Low Carbon Development

US-China Cooperation in China and Beyond

CCS, GEI, GIEC, CAS-ISD 2009 to Present



2009 Context

- US China relations on climate change nascent
- Leadership in both nations hungry to advance
- Many hurdles and opportunities
- US subnational (state) action provided template
- Global agreement contingent on US China bilateral

Principles

- Stepwise "domestication"
- Cooperative, partnership based
- International and local experts
- NGO led, Government endorsed (NDRC, US DOS)
- Driven national goals (12th Five Year Plan)
- Driven by implementation at full scale

Practices

- Leadership exchange (state/provincial)
- Co-development of tools and curriculum
- Initial test pilot (Chongqing) and iteration
- Governmental endorsement (NDRC, 2013)
- Recruitment of national partners (local China institutions)
- Local LCD training, learning by doing (30 provinces, cities in three years)
- Shift to barrier removal for implementation at full scale (South China renewable energy and financing)

Results

- LCD Toolkit (Integrated Modeling Framework)
- LCD Curriculum (Mandarin and English)
- US States-China Provinces MOU's
- Chongqing LCD plan and analysis
- Shanxi Province city-level LCD planning
- Map of 30 training locations
- REI Toolkit
- Guangdong GIS
- Huangpu Pilot Business Model and investment analyses (50 vs 100%)

LCD Toolkit (Integrated Modeling Framework)









•Economy-Wide Synthesis Module, plus: •Energy Supply Module Energy, •Residential, Commercial & Institutional Economic & Module Industrial Module **Emissions** Transportation Module **Baselines** •Agriculture, Forestry & Land Use Module •Waste Management Module Sector-Specific for Action Screening & Prioritization: Multi-•Energy Supply Criteria •Residential, Commercial & Institutional Industrial Action •Transportation & (Urban) Land Use Catalogs Agriculture & Forestry •Waste Management Policy Design Templates •Causal Chain Templates •Microeconomic Analysis Principles Sector-level Microeconomic (Cost Policy Effectiveness) Modeling Tools •Macroeconomic Screening Tool Design & •Linkage to Formal Macroeconomic Models Analysis (e.g. REMI) •Financing Mechanisms Guidance Cross-Sector Integration Tools in the Synthesis Module (assess progress to targets, develop MAC curves)

LCD Toolkit



LCD Curriculum



US States-China Provinces - MOU's



www.climatestrategies.us

- To: Jin Jiaman, Executive Director, Global Environmental Institute
- From: Thomas D. Peterson, President and CEO, Center for Climate Strategies (CCS), Linda Schade, Program Development Director, CCS

Center for Climate Strategies

- Subject: Second Draft Memorandum of Understanding for a CCS–GEI Climate Planning Partnership
- Date: November 25, 2016

This agreement is made and entered into as of the [date] day of September, 2009, by and between The Center for Climate Strategies (CCS) and the Global Environmental Institute (GEI).

PURPOSE OF AGREEMENT

The important role of sub-national actors in reducing growing global greenhouse gas (GHG) emissions and adapting to climate change is increasingly understood. CCS is the premier catalyst in the United States for sub national climate policy development and integration and is widely recognized for its highly successful model for sub-national climate action planning which integrates advanced economic modeling, stakeholder input, and a consensus building facilitation process. CCS' signature process has been refined and enhanced through more than 22 state action plans in the U.S., technical assistance to 42 U.S. states, six Mexican Border States, and four Canadian Provinces. CCS has also played a critical role in the development of regional agreements including the Western Climate Initiative, the Midwestern Governors Greenhouse Gas Accord, and the Southern Governors Climate Initiative. Today CCS works to build bridges between states and national policy makers in the formulation of national climate policy. CCS is active in many technical facets of national law and policy development in the U.S. and abroad.

GEI is a Beijing-based non-governmental organization with a mission to design and implement market-based models for solving environmental problems in order to achieve development that is economically, ecologically, and socially sustainable. GEI's Energy and Climate Change Program includes a US-China Track II Dialogue on Climate Change which aims toward promoting cooperation between the Chinese and US governments on the issue of climate change. In July and October 2008, the project held two informal dialogues between the two governments. During the two dialogues, two sides introduced their own policies, actions, plans and objectives on the issue of climate change. They also raised the ideas of enhancing policy communications, joint technology research and innovation, technology transfer, etc. Furthermore, the two sides discussed the feasibilities of future policy dialogue between the Chinese Central Government and the American National Government, joint technology research, innovation and promotion, cooperation on low carbon business between the Chinese provincial level and the US state level.

合作备忘录

Memorandum of Understanding

習音を含却技術文中心(SPRCES) 様体優特気術(GE) 電子機模称や(CCCS) msi Province Research Center for Eco-Environmental Sciences (SPRCES) bal Environmental Institute (GEI) mse for Climas extraogies (CCS), 気能改変現処領列以及相关電源、环境与經済政策分析的合作协议 aborative agreement on low carbon development (LCD) planning support and related p; environmental and economic issues. 54: 10.9.11.15

r 13, 2015

既要/Overview

4.55款(以下菜称"备Б菜")就美国气候液略中心(以下简称 CCS)和全球环境研究研究所 述D:共同方山西省生态环境研究中心(以下常称 SPRCES)提供规划编制和政策分析方 业合作协议。合作协及低碳发展规划级新和其他和关策或,包括但不限于;环境和健 2气污染)、水质调密费/质量、经济发展和公平问题、能够安全与弱心和工业生产

norandum of understanding (MOU) provides a description of the technical and planning, provided by CCS and GEI to SPRCES in the areas of low carbon development (LCD) unalysis, and other topics, including but not limited to: environmental and health issues (e.g., water consumption/quality; economic development and equity issues; energy security and ul industrial production.

