
Assessment of The Impact of China's CDM Projects on Sustainable Development

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Economy (PRCEE)

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Outline

1. Introduction
 2. Methodology
 3. Major findings
 4. Cause Analysis
 5. Policy recommendation
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1. Introduction

- Background
 - Research Purpose
 - Institutional Arrangement
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1. Introduction

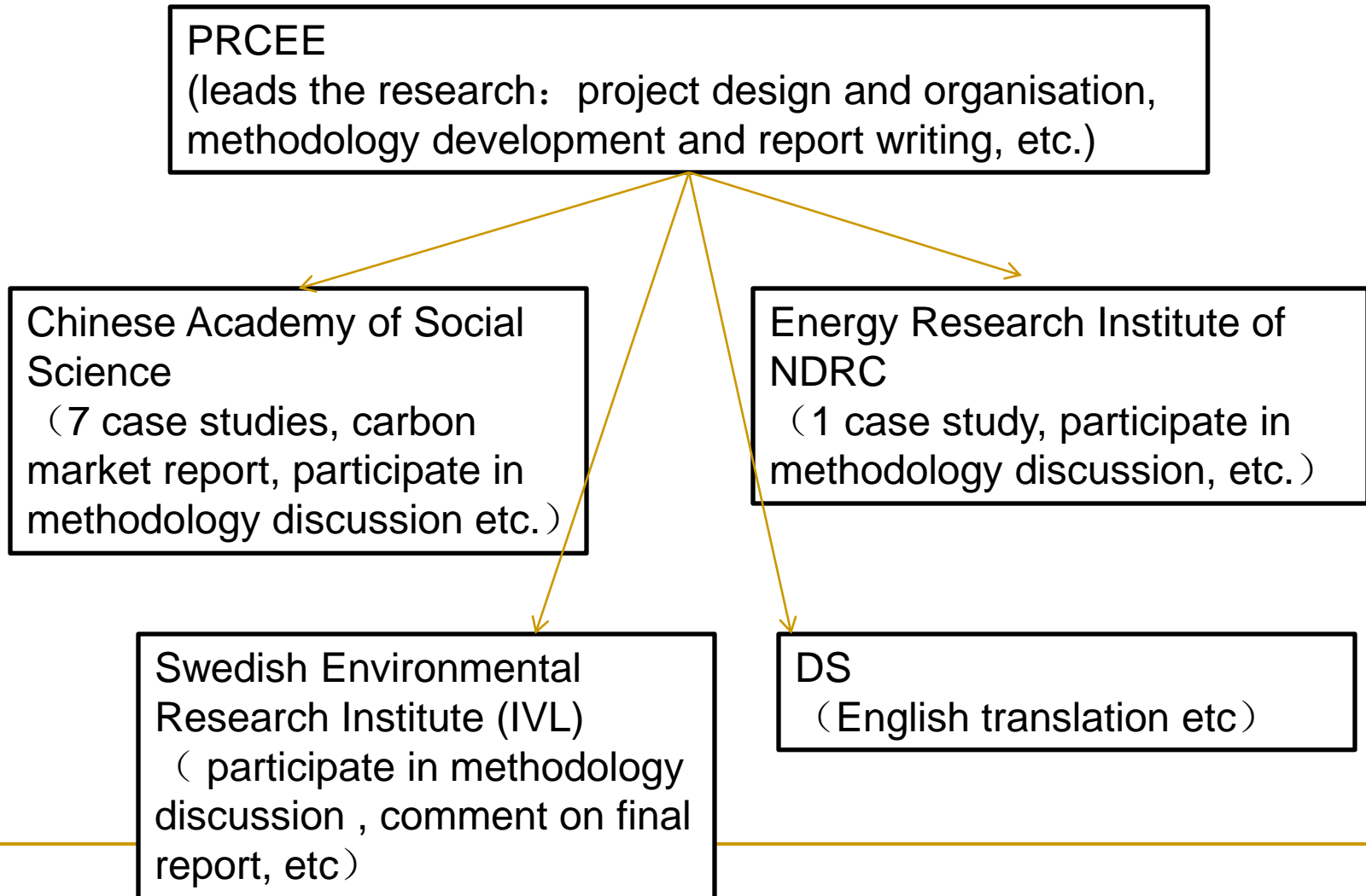
Background: three key words

- China: large amount of projects by number and CREs, broad project scopes
- CDM Projects
 - Two targets defined by Kyoto Protocol:
 - To promote sustainable development in developing countries
 - To assist the developed countries to achieve the quantified GHG emission reduction targets
 - Great attention, reform?
- The impact on sustainable development:
questionable?

