Co-benefits Approach in China

---linking renewable energies, carbon reduction, clean air and local value-creation

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realistic priority

Priorities for policy-making in local government

job creation?

air pollution?

urbanization & reform

socioeconomic development

ecological civilization

environment & resource conservation

imperative?!

GHG reduction

global climate change

Local Governance: gap in Science & Policy

Policy tools are essentials for climate governance.

Climate Change 2013: The Physical Science Basis

The Working Group I contribution provides a comprehensive assessment of the physical science basis of climate change. The report includes a detailed assessment of climate change observations throughout the climate system; dedicated chapters on sea level change, biogeochemical cycles, clouds and aerosols, and regional climate phenomena; extensive information from models, including near-term and long-term climate projections; and a new comprehensive atlas of global and regional climate projections for 35 regions of the world.

- Summary for Policymakers (ar | en | es | fr | ru | zh)
- Working Group I Report website
- Quick link to report PDFs

Climate Change 2014: Impacts, Adaptation and Vulnerability

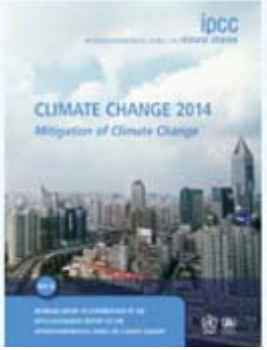
The Working Group II contribution considers the vulnerability and exposure of human and natural systems, the observed impacts and future risks of climate change, and the potential for and limits to adaptation. The chapters of the report assess risks and opportunities for societies, economies, and ecosystems around the world.

- Summary for Policymakers (en) New
- Working Group II Report website
- Quick link to report PDFs

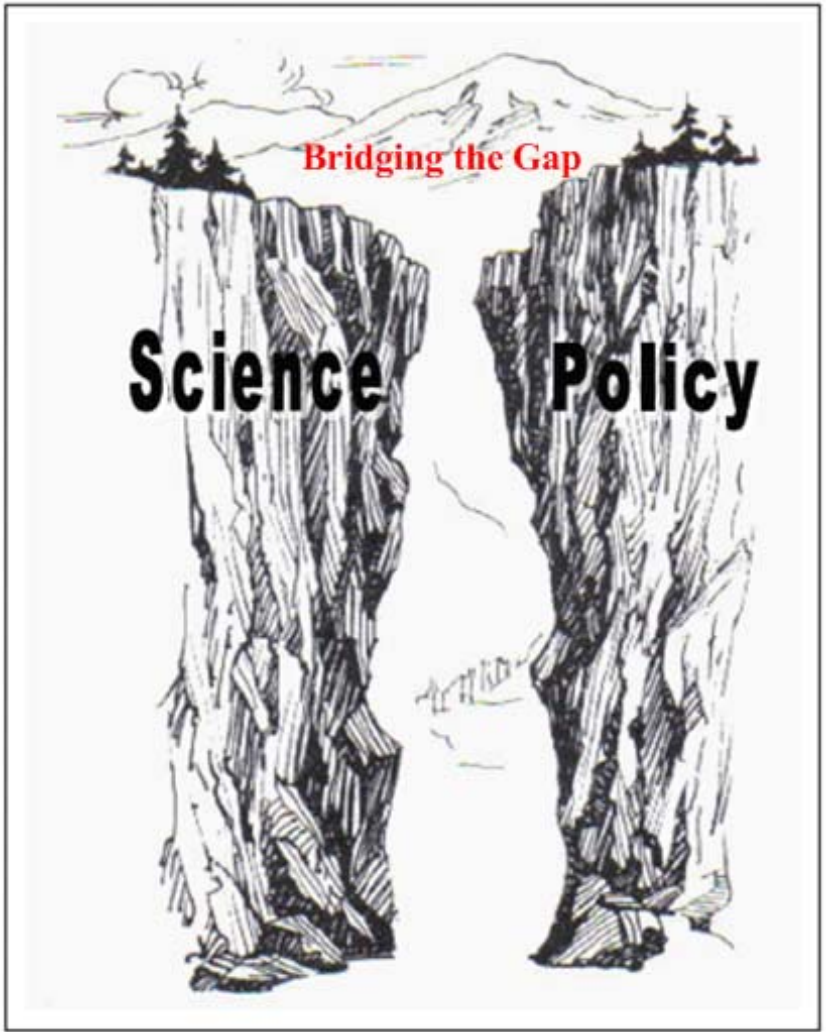
Climate Change 2014: Mitigation of Climate Change

The Working Group III contribution assesses the options for mitigating climate change and their underlying technological, economic and institutional requirements. It transparently lays out risks, uncertainty and ethical foundations of climate change mitigation policies on the global, national and sub-national level, investigates mitigation measures for all major sectors and assesses investment and finance issues.