(包含:1) 省级和市级温空气体清单的万发以及对能增效用、经济增长和温空气体持 (强制:2) 违规绝产温空气体排放、经济增长、能派使用和权益问题方面产生积极影 3) 对次追政策所产生的影响进行直接《微观》和问报《宏观》分析。

合作备忘录

Memorandum of Understanding

中国科学院广州能源研究所 (GEC) 全球环境研究所 (GE) 美国气候战略中心 (CCS) Guagchou Institute of Energy Conversion, Chinese Academy of (GIEC) Global Environmental Institute (GEI) Center for Clinate Strategies (CCS) 在广东省等中国南方地区关于可再生能源规划与设计支持等领域的合作依 伴关系的谅解备忘录 Memorandum of Understanding (MOU) for a collaborative partnership on renewable energy planning and design support in Guangdong Province and South China 2016 年 12月8月

December 8, 2016

view and Purpose of MOU

morandum of Understanding (MOU) provides for a partnership working relationship uangzhou Institute of Energy Conversion (GIEC), the Global Environmental Institute Center for Climate Strategies (CCS) in a collective effort to build capacity, evaluate, and plan for a viable carbon-neutral and renewable power supply future for rovince, the region of South China, and other regions. It also provides a framework rs to map out a set of activities that are implementable within the province and other regions.

ect Objectives, Work Plans and Milestones

tnership is expected to encourage and facilitate tools development, training, pacity, and planning and implementation activities related to development of a bon-neutral power supply in Guangdong Province and other regions, and to provide

Chongqing LCD plan and analysis



图1重庆各行业排放清单与预测



阶梯式边际减排成本曲线图





700 GHG减排量/百万吨CO2e 600 500 400 300 200 100 0 AFF-4b AFF-4a Ξ ES-5 T-6 ES-4 T-5 RCI-3 T-4 ES-2 RCI-2 ES-3 Ŀ T-2 RCI-4 ES-1 Ŀ <u>1-</u>2 RCI-1 Ξ I-5

图2-8各部门各政策累计减排量(2011-2015年)

Shanxi Province Research Center for Eco-environmental Sciences, GHG Baseline Development for Yangquan City LCD Plan



Map of 30 Training Locations



REI Toolkit

GIS Supply/Demand Targeting

Technology Application Scoping

Technology Application MCA Screening

Low Carbon Development Baselines

Financial Mapping, Risk, Return, Impacts



Huangpu EDZ, Guangzhou Industrial Solar PV Program Analysis



Yunpu Industrial Park

Sino-Singapore Knowledge City





100% of Production for Own-Use

Total Initial Investment (X)	X6 727 950
	<i>±0,727,33</i> 0
Discounted Net Cash Flow - NCF (¥2018)	¥7,361,293
Internal Rate of Return (IRR) %	25%
Minimum Acceptable Rate of Retum	
(MARR)%	8.2%
Return on Investment - ROI (%)	67%
Investment Cut-Off Period (years)	5.0
Payback Period (years)	4.5
Discounted Payback Period (years)	5.1
Benefit to Cost (BC) Ratio	1.67
Levelized Cost of Electricity - LCOE (¥/kWh)	¥0.48
NPV of Implementation Costs (¥2018)	¥10,948,422

50% of Production for Own-Use

Total Initial Investment (¥)	¥6,727,950
Discounted Net Cash Flow - NCF (¥2018)	¥2,638,309
Internal Rate of Return (IRR) %	8.3%
Minimum Acceptable Rate of Return	0.070
(MARR) %	8.2%
Return on Investment - ROI (%)	23%
Investment Cut-Off Period (years)	5.0
Payback Period (years)	18.7
Discounted Payback Period (years)	12.6
Benefit to Cost (BC) Ratio	1.23
Levelized Cost of Electricity - LCOE (¥/kWh)	¥0.52
NPV of Implementation Costs (¥2018)	¥11,704,046

Huangpu EDZ Industrial PV Program Financial Analysis

Sensitivity of Net Cash Flow to Key Variables



Lessons

- It worked
- It can work elsewhere
- It takes time and money
- It requires trouble shooting
- It requires an effective template
- It takes sustained willpower by both sides

Outcomes

- Increase supply/demand for low carbon actions
- Reduce supply/demand for carbon intensive actions
- Contribute to:
 - China National Adoption of LCD Paradigm
 - Mega Shift to Energy/Resource Efficiency and Renewables
 - 13th Five Year Plan, National Energy Policies
 - Local Interest in Action by Cities, Provinces
 - Cross Border Technology and Expertise Exchange
 - Recalculation of China GHG Peaking
 - US China Bilateral Agreement
 - Paris Agreement and NDC Format

2018 Context

- Ambition is not enough
- Willpower must expand
- Health impacts are growing
- Climate impacts are growing
- Energy and resource demand is growing
- Economic opportunities and challenges are growing
- Over 80 percent of future emissions from developing nations

Key Issues

- Alignment with national goals
- Mobilization of manpower and money
- Expansion of public support
- Freedom of choice on policies
- Capacities for self determination

Next Steps

- Expand cooperation in Rest of World
- Integrate LCD into planning and investment
- Use multi objective participatory procedures
- Combine international and domestic experts
- Customize a generic template for domestication
- Focus on implementation of policy at full scale