The China Sustainable Energy Program
中国可持续能源项目

TENTH SENIOR POLICY ADVISORY COUNCIL MEETING

ENHANCING IMPLEMENTATION OF CHINA'S 2010 20-PERCENT ENERGY EFFICIENCY TARGET

November 16, 2007

Renaissance Tianjin Teda Hotel & Convention Center
Tianjin, P.R. China

大卫与露茜尔·派克德基金会
威廉与佛洛拉·休利特基金会 合盟
能源基金会
The David and Lucile Packard Foundation, The William and Flora Hewlett Foundation, in partnership with the Energy Foundation

旧金山总部 San Francisco Office: 1012 Torney Avenue, #1 • San Francisco, CA 94129, U.S.A.
电话 Tel: (415) 561-6700 • 传真 Fax: (415) 561-6709 • 电子邮件 Email: china@ef.org • 网站 Web: www.efchina.org
北京办事处: 中国北京市建国门外大街 19 号国际大厦 2403 室 • 邮编: 100004
Beijing Office: CITIC Building, Room 2403, No. 19, Jianguomenwai Dajie • Beijing 100004, P.R. China
电话 Tel: (86-10) 8526-2422 • 传真 Fax: (86-10) 6525-3764 • 电子邮件 Email: china@ef.org • 网站 Web: www.efchina.org

CONTENTS

10TH SENIOR POLICY ADVISORY COUNCIL MEETING:

ENHANCING IMPLEMENTATION OF CHINA'S 2010 20-PERCENT ENERGY EFFICIENCY TARGET

APPENDICES

CHINA SUSTAINABLE ENERGY PROGRAM
10TH SENIOR POLICY ADVISORY COUNCIL (PAC) MEETING

ENHANCING IMPLEMENTATION OF CHINA'S 2010 20-PERCENT ENERGY EFFICIENCY TARGET

NOVEMBER 16, 2007

TIANJIN, P.R. CHINA

AGENDA

1:45 pm

WELCOME REMARKS

Colburn S. WILBUR, Chair, Senior Policy Advisory Council; Trustee, The David and Lucile Packard Foundation

Introduction: New Senior Policy Advisory Council Members
WANG Junmin, Vice Governor of Shandong Province

Introduction: Funding Partners and New CSEP Director (introduced by Eric HEITZ, President, The Energy Foundation)

Andrew BOWMAN, Director, Climate Change Program, Doris Duke Charitable Foundation
Paul BREST, President, William and Flora Hewlett Foundation
Walt REID, Conservation and Science Program Director, David and Lucile Packard Foundation
LIN Jiang, Director, China Sustainable Energy Program

SESSION ONE

LOCAL IMPLEMENTATION OF THE 20-PERCENT ENERGY EFFICIENCY TARGET: EXPERIENCES AND BARRIERS

2:10 pm

SHANDONG'S EXPERIENCES IN IMPLEMENTING THE 20-PERCENT ENERGY EFFICIENCY TARGET

WANG Junmin, Vice Governor, Shandong Province

2:40 pm

IMPLEMENTING THE 20-PERCENT ENERGY EFFICIENCY TARGET IN THE TOP-1,000 INDUSTRIAL ENTERPRISES

DAI Yande, Deputy Director, Energy Research Institute, National Development and Reform Commission

3:00 pm

POLICY RECOMMENDATIONS FOR ACHIEVING THE 20-PERCENT ENERGY EFFICIENCY TARGET

FENG Fei, Director, Industrial Economics Department, Development Research Center of the State Council

3:20 pm

DISCUSSION

3:50 pm	**BREAK**

SESSION TWO

NEW LAWS FOR STRENGTHENING THE IMPLEMENTATION OF THE 20-PERCENT ENERGY EFFICIENCY TARGET

4:05 pm	**DRAFTING THE ENERGY LAW** *YE Rongsi,* Deputy Head, Expert Team for Drafting the Energy Law; President, Energy Law Academy, China Law Association
4:25 pm	**ENFORCEMENT OF THE NEW ENERGY CONSERVATION LAW** *LI Mingzhi*, Director, Economic Affairs Office, Financial & Economic Committee, National Peoples' Congress
4:45 pm	**AMENDMENT OF THE ELECTRICITY LAW TO IMPROVE ENERGY EFFICIENCY AND ENVIRONMENTAL PROTECTION** *WANG Yonggan,* Chairman, China Electricity Council
5:05 pm	**DISCUSSION**