Research Purpose

To assess the impacts of CDM projects on sustainable development, based on the quantitative evaluation, and to further propose the policy improvement recommendations.

Institutional Arrangement



2. Research Methodology

- Developed the Multi-Attributive Assessment of CDM specific for China (MATA-CDM-China) methodology, based on international the multi-attribute utility evaluation theory
 - Applying the absolute utility function, the evaluation results of all elements are indicated by the single value (u), with the values ranging from -1 to 1. The total utility value (U) is calculated based on the single value (u) through mathematic modeling. A positive U value **U>0** shows a positive impact on sustainable development; **U<0** shows the negative impact. **U=1** shows the best result, **0.5 shows** a good result, **0** shows the same as the baseline, without contribution
 - Apply to all project types apart from HFC23 and N2O projects
 - Can calculate the sustainable impact level of a category of CDM projects and compare the sustainable impact levels of different categories of CDM projects, and can calculate the impact level of an individual project

$$U(P) = \sum_{i=1}^n w_i u_i [c_i(P)]$$

Steps:

- Step 1: Establish the indicator system
 - Step 2: Decide the utility function
 - Step 3: Confirm the weights of different indicators
 - Step 4: Evaluation
 - Step 5: Synthetic analysis
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Assessment of CDM Projects' Impact on China's Sustainable Development

Social progress

Social justice

Change of service quality and quantity to residents around the project

Capacity building

Training opportunities created by the project and promotion of capacities such as internal management level and data monitoring

Employment

State of employment quantity provided by projects

Environmental protection

Biological protection and land resources

Land resources change of project or impact of project on biological environment compared with virtual thermal power plant

Emission-reduction effect

Change of greenhouse gas and pollutants such as SO_2 and NO_x

Fossil fuel

Change of fossil fuel consumed by the project compared with virtual thermal power plant

Economic development

Regional development

Whether the project is in line with the region industrial master plan as well as the extent to which it is to promote industrial restructuring, transformation and upgrading, etc.

Microeconomic efficiency

Change of internal return rate when project owner considers CER benefits

Technology transfer

Whether project makes contributions to introducing overseas advanced technology and its contribution

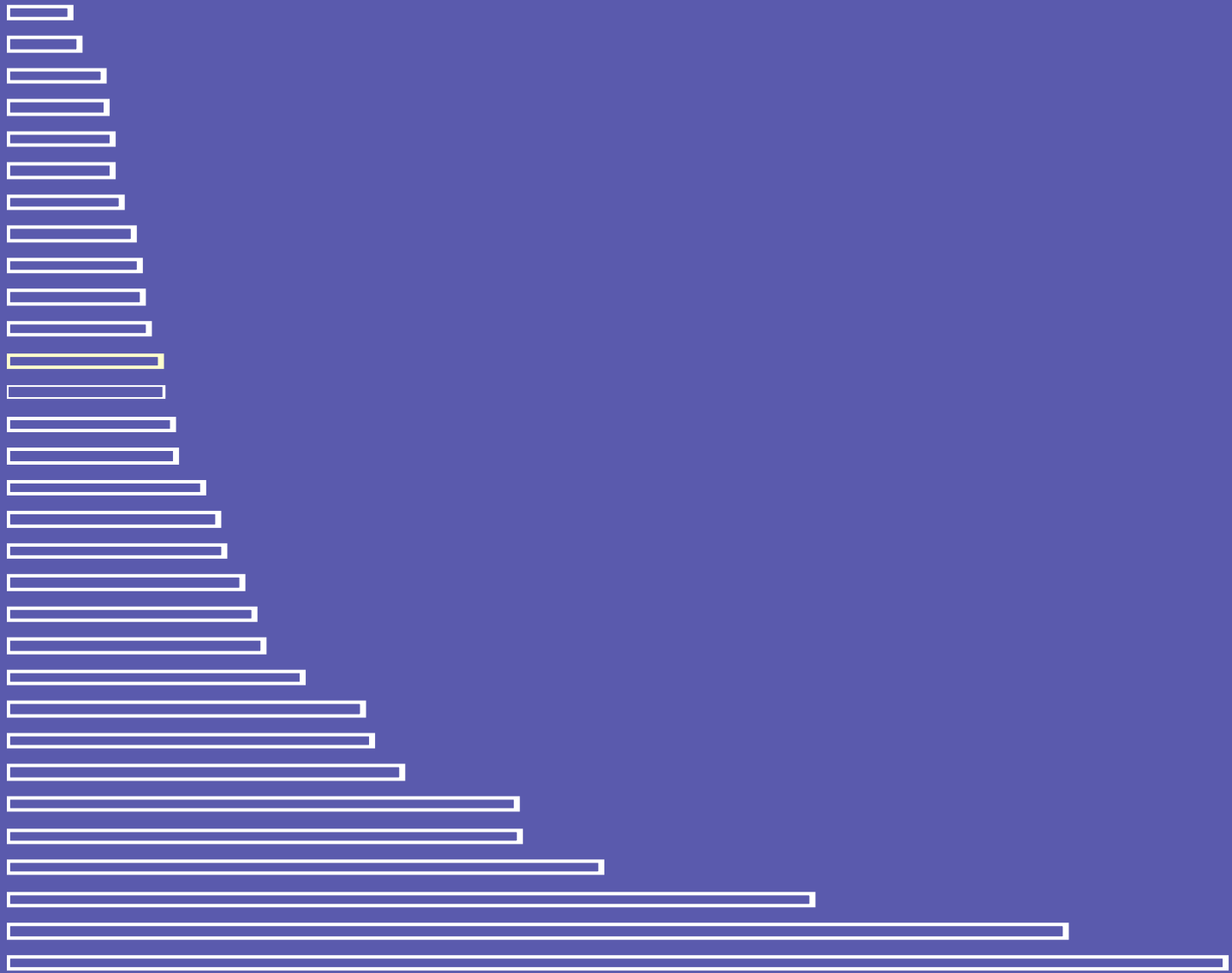
MATA-CDM-China Evaluation Indicator System