- Summary for Policymakers (en) New
- Working Group III Report website
- Quick link to report PDFs



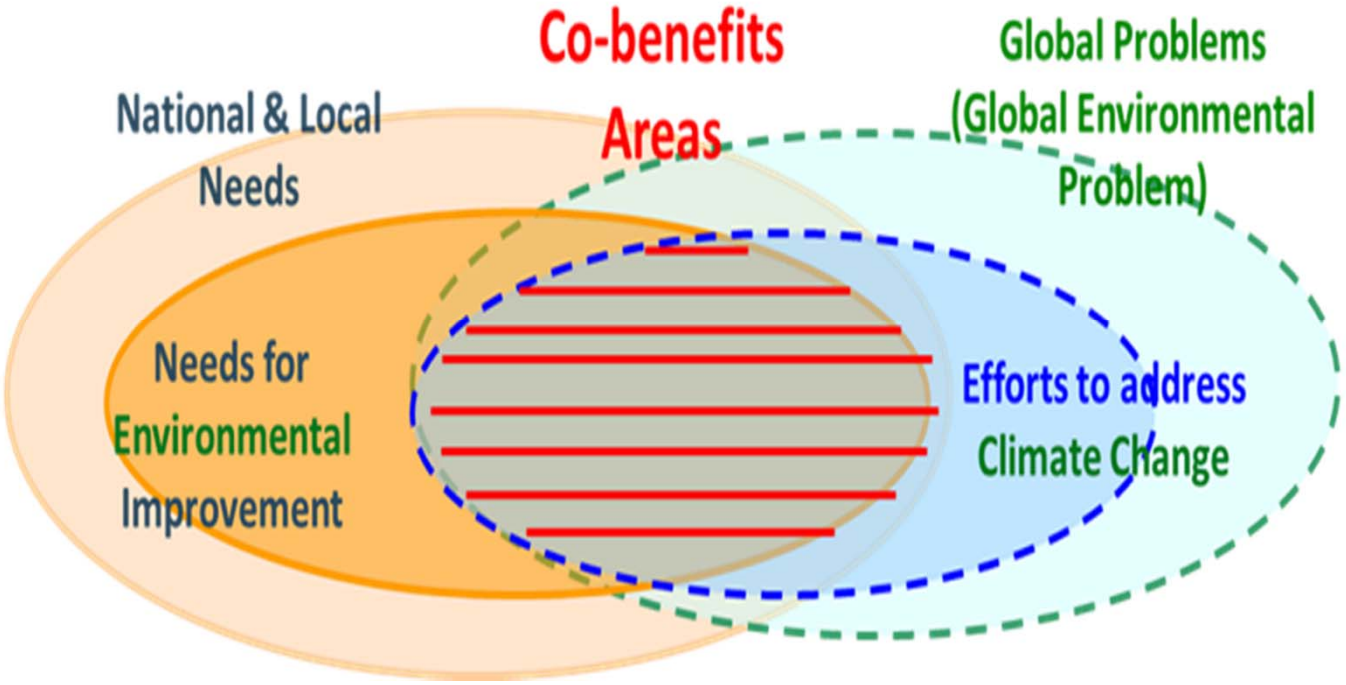
IPCC AR-5



One proposed solution: co-benefit

Approach: co-benefits

Co-benefits refers to the development and implementation of policies and strategies that simultaneously contribute to ***tackling climate change*** *and* ***solving local environmental*** *and developmental problems.*



Co-benefits:

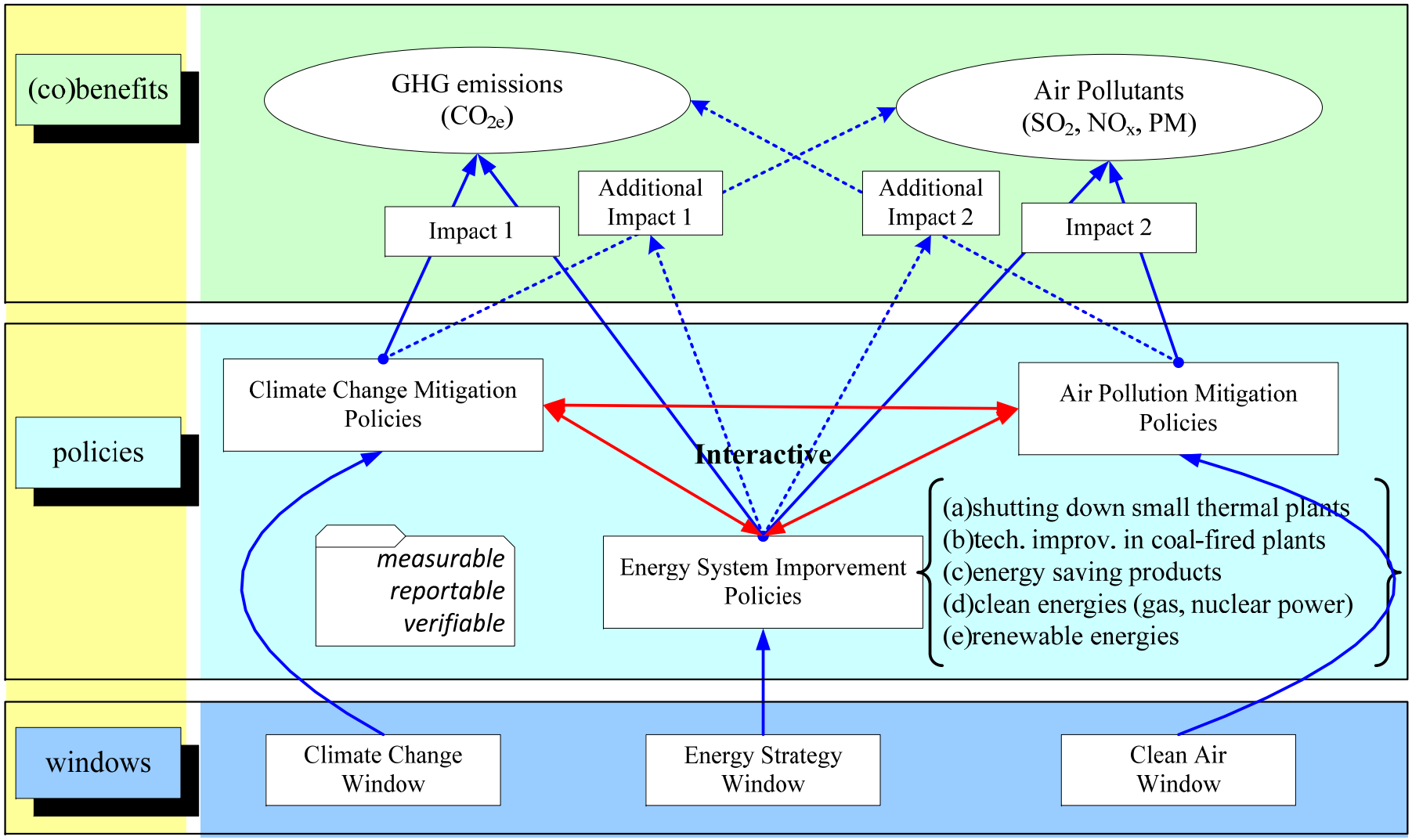
(1) Scientific Approach;

(2) Communicable Language;

(3) Evaluation Tool;

(4) Integrated Governance;