SESSION THREE

GUIDANCE AND ADVICE FOR THE CHINA SUSTAINABLE ENERGY PROGRAM

5:25 pm	**CSEP FOCUSES IN 2008** *Fuqiang YANG,* Chief Representative, The Energy Foundation Beijing Office
5:40 pm	**DISCUSSION**
6:40 pm	**CLOSING REMARKS** *Colburn S. WILBUR,* Chair, Senior Policy Advisory Council
6:50 pm	**ADJOURN**
7:00 pm	**BANQUET**

CHINA SUSTAINABLE ENERGY PROGRAM
10TH SENIOR POLICY ADVISORY COUNCIL (PAC) MEETING

ENHANCING IMPLEMENTATION OF CHINA'S 2010 20-PERCENT ENERGY EFFICIENCY TARGET

NOVEMBER 16, 2007
TIANJIN • P.R. CHINA

ATTENDEES

Senior Policy Advisory Council Members

Peter BRADFORD
Energy Advisor Fellow
P.O. Box 497
Bradford Road, Route 11
Peru, VT 05152-0497, USA

FU Zhihuan
Chairman, Finance and Economics Committee,
National People's Congress
No. 23 Xi Jiao Min Xiang
Xicheng District
Beijing 100805, P.R.CHINA

Thomas JOHANSSON
Professor and DirectoInternational Institute for
Industry Environmental Economics
Lund University
PO Box 196
Lund, S-221 00, SWEDEN

MAO Rubai
Chairman, Environmental Protection & Resources
Conservation Committee, National People's
Congress
2 Xihuangchenggen Beijie
Beijing 100034, P.R. CHINA

PAN Yue
Vice Administrator
State Environmental Protection Administration
No.115 Xizhimennei Nanxiaojie
Beijing 100035, P.R. CHINA

QU Geping
China Environmental Protection Foundation
No. 16, Guangqumen Nei, Chongwen District
Beijing 100062, P.R. CHINA

William K. REILLY
President and CEO
Aqua International Partners, L.P.
345 California Street, Suite 3300
San Francisco, CA 94104, USA

Colburn S. WILBUR
Trustee
The David & Lucile Packard Foundation
300 Second Street, Suite 200
Los Altos, CA 94022, USA

XIE Fuzhan
Director
National Bureau of Statistics,China
No. 57, Yuetan Nanjie, Sanlihe, Xicheng District,
Beijing 100826, P.R. CHINA

YANG Jike
President
South-North Institute for Sustainable Development
Dongxiaolou, Zhongshan Park East Gate Tiananmen
Beijing 100031, P.R. CHINA

ZHANG Guobao
Vice Chairman
National Development and Reform Commission
38 Yuetan Nanjie
Beijing 100824 P.R. CHINA

Dialogue Partners

HE Jiankun
Executive Vice President
Tsinghua University
P.O. Box 1021
Beijing 102201, P.R. CHINA

LI Xinmin
Deputy Director General
Pollution Control Department
State Environmental Protection Administration
115 Xizhimennei Nanxiaojie
Beijing 100035, P.R. CHINA

LU Xinyuan
Director
Department of Environmental Protection
Enforcement and Inspection
State Environmental Protection Administration
115 Xizhimennei Nanxiaojie
Beijing 100035, P.R. CHINA

SHI Baoquan
Vice Administrator
Standardization Administration of China
9 Madian Donglu, Building B, Room 1101
Haidian District
Beijing 100088, P.R. CHINA

SHI Dinghuan
Secretary General
Ministry of Science and Technology
15 Fuxing Road
Haidian District
Beijing 100862, P.R. CHINA

SHI Yaobin
Deputy Director General
Tax Policy Department
Ministry of Finance
3 Nansan Lane, Sanlihe
Beijing 100820, P.R. CHINA

WU Yong
Deputy Director
Department of Science and Technology
Ministry of Construction
9 Sanlihe Road
Beijing 100835, P.R. CHINA
YE Rongsi
Vice Trustee
China Electricity Council
1 Baiguang Road, Lane 2
Beijing 100761, P.R. CHINA

ZHOU Fengqi
Professor
Energy Research Institute
B-1515, Guohong Mansion
Jia (A) 11, Muxidi Beili
Xicheng District
Beijing 100038, P.R. CHINA