Type	Weight	Name	Weight	Type	Base line
Social progress	0.25	Social equity	0.37	Semi-quantitative	No change of service quality and quantity obtained by residents around project
		Employment	0.30	Semi-quantitative	Reference to the virtual thermal power plant and with international experience, suppose the newly-added employment (people. month) each 1000 CER equals to 3 people. month/1000 CER
		Capacity building	0.33	Qualitative	No other additional training except for ordinary employee training
Environmental protection	0.43	Fossil energy	0.34	Quantitative	The coal consumption for power generation of each MWh in virtual thermal power plant is /KWh
		Emission-reduction effect	0.37	Semi-quantitative	As for the emission of pollutants from the virtual thermal power plant, such as CO ₂ , SO ₂ , NO _x , dust, CDO, etc., the measurement standards are that the emission concentration of SO ₂ is 400mg/m ³ or the emission concentration of NO _x is 650mg/m ³ .
		Biological protection and land resources	0.29	Semi-quantitative	Compared with the virtual thermal power plant, the needed land resource of this project retains the same or there is no influence of this project on biological environment.
Economic development	0.32	Microeconomic efficiency	0.36	Quantitative	The internal rate of return (IRR) of the virtual thermal power plant is 8%.
		Technical transfer	0.38	Qualitative	Introduction of overseas technologies (i.e. equipments) on commercial terms (i.e. market price). No introduction of core technologies or advanced technical know-how.
		Regional economy	0.26	Semi-quantitative	These projects are located in economically backward regions or economically moderately developed regions or developed regions, which basically accords with the overall industrial arrangement in these regions; there is no technical spillover or basically no influence on the adjustment, optimization and upgrading of regional industrial structure.

Table 2: Multi-level description of the Evaluation Indicators for Impact of China's CDM projects on Sustainable Development

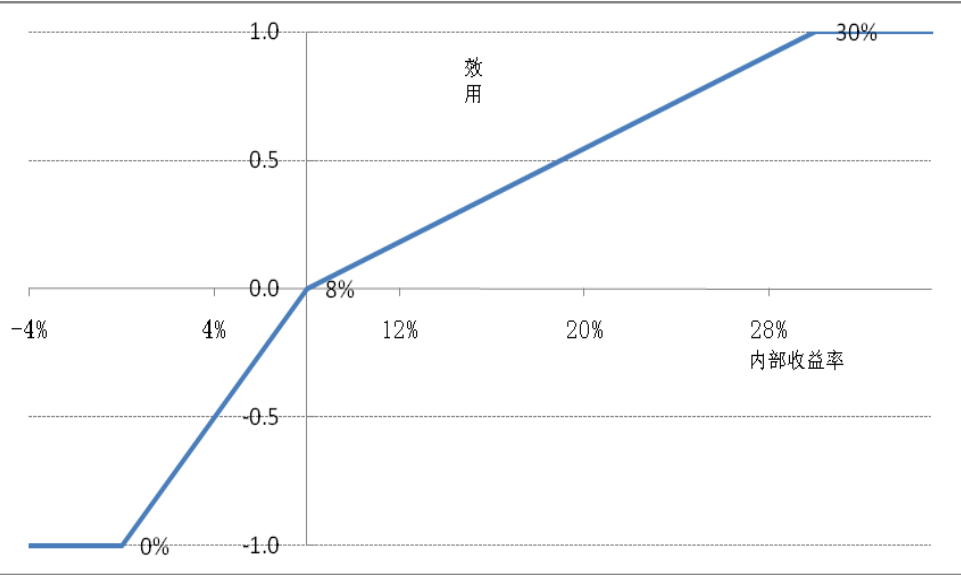
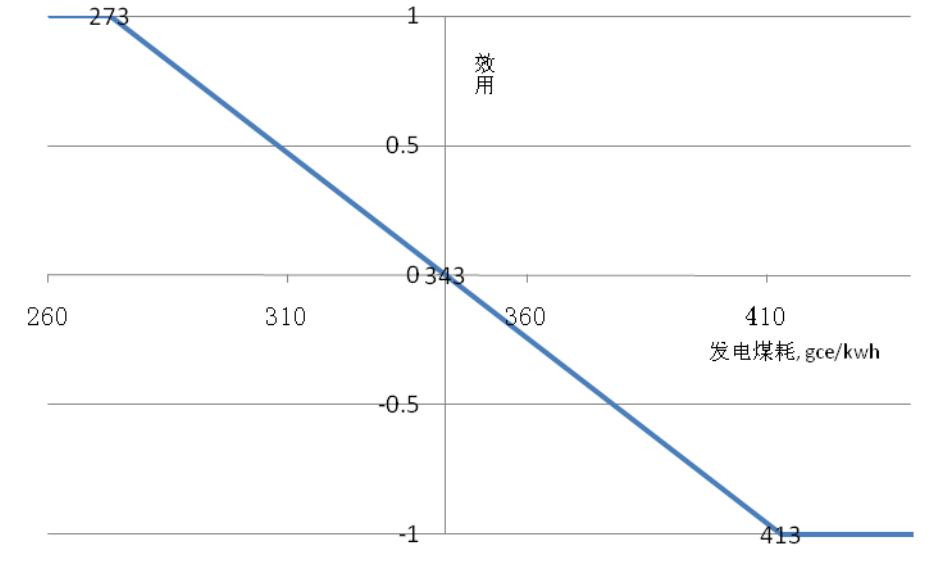
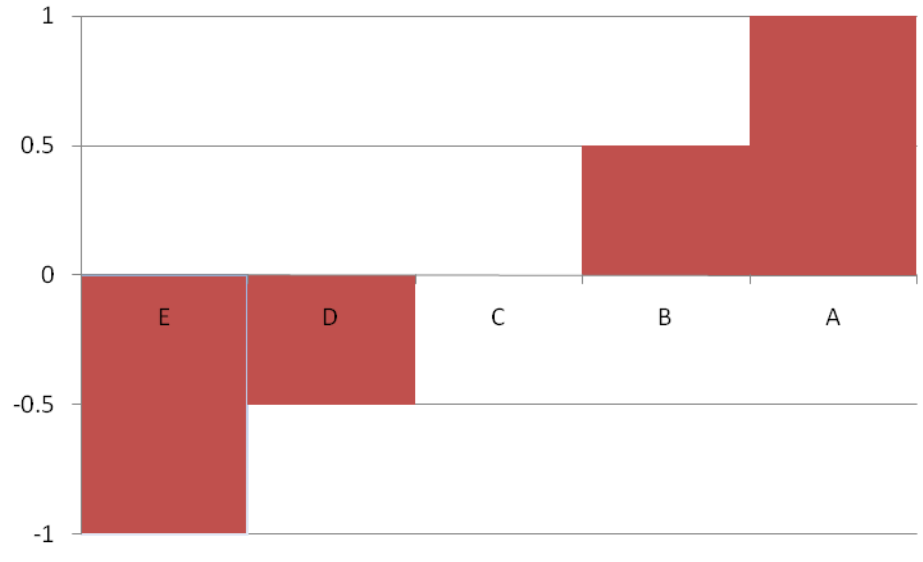
Indicator	Type	Feature	Description	Multi-level description
Social progress	Social Equity	Semi-quantitative	change of service quality and quantity obtained by residents around project	Key service has significant growth
				General service has significant growth
				No service available
				The availability of general service has declined.
				The availability of key service has significantly declined.
	Employment	quantitative	Change of the employment associated with the project. Based on the international evaluation baseline, 3 people*month/1000CER, if the number of newly added employees equals to 3 people*month/1000CER, the project utility value is 0; if the number of newly added employees is 223 people*month/1000CER, the project utility value is 1; if the number of newly added employees is -220 people*month/1000CER, the project utility value is -1.	220 person*month/1000CER difference compared with the baseline
				Employment of the project is 3 person*month/1000CER, the value is 0
				-220 person*month/1000CER difference compared with the baseline
	Capacity Building	qualitative	Training opportunities created by the project	A lot more training opportunities
More training opportunities				
No change				
Less training opportunities				
No training opportunities				
Environmental protection	Fossil fuel	quantitative	Fossil fuel consumption changes compared with the coal consumption for power generation of each MWh in virtual thermal power plant, 343gce/KWh in 2005, which is the evaluation baseline. If the coal consumption is 343, the utility value is 0; if the coal consumption is 273 gce/kwh (refer to Huaneng Yuhuan Ultra-supercritical 1000MW coal generation in 2005), the utility value is 1. If the coal consumption exceed or equals 413 gce/kwh, the utility value is -1.	Coal consumption per unit power generation ≤ 273 gce/KWh
				Coal consumption per unit power generation =343 gce/KWh
				Coal consumption per unit power generation ≥ 413 gce/KWh

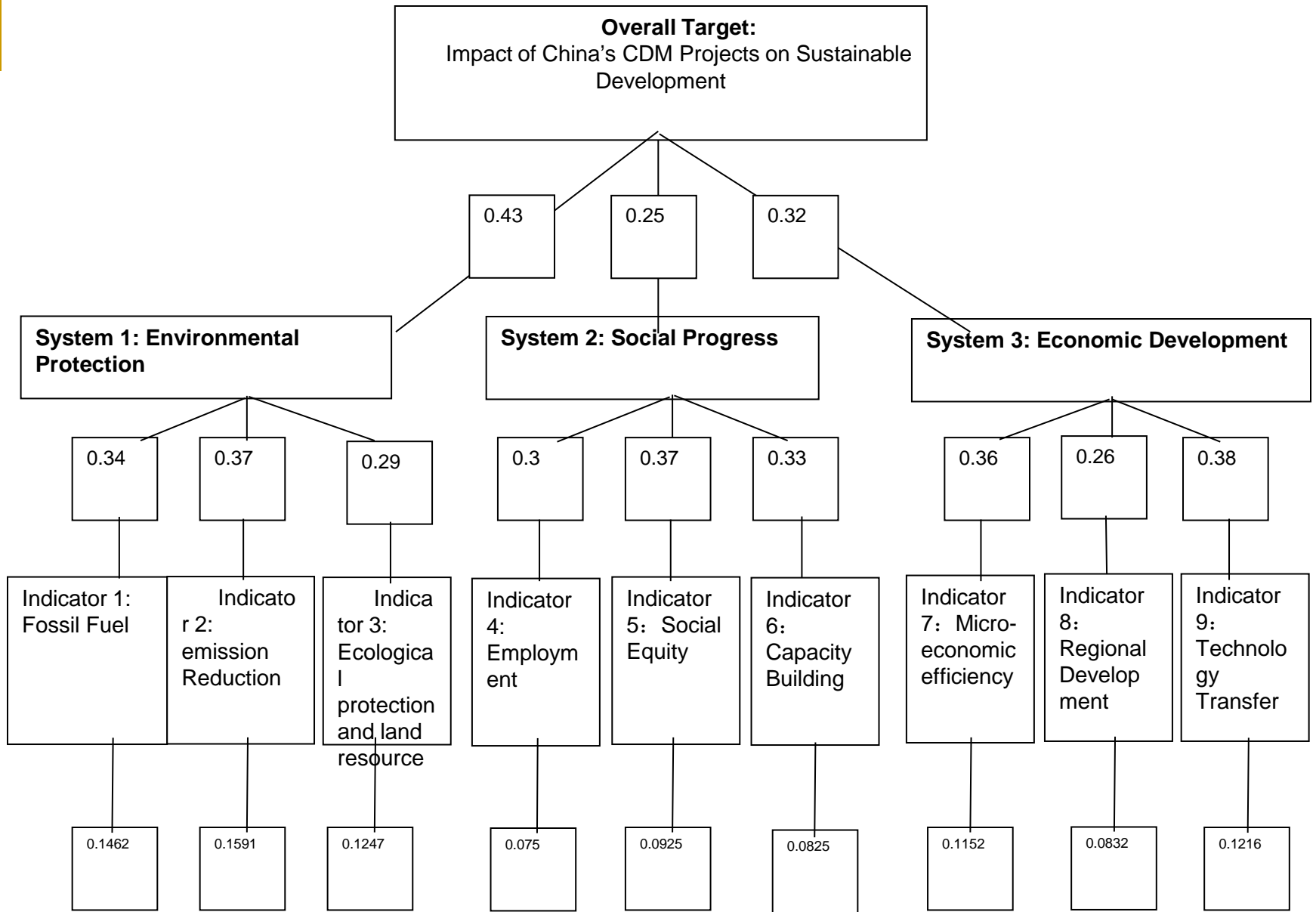
Technology Transfer	quantitative	<p>The contribution of the project to the introduction of foreign advanced technology and the contribution level. The evaluation mainly consider whether TT occurred in the CDM projects. Identification of TT includes the introduction of foreign advanced equipments, technical training, research cooperation for part of the technology, the direct investment from foreign supplier etc. When there is no TT happened, the utility value is 0; when advanced technology is introduced and technical training is provided, the value is between 1 and 0.5 depending on the contribution levels; when inappropriate or even out-of-date technology is introduced, the value is between -1 to -0.5 depending on the negative situation.</p>	<p>Significant contribution (introduction of foreign advanced technology + technical training + R&D cooperation + direct investment)</p>
			<p>Positive contribution (introduction of foreign advanced technology + technical training)</p>
			<p>No contribution (no introduction of foreign advanced technology + no technical training)</p>
			<p>Some negative impact (introduction of inappropriate or to-be out-of-date technologies)</p>
			<p>Significant negative impact (introduced technology is out-of-date and inappropriate)</p>
Regional development	Semi-qualitative	<p>The contribution level of the project to the regional economic development and/or if it fits the overall regional industrial layout , to promote the regional industrial structure improvement and reform, etc. The evaluation takes in to account the marginal contribution to the economy, the technology overspill effects, etc. The marginal contribution to the regional economy is based on the GDP per person in 2005, which divided the country as developed regions, mid-level regions, and economically backward regions.</p>	<p>The projects are located in economically backward regions, which entirely fit the overall industrial layout in these regions; there is significant technical spillover and have greatly promoted the adjustment, optimization and upgrading of regional industrial structure.</p>
			<p>The projects are located in economically backward regions or mid-level regions, which fit the overall industrial layout in these regions; there is technical spillover and have promoted the adjustment, optimization and upgrading of regional industrial structure in certain extent.</p>
			<p>The projects are located in economically backward regions or economically moderately developed regions or developed regions, which basically fit the overall industrial layout in these regions; there is no technical spillover or basically no influence on the adjustment, optimization and upgrading of regional industrial structure.</p>
			<p>The projects are located in mid-level economic regions or developed regions, which do not fit the overall industrial layout in these regions; there is no technical spillover, and hinder the adjustment, optimization and upgrading of regional industrial structure.</p>
			<p>The projects are located in mid-level economic regions or developed regions, which are against the overall industrial layout in these regions; there is no technical spillover, and greatly hinder the adjustment, optimization and upgrading of regional industrial structure.</p>



Features of the indicators

- Qualitative, Quantitative, and semi-quantitative
 - Relative, absolute
 - “Relative” refers to the indicators compared with the baseline
 - **the baseline is defined as a virtual power plant with all the average features of a coal-fired power plant in China**
 - Illustrated by the factors
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Evaluation Methods

- Studied all the 202 CDM registered projects in China by 1 May 2008, and summarised and analysed all of their PDDs.
 - Selected 14 representative on-going CDM projects based on Delphi methodology, and conducted extensive analysis and calculation based on the MATA-CDM-China methodology
 - Phone-interviewed CDM consultant agencies in 10 provinces
 - Face-to-face interviews with 15 European companies
 - A number of expert consultation workshops
 - Over 200 surveys
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Case Study of Impact Assessment on Sustainable Development of China's CDM Projects

Type	Industrial Nature	Case Name	EB Reg. ID/Ref.	EB Reg. Time
Energy Conservation and Energy Efficiency Improvement	Cement Heat Utilisation	Conch Ningguo Cement Factory	CDM1086/898	
	Steel Heat Utilisation	Hebei Handan Steel Group CCP Power Generation Project	CDM1547/1262	
		Complementary coke dry quenching power generation for No.9 & No.10 coke oven in Wuhan Iron and Steel Corporation	CDM2346/1695	
	Ultra-supercritical Power Generation	Guodian Taizhou USC Power Generation	CDM4488/NA	Not registered, under review
Renewable energy	Hydro power	Hei'er	CDM1068/1102	
		Xiaoxi	CDM1765/1749	
	Wind power	Dongshan wind power project in Chifeng,	CDM0696/689	
		Rudong Dongling Wind Power Project	CDM0908/833	
	Biomass power	Straw Power Generation Project	CDM1001/778	
Fuel Substitute	Natural Gas	No.3 Thermal Power Plant NGCC	CDM2257/1373	Feb. 15, 2008
Methane Recycle and Use	Coal Bed Methane Recovery	Shanxi Yangquan Coal Group	CDM1347/892	
	Landfill gas power	Nanjing Tianjingwa Landfill gas power Project	CDM0128/71	
Non-CO2	HFC23 Decomposition	Jiangsu Changshu San'aifu Group	CDM0472/306	
	N ₂ O Decomposition	Shanxi Tianji Chemical Group	CDM1788/1436	

