:
  - Assess the general socio-economic features of China's waste management activities using integrated assessment models
  - Provide environmental policy recommendations

Methodology Map

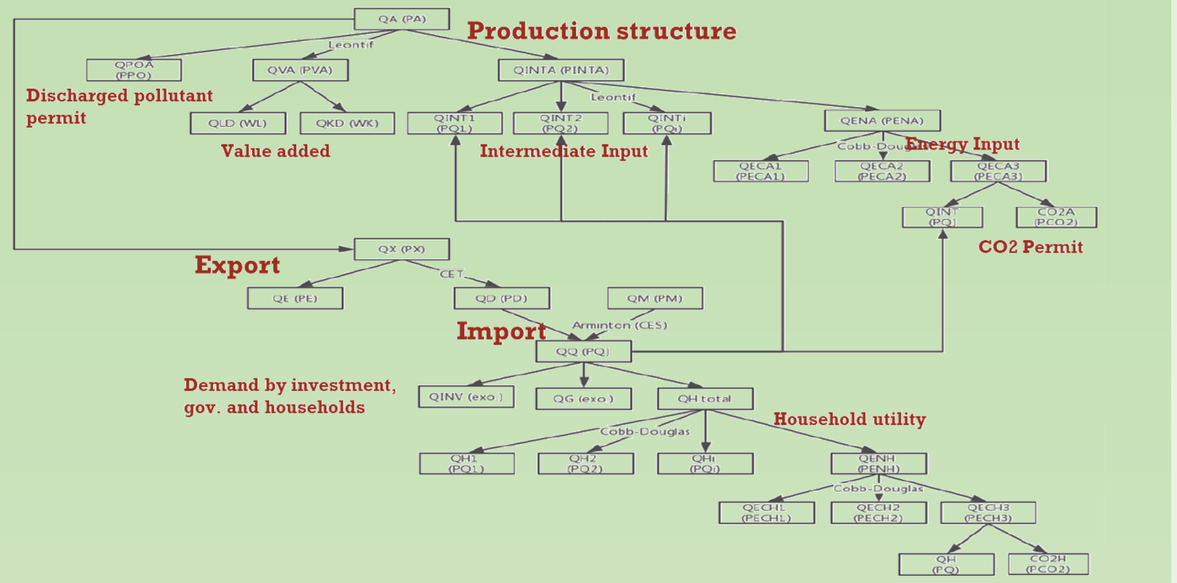


- Extend National IO Table with Waste Management Accounts:
  - Since current official national IO does not include waste management sectors, we use the intermediate input coefficients from Green IO accounting system. (Zhao and Lei, 2010)
  - For intermediate output coefficients, we assume a unified waste management cost among all the industry sectors and households and calculate sectoral demand in proportionate to their amounts of generated wastes.

- 2 types of waste management sectors and costs
  - Actual management cost: to form actual management sector
  - Impute management cost: besides actual management, the extra cost needed to manage all the discharged pollutants at current tech. level



CGE Modelling Structure



Static Result Analysis

	BAU	Discharged water pollutant -10%	Discharged gas pollutant -10%	Discharged solid pollutant -10%
GDP 100m RMB	264853	264830	264392	264841
GDP change100m RMB		-23	-461	-12
Waste management cost 10bn RMB	2305.3	2239.3	2267.2	2269.6

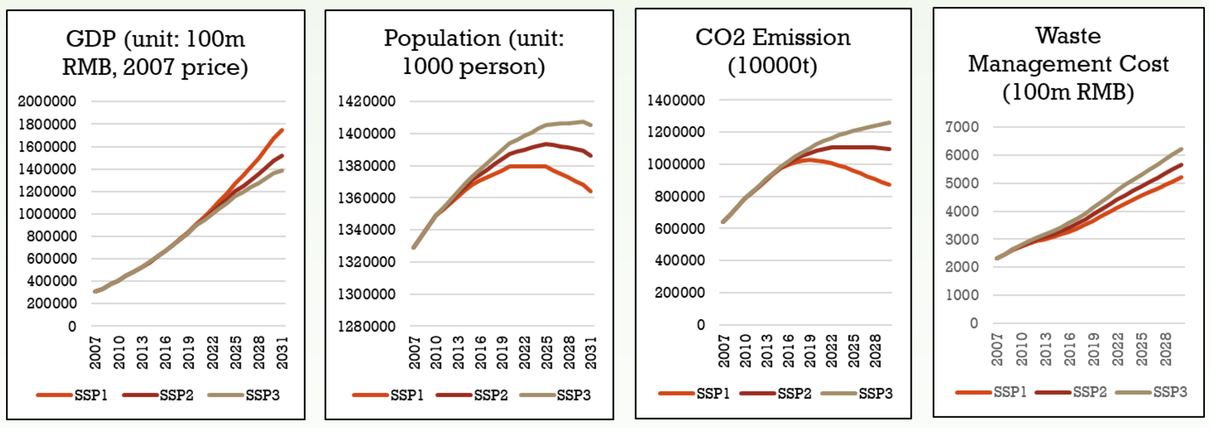
- When there is a limit on discharged pollutant amounts, model will choose either produce less or use the more expensive full waste management sector
- A limitation on discharged pollutant amounts will cause 23~461 100m RMB of GDP loss, and the limitation on gas discharged pollutant has the largest influence in terms of GDP loss

GDP Loss	Coal	Oil	Gas	Elec.	Agri.	Mining	Food & Tabaco Ind.	Textile	Chemical Ind.	Non metal mineral	Metal Process.	Metal product	Other Manu.	Water	Cons.	Trans.	Service
limit on waste water	-0.05%	-0.01%	-0.02%	-0.03%	-0.02%	-0.08%	-0.02%	-0.01%	-0.02%	-0.10%	-0.08%	-0.10%	-0.05%	-0.01%	-0.12%	0.01%	0.12%
limit on waste gas	-2.21%	-1.55%	-7.43%	-3.22%	-1.02%	-1.48%	-1.20%	-0.90%	-0.87%	-1.88%	-1.49%	-1.06%	-1.32%	-2.30%	-1.98%	0.02%	2.33%
limit on solid waste	-0.03%	-0.01%	-0.05%	-0.03%	-0.01%	-0.03%	-0.01%	-0.01%	-0.01%	-0.04%	-0.03%	-0.03%	-0.03%	-0.01%	-0.04%	0.00%	0.04%

Sectoral analysis

Dynamic Result Analysis

- SSP1: a high sustainable scenario with relatively low population growth.
- SSP2: a middle road for sustainable development.
- SSP3: a low sustainable scenario with relatively high population growth.



Conclusions & Limitations

- Conclusion: A limit on the discharged amount of pollutants will contribute to the output gains of service sectors but will cause output losses in the waste intensive sectors like manufacturing and mining. In a more sustainable scenario, total waste management cost will decrease faster with a lower percentage of total GDP.
- Limitation: Distinguish different ways of waste management, like incineration, landfill or recycling options under solid waste management.

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