Presenters

DAI Yande
Vice Director
Energy Research Institute
B-1515, Guohong Mansion
Jia (A) 11, Muxidi Beili
Xicheng District
Beijing 100038, P.R. CHINA

FENG Fei
Director General
Industrial Economics Research Department
Development Research Center of the State Council
No. 225 Chaoyangmennei Dajie
Dongcheng District
Beijing 100010, P.R.CHINA

LI Mingzhi
Director, Office on Economic Affairs
Financial & Economic Committee of National
People's Congress
No. 23 Xijiaominxiang Street, Xicheng District,
Beijing 100805, P.R.CHINA

WANG Yonggan
Secretary General, China Electricity Council
1 Baiguang Road, Lane 2
Beijing 100761, P.R. CHINA

YE Rongsi
Vice Trustee
China Electricity Council
1 Baiguang Road, Lane 2
Beijing 100761, P.R. CHINA

YANG Fuqiang
Chief Representative
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

Foundation Representatives

Andrew BOWMAN
Director, Climate Change Initiative
Doris Duke Charitable Foundation
650 Fifth Avenue, 19th Floor
New York, NY 10019, USA

Paul BREST
President
The William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025, USA

Danielle DEANE
Program Officer, Environment Program
2121 Sand Hill Road
Menlo Park, CA 94025, USA

Andre FERREIRA
Consultant
The William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025, USA

Erin HAFKENSCHIEL
Program Assistant
The William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025, USA

Hal HARVEY
Program Director, Environment Program
The William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025, USA

George POLK
CEO
The Catalyst Project
49 Elgin Crescent
London W11 2JU
UNITED KINGDOM

Walt REID
Director of Conservation and Science Program
The David & Lucile Packard Foundation
300 Second Street, Suite 200
Los Altos, CA 94022, USA

Joseph RYAN
Program Officer, Environment Program
Managing Director for Latin America
The William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025, USA

Alejandro VILLEGAS
Consultant Program Officer,
Environment Program, Mexico
William and Flora Hewlett Foundation
2121 Sand Hill Road
Menlo Park, CA 94025, USA

Other Attendees

Nathaniel ADEN
Environmental Energy Technologies Division
Lawrence Berkeley National Laboratory
1 Cyclotron Road, MS 90/3026A
Berkeley, CA 94720, USA

BAI Chenxi
Beijing Municipal Commission of Urban Planning
60, South LiShi Road, Xicheng District,
Beijing 100045, P.R. CHINA

CHEN Fan
Appraisal Center for Environment and Engineering,
State Environmental Protection
No. 8 Dayangfang, Beiyuan, Chaoyang
Beijing, P.R. CHINA

CHEN Haihong
Senior Engineer
China National Institute of Standardization
4 Zhichunlu, Haidian District
Beijing 100088, P.R. CHINA

CHEN Jianghua
Deputy Director
State Grid Corporation DSM Instruction Center
No.20 West Beijing Road
Nanjing 210024, P.R.CHINA

CHEN Rumei
Director
Shanghai Energy Conservation Supervision Center
8 F, 27 Zhi Zao Ju Road
Shanghai 200011, P.R.CHINA

CHEN Xiufen
Building Industry and Building Industry
Administration Department
Shanghai Construction and Administration
Commission
No.75 Wanping Nanlu
Shanghai 200032, P.R. CHINA

CHEN Yanling
Vice Division Head, Beijing Transportation Planning
Committee
No. 317, GuangAnmennei St. XuanWu,
Beijing 100853, P.R. CHINA

Paulo CUSTODIO
Consultant
Logit Engenharia Consultiva
Av Eusebio Matoso, 690-6º Andar
Pinheiros CEP
Sao Paulo, 05423-000 SP BRAZIL

DONG Yong
Chief Division
Science and Technology Division
Chongqing Construction Commission
No.81 Zhongshan Silu
Chongqing 400015, P.R. CHINA

Barbara FINAMORE
Senior Attorney
Director of China Clean Energy Project
Natural Resources Defense Council
111 Sutter St., 20th Floor
San Francisco, CA 94104, USA

Denis FOURMEAU
Counsellor
Science, Technology & Environment Section
EC Delegation to China
4TH Floor,Qian Kun Mansion,6, Sanlitun Xi Liu Jie,
Beijing 100027, P.R. CHINA