Summary of the Impact
Assessment of China's CDM
Projects on Sustainable
Development

Ranking of the CDM impacts on sustainable development in different industries

Comprehensive ranking	Scope of the industry	Impact level on sustainable development
1	Cement waste heat utilization	0.6654
2	Coal-bed methane recovery	0.6140
3	Landfill gas power	0.5364
4	Ultra supercritical power	0.5049
5	Wind power	0.5040
6	Natural gas power	0.4799
7	Small hydro power	0.4744
8	Steel waste heat utilization	0.4718
9	Biomass power generation	0.2428

3. Major findings

- In general, CDM projects in China contribute to sustainable development. However, they have not achieved the goal of promoting sustainable development in developing countries as defined in the Kyoto Protocol. The average sustainable development impact level was 0.49, and all the studied projects had positive sustainable development impact levels (above 0).
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3. Major findings

- At the systematic column, environment protection is the main aspect in which these projects have shown their positive impacts on sustainable development. The average utility value of all the evaluated projects is 0.3290, contributing around 2/3 to the average value of sustainable development impact.
- At the Indicator column, the indicators such as emission reduction, fossil fuels and capacity building are the aspects in which these projects performed well.
- In terms of project scopes, different types of CDM projects in different industries show different levels of impact on sustainable development. CBM recovery and utilisation projects have the highest impact on sustainable development, with the impact value of 0.5752.

4. Cause Analysis

Positive reasons:

- UNFCCC and Kyoto Protocol have both defined “to promote the sustainable development in developing countries” as an important principle and target
 - COP/MOP and the CDM EB have both formulated the policies and regulations to ensure that the CDM can help the host country to realize its sustainable development targets: a CDM project design document shall demonstrate how to promote sustainable development ;
 - whether a CDM project fulfils necessary sustainable development criteria is one of the auditing areas for the DOEs;
 - China has adopted relevant policies and regulations, set the priority areas for CDM project development and facilitated energy conservation and emission reduction, which furthermore have significant synergy effects on reducing GHG emissions
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4. Cause Analysis

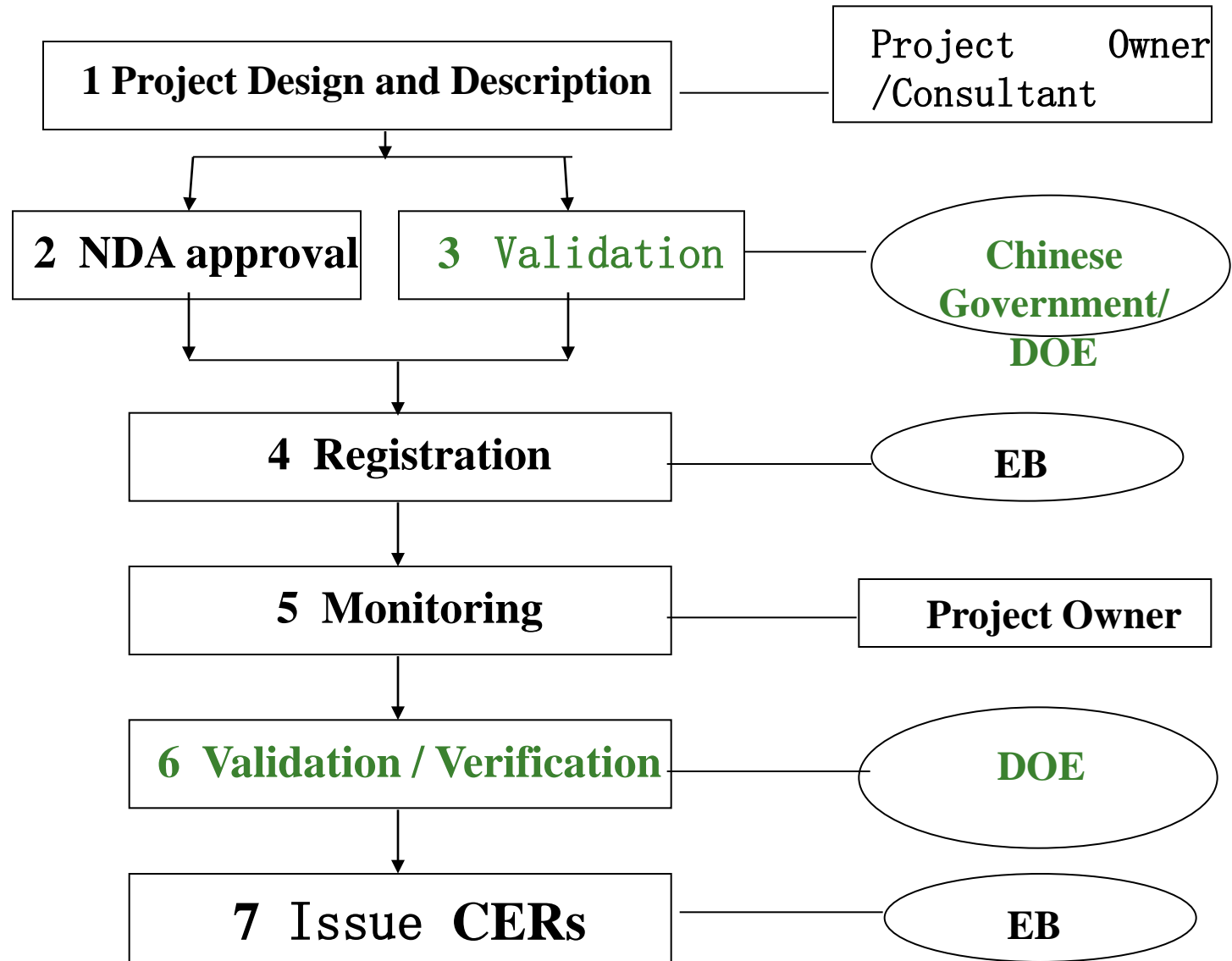
- Negative Reasons:

- The **institutions** of CDM are not perfect and lack overall coordination $1+1<2$
 - Lack of a comprehensive and uniformed **understanding** on sustainable development
 - The CDM should not be a pure marketing and trading activity, but has become become completely market-oriented in reality. On the other hand, the effects of sustainable development has not been capitalised.
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4. Cause Analysis

- **All the stakeholders have the responsibilities:**
 - 1、UNFCCC COP/MOP (EB)
 - 2、DOE
 - 3、Chinese government
 - 4、Project owner/developers
 - 5、Developed countries/buyers
-

CDM
Overall Procedure



5. Recommendations

- 1、 Chinese government
- 2、 **the EU**
- 3、 **UNFCCC COP/MOP (EB)**



Chinese government

- 1、 It is important to further understand the significance and the effects of CDM on sustainable development in China, identify the best benefits of CDM for China;
- 2、 For the supervision on CDM project:
 - 1) It is essential to speed up the amendment work on the Measures for the Operation and Management of Clean Development Mechanism Projects, establish a sustainable development indicator system that is scientific and concrete and consistent with the reality of China, and thereby use this system as one of the restrictive conditions for the approval of CDM projects. Indicator system, weighting, 0.5 as a border.
 - 2) Institutionalising the impact assessment of CDM projects on sustainable development as soon as possible
 - 3) Reinforcing the administration on CDM project, introducing the clear definition of technology transfer at the CDM Board to promote the transfer of technology
 - 4) Strengthening the post-evaluation system for CDM project

The EU

- should identify European interests and introduce policies and measures that enable businesses to take advantage of CDM business opportunities.
 - should amend the act to allow a larger proportion of CERs in the EU-ETS carbon market
 - should take action to eliminate supply-side barriers to technology transfer and facilitate the technology transfer in CDM projects.
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UNFCCC COP/MOP (EB)

- 1、 Should perfect the UN-level administrative and legislative system for CDM project
- 2、 should reinforce or improve the supervision and administration of DOE
- 3、 should perfect the additionality tools proposed by the “Protocol”, reinforce the research on “additionality” and establish a dynamic mechanism, to ensure the additionality requirement can be well serviced and be consistent with the two objectives of CDM projects - sustainable development and GHG reduction
- 4、 Should adopt positive measures to promote methodology research and the development of the CDM projects that have more significant impacts on sustainable development
- 5、 Should strengthen the capacity building on CDM and sustainable development of the developing countries, and intensify the staff training and information exchange.

Summaries

- 1、 Developed the MATA-CDM-China evaluation methodology, proposed **a virtual power plant as the** baseline, defined the sustainable development impact level (U) as the final results for comparison
 - 2、 CDM projects have positive role in promoting sustainable development in developing countries, but mainly in terms of environmental protection, which is more to help developed countries to achieve the GHG emission reduction targets.
 - 3、 All the stakeholders have responsibilities to help developing countries to achieve sustainable development.
 - 4、 CDM is not a pure market-based mechanism, but has been over market-oriented, by contrast, the sustainable development benefits have not been capitalised
 - 5、 All the additionality evaluation criteria should be consistent with the objective of sustainable development, not against it.
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Thank You!