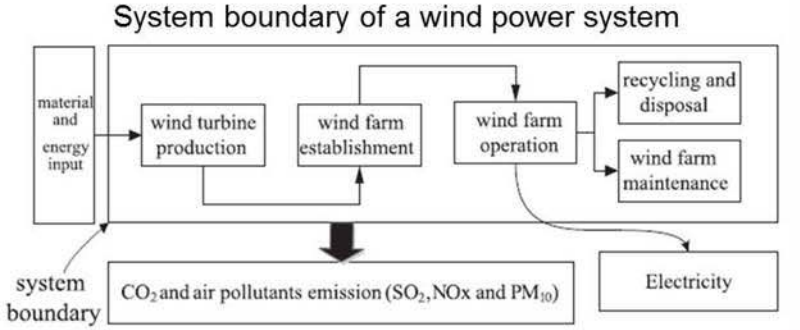
基于*Co-benefit*的碳排放与空气污染政策评估框架*

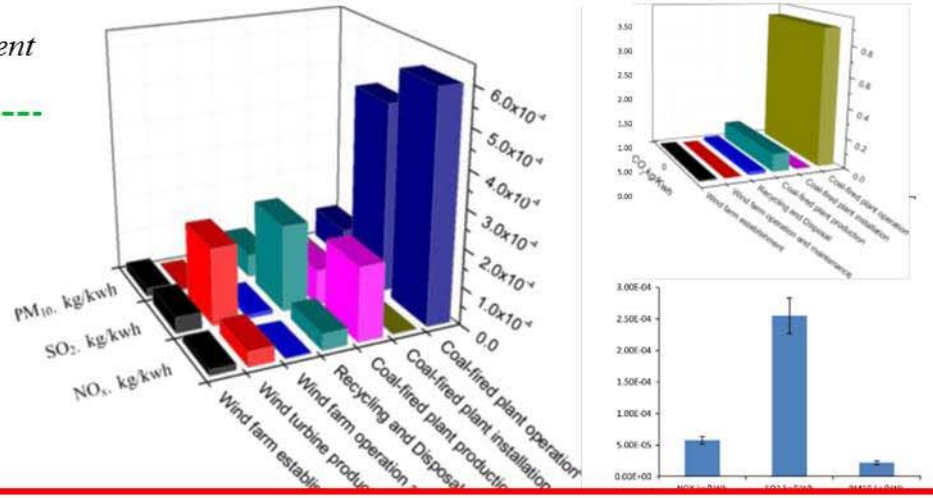


*(*source: revised based on IPCC; unpublished, Xue, 2015.)*

Co-benefits in Renewable Energies

基于生命周期的风电评估/*life cycle co-benefits assessment of wind power (*source: Xue, et al., 2015, published in RSER.)*

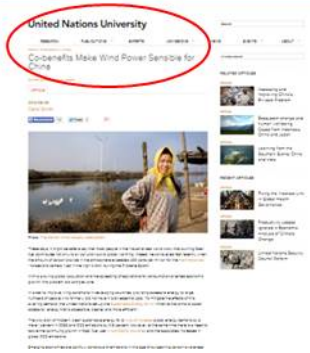




Lawrence L. Kazmerski, Ph.D.
Editor-in-Chief
Renewable & Sustainable Energy Reviews

Reviewer Comments: *… accepting this manuscript because of its good contents and precised presentation with sufficiently enough theoretical text and figures. This review paper has rich blend of technical and scientific information.* ----- ***RSER* (IF: 5.31)**

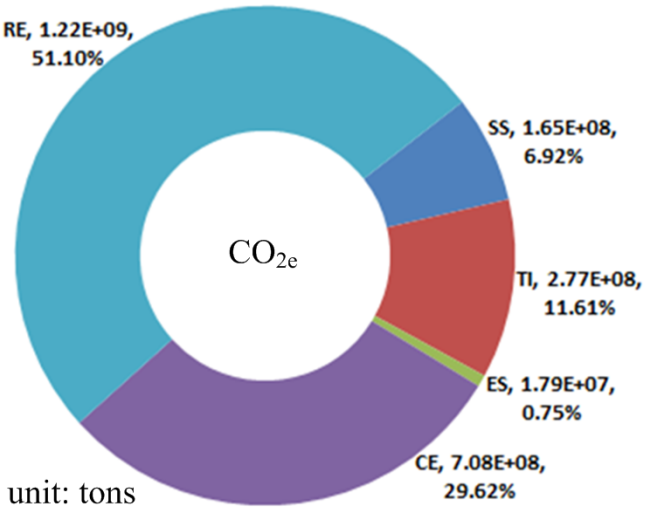
Comments from the editors and reviewers:
Reviewer #1: Authors have worked in secured direction. I am accepting this manuscript because of its good contents and precised presentation with sufficiently enough theoretical text and figures. This review paper has rich blend of technical and scientific information.
Reviewer #3: The authors have updated and explained the equations in which I had objections. Other than the issues the paper is significant and unique enough to be published.