Karl FJELLSTROM
Country Director
India, China, and Bangladesh
Institute for Transportation and Development Policy
115 West 30th Street, Suite 1205
New York, NY 10001, USA

FU Zhihua
Director
Center for Regional Study
Research Institute for Fiscal Science
Ministry of Finance
Xinzhi Dasha, No.28 Fucheng Road Haidian District,
Beijing 100036, P.R.CHINA

GAO Erjian
Chief Division
Science and Technology Division
Shenzhen Construction Bureau
No.8 Zhenhua Lu
Futian District
Shenzhen Guangdong 518031,P.R. CHINA

James GODBER
Industry Program Consultant
Defra, U.K.
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

Dermot O'GORMAN
Representative
WWF China Program
Room 1609， Wen Hua Gong
Beijing Working People's Cultural Palace
Beijing 100006，P.R. CHINA
Website: www.wwfchina.org

Peng GONG
Professor
Division of Ecosystem Science
University of California
Berkeley, CA 94720, USA

HAN Wenke
Director General
Energy Research Institute
B-1509, Guohong Mansion
Jia (A) 11, Muxidi Beili
Xicheng District
Beijing 100038, P.R. CHINA

HE Kebin
Professor
Institute of Environmental Science and Engineering,
Tsinghua University, Haidian District
Beijing 100084, P.R.CHINA

HE Qingfeng
Chief Division
Science and Technology Division
Xiangmen Construction and Administrative Bureau
No.362 JiaHe Lu
Xiamen Fujian 361003, P.R. CHINA

Steve HOWARD
CEO
The Climate Group
The Tower Building
3rd Floor
York Road
London, SE1 7NX
UNITED KINGDOM

HU Xiulian
Researcher
Energy Research Institute
Building B, Guohong Mansion
Jia (A) 11, Muxidi Beili, Xicheng District
Beijing 100038, P.R. CHINA

HU Zhaoguang
Chief Economist
State Grid Corporation Power Economic Research Center
1 Baiguang Road, Lane 2
Beijing 100761, P.R. CHINA

Joe HUANG
Director
White Box Technologies
31 Sarah Lane
Moraga, CA 94556, USA

JIANG Kejun
Researcher
Energy Research Institute
Building B, Guohong Mansion
Jia (A) 11, Muxidi Beili, Xicheng District
Beijing 100038, P.R. CHINA

JIANG Lian
Office Manager
The Climate Group Beijing Office
Room1505 Golden Tower, Xiba River South St,
Chaoyang District
Beijing100028, P.R. CHINA

JIA Yuliang
Vice Chairman, Jinan Municipal Construction
Committee
No. 4 Gonghe St. Jinan 250001, P.R. CHINA

JIN Ruidong
Natural Resources Defense Council
G.I. International Centre
Room 1606
3A Building I
Yongandongli, Jianguomenwai St.
Beijing 100022, P.R. CHINA

Flora KAN
Chief Technical Advisor
NDRC/UNDP/GEF China End Use Energy
Efficiency Project
Project Management Office
Guohong Building Bld. B, Room 1713
Muxidi Beili A11, Xicheng District
Beijing 100038, P.R.ChHINA

Astrid Skala KUHMANN
Chief Representative
German Development Cooperation (GTZ)
Landmark Towers 2, Unit 1011
8, North Dongsanhuan Road
Chaoyang District
Beijing 100004, P.R.CHINA

Mark LEVINE
Director
Environmental Energy Technologies Division
Lawrence Berkeley National Laboratory
1 Cyclotron Road, MS 90/3026A
Berkeley, CA 94720, USA

MAO Qizhi
Professor, Associate Dean, School of Architecture,
Tsinghua University

LI Juanjuan
Chief Division
Department of Housing Industry Administration
Shanghai Municipal Housing, Land and Resources
Administration Bureau
No.99 Beijing Xilu
Shanghai 2000003, P.R. CHINA

LI Guizhen
Deputy Chief Division
Science& Technology and BEE Chief
Jinan Construction Commission
No.131 Jinger Lu
Jinan, Shandong 250001, P.R. CHINA

LI Shantong
Development Research Center
No. 225 Chaoyangmennei St.
Chaoyang District, Beijing 100028, P.R. CHINA

LI Zhengrong, PHD
Thermal Engineer Department
Tongji University
No.1239 Si Ping Lu
Shanghai 20092, P.R.CHINA

LIN Haiyan
Deputy Director
China Academy of Building Research
NO.30 Beisanhuan Donglu
Beijing 100013, P.R. CHINA

LIN Borong
Building Science and Technology Department
Tsinghua University
Tsinghua Yuan, Haidian Districti
Beijing 100084, P.R. CHINA

LIN Shuzhi
Chief Engineer
Xiangmen Construction and Administrative Bureau
Guanghua Building
Xiamen Fuzhou 361004, P.R. CHINA

LIN Wei
Director, Transportation Research Center, Kunming
Baita Rd. TangJiaying
Kunming 650041, P.R. CHINA

LONG Weiding
Deputy Director
Building Energy Efficiency and New energy
Research Center
Tongji University
No.727 Zhong Shan Bei Lu
Shanghai 200070, P.R. CHINA

LU Jin
Commuiciations
The Climate Group Beijing Office
Room1505 Golden Tower, Xiba River South St.
Chaoyang District
Beijing, CHINA,100028

LU Xinming
Deputy Division Director
Department of Environment and Resource Conservation
National Development and Reform Commission
No. 38, Yuetan Nanjie
Sanlihe, Beijing 100824, P.R. CHINA

LU Zhi
Chief Representative of China Program
Conservation International
Conservation Biology Building, Peking University
Beijing 100871, P.R. CHINA

LUO Shurong
Chief Engineer
Fuzhou Construction Bureau
No.54 Wuyi Zhonglu
Fuzhou Fujian 35005, P.R. CHINA

MA Guangwen
Deputy Director
Institute for West Development
Sichuan University
391#, Sichuan University,
Chengdu 610065, P.R.CHINA

David MOSKOVITZ
Director
The Regulatory Assistance Project
177 Water Street
Gardiner, ME 04345, USA

NIU Wenyuan
Professor
Chief Scientist, Sustainable Development Research Group
China Academy of Science
No. 55, Zhongguancun East Rd.
Beijing, P.R. CHINA

Stephanie OHSHITA
University of San Francisco
College of Arts and Sciences
Harney Science Center, Room 520
2130 Fulton Street
San Francisco, CA 94117-1080, USA

George POLK
CEO
The Catalyst Project
49 Elgin Crescent
London W11 2JU
UNITED KINGDOM

Lynn PRICE
Deputy Group Leader
International Energy Studies
Energy Analysis Department
Lawrence Berkeley National Laboratory
1 Cyclotron Road, Mail Stop 90R-4000
Berkeley, CA 94720, USA

PAN Haixiao
Professor
School of Urban Planning, Tongji University
No. 1239, Siping, Rd, Shanghai, 200092

PENG Zhiping
Information Center
Ministry of Construction
No.21 Ganjiakou
Haidian District
Beijing 100037, P.R. CHINA

QI Ye
Professor, School of Public Policy & Management,
Tsinghua University
Director of Public Policy Research Institute
Haidian, Beijing 100084, P.R. CHINA

QIAO Mingjia
Deputy Director
Chongqing Construction Comission
No.81 Zhongshan Silu
Chongqing 400015, P.R. CHINA

REN Jun
Director Assistant
Guangzhou Academy of Building Research
No.4 GuangWei Lu
Guangzhou Guangdong, P.R.CHINA

Gerd SIPPEL
Director, Urban Development Programme
Landmark Towers 2, Unit 1011
8, North Dongsanhuan Road
Chaoyang District
Beijing 100004, P.R.CHINA

Rebecca SCHULTZ
Regulatory Assistance Project
50 State Street, Suite 3
Montpelier, VT 05602, USA

SHAO Xuemin
Country Director
Country Representative, China and Mongolia
United Nations Environment Programme
2 Liangmahe Nanlu
Beijing, 100600, P.R.CHINA

Toru SHIBUICHI
Resident Representative
Asian Development Bank Resident Mission in the People's Republic of China
Beijing International Financial Building
Block D, 7th Floor
156 Fuxingmennei Dajie.
Beijing 100031, P.R. CHINA

SU Ming
Deputy Director
Research Institute for Fiscal Science
Ministry of Finance
Xinzhi Dasha, No.28 Fucheng Road Haidian District,
Beijing 100036, P.R.CHINA

WANG Jinnan
Director
Chinese Academy for Environmental Planning
Chinese Research Academy of Environmental Sciences
8 Dayangfang Road, Chaoyang District
Beijing 100012, P.R. CHINA

WANG Leiping
Senior Energy Specialist
World Bank, China Program
World Bank Office—Beijing Office
China World Trade Center
China World Tower 2, 16th Floor
1 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

WANG Wei
Vice president, Shanghai Academy of Building Science
No. 75 Wanping Nan Rd, Shanghai, 200032

WANG Xinchun
Director
Institute of Technical Information for Building Materials Industry of China
P.O. Box 859
Beijing 100024, P.R.CHINA

WANG Yi
Professor
Institute of Policy and Management
Chinese Academy of Science
No.55 Zhongguancun Donglu, Haidian District
Beijing 100080, P.R.CHINA

WANG Youwei
Chief Engineer
China Academy of Building Research
NO.30 Beisanhuan Donglu
Beijing 100013, P.R. CHINA

WANG Yunxin
Deputy Director
Building Energy Efficiency Research Center
Fujian Academy of Building Research
No.162 Yang Qiao Zhong Lu
Yangzhong Fujian 350025, P.R.CHINA

WANG Zhongying
Director
Center for Renewable Energy Development
Energy Research Institute
National Development and Reform Commisstion
1418, Guohong Mansion
11 Muxidi Beili Jia (A)
Xicheng Distict
Beijing 100038, P.R. CHINA

XU Jihuan
Professor
Shanghai Green building Alliance
No.1555 Kongjia Lu
Shanghai 200092, P.R. CHINA

XU Huaqing
Director
Center for Energy, Environment and Climate Change
Energy Research Institute
B-1407, Guohong Mansion
Jia (A) 11, Muxidi Beili, Xicheng District
Beijing 100038, P.R. CHINA

YAO Yufang
Professor, China Academy of Social Science
No. 5 Jianguomenwai Dajie
Beijing, CHINA

YAO Pei
Deputy Chief Division
Information Center
Ministry of Construction
No.21 Ganjiakou
Haidian District
Beijing 100037, P.R. CHINA

YE Qing
Executive Chief Architect
Shenzhen Institute of Building Research
Shenzhen, P.R. CHINA

Yongyuan YIN
Professor
Adaptation and Impacts Research Division
Environment Canada and Institute for Resources
University of British Columbia Room 442, 2202
Main Mall, Vancouver, BC V6T 1Z4
CANADA

YU Yanshan
Deputy Director General of the General Administrative Office
Director General of the Department of Research
State Electricity Regulatory Commission
86 Xichang'an Dajie
Beijing 100031, P.R. CHINA

Hongjun ZHANG
Holland & Knight, LLP
2099 Pennsylvania Avenue, N.W., Suite 100
Washington D.C. 20006, USA

ZENG Jie
Deputy Director
Building Design Research Institute
China Academy of Building Research
NO.30 Beisanhuan Donglu
Beijing 100013, P.R. CHINA

ZENG Shengzhi
Wuhan Municipal Office of Wall Material Innovation& Energy Efficiency in Building
No.721 Hankou Jianshe Dadao
Wuhai Hubei 430015, P.R. CHINA

ZHANG Xiliang
Professor
Institute of Energy, Environment and Economy
Tsinghua University
Energy Science Building, Tsinghua University
Beijing 100084, P.R.CHINA

ZHANG Weiwei
Fuzhou New Technology Promotion Center
No.54 Wu Yi Zhou Lu
Fuzhou Fujian, P.R.CHINA

ZONG Weihua
Chief Division
Science& Technology and BEE Chief
Jinan Construction Commission
No.131 Jinger Lu
Jinan, Shandong 250001, P.R.China

Nan ZHOU
Energy Analysis Program
Lawrence Berkeley National Laboratory
1 Cyclotron Road
Berkeley, CA 94720, USA

Energy Foundation Staff

Naree CHAN
Program Associate
The Energy Foundation
1012 Torney Avenue #1
San Francisco, CA 94129, USA

GONG Huiming
Program Officer
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

HE Dongquan
Senior Program Officer
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

Eric HEITZ
President
The Energy Foundation
1012 Torney Avenue #1
San Francisco, CA 94129, USA

HOU Yanli
Program Officer
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

HU Min