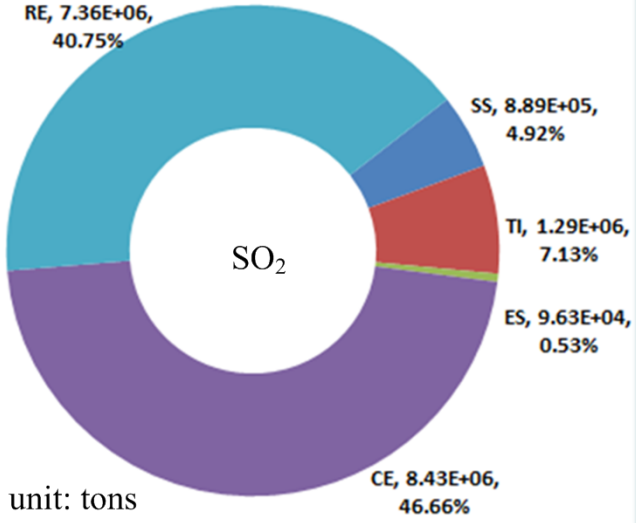


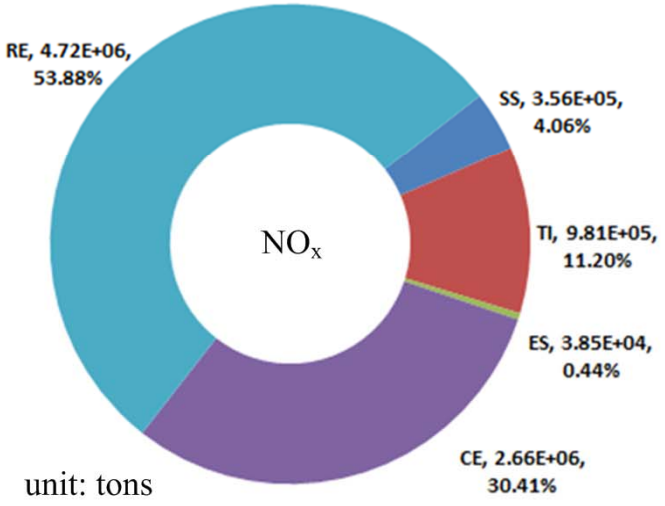
联合国大学网站长文评述，
http://unu.edu/

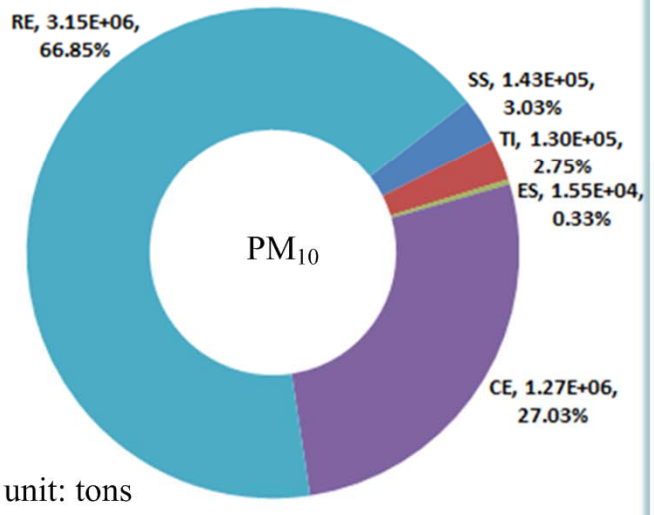
It says*:…a recent paper, led by the Institute of Applied Ecology of the Chinese Academy of Sciences… point out that though the political rhetoric may at times acknowledge that issues of climate change, air quality and energy supply are intertwined, …, policymakers need to develop a deeper appreciation for the multiple, far-reaching benefits of low carbon initiatives. … … **by: S. Carol, UNU***

Co-benefits of China's efforts to CC









*(*source: unpublished, Xue, 2015.)*

Estimates indicate that:

(1) during 2006-2010, RE sector has the most contribution to CO_2, NO_x and PM_{10} emissions reduction, while the CE sector has the most contribution to SO_2, accounting 46.66%, followed by the RE sector of 40.75%.

(2) energy strategy shifting to clean and renewable energies has the greatest contribution compared to coal-based energy and other options as well.

co-benefits evaluation in public transport

Bus models and emission standards.

Manufacturer	Bus types	Emission standards	Bus fuel types	Buses weight (kg)
SG Automotive Group	DD6980QS	EuroI	Diesel	11,200
SG Automotive Group	DD6100QS	EuroI	Diesel	11,200
SG Automotive Group	DD6101QS	EuroI	Diesel	11,200
SG Automotive Group	DD6980QS	EuroI	Diesel	15,500
SG Automotive Group	DD6980S02	EuroI	Gasoline	12,500
SG Automotive Group	DD6105S01	EuroI	Gasoline	17,500
SG Automotive Group	DD6129S24	Euro III	Diesel	18,000
SG Automotive Group	DD6105S04	Euro III	Diesel	13,000
SG Automotive Group	DD6118S23	EuroIII	CNG	16,000
Yutong Group Co., Ltd.	ZK6126HG	EuroIII	Diesel	16,500
Wuzhoulong Motors Co., Ltd.	FDG6101HEVG	EuroIII	Hybrid (electricity/diesel)	16,500
Wuzhoulong Motors	FDG6113EVG	–	Pure	18,000

Table 12

CO_2 and air pollutants emissions for different buses and taxies kg/(year·vehicle).

Models	VOC	NO_x	SO_x	PM	CO_2
Old diesel bus	206.614	1462.246	6.259	592.317	61,298.061
CNG bus	33.354	14.037	0.090	0.117	35,318.142
New diesel bus	35.719	488.229	5.247	16.842	51,515.611
Hybrid bus	28.932	546.957	132.436	13.642	67,019.750
Electric bus	N/a	471.510	398.970	N/a	78,720.408
CNG taxi	0.008	52.044	0.080	0.663	31,871.110
Diesel taxi	5.379	173.223	4.888	7.428	28,859.091
Petrol taxi	9.883	11.453	3.472	0.247	34,435.115
Hybrid taxi	8.967	47.050	34.678	0.537	36,084.669
Electric taxi	N/a	196.560	166.320	N/a	32,816.448

Basic information about buses and taxies in Shenyang City.

Measures	Passengers	Life service, years	Cost, US$ per unit	Energy consumption per 100 km
CNG bus				
DD6118S23	66	13	55,556	34–40 m^3
Diesel bus				
ZK6126HG	86	13	57,143	23–25 L
DD6129S24	88	13	58,095	25–27 L
DD6118S23	88	13	58,095	25–27 L
Hybrid bus				
FDG6101HEVG	90	13	142,857	Saving 19% of diesel
Electric bus				
FDG6113EVG	95	13	317,460	155 kW hours
CNG taxi				
Jetta	5	6	12,032	7–8 m^3
Elantra	5	6	13,968	7–8 m^3
Diesel taxi				
Jetta 1.6	5	6	15,286	5.1–5.5 L
Petrol taxi				
Junjie 1.8	5	6	12,222	9.5–10.5 L
Elantra 1.6	5	6	14,254	7–8 L
Santana 3000 1.8	5	6	12,667	9–11 L
Hybrid taix				
BYD F3DM	5	6	23,778	5.8 L
Electric taxi				
BYD e6	5	6	58,175	20 kW hours

ource: interview and market survey performed by authors

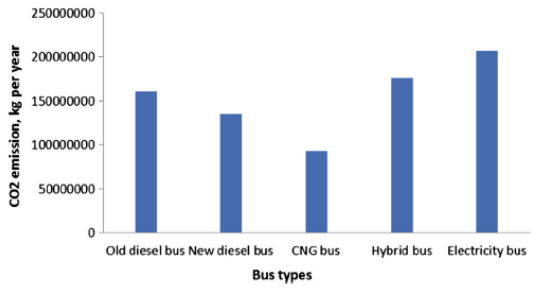


Fig. 2. CO_2 emission of bus fleets under different scenarios.

In: JCP, 2013.

Proposed Questions

- Methods Development
- Applied in policy-making at local level
- Integrated into IT-based Decision Support System
- To develop new research-proposal between Sino-German-USA? (i.e.: international trade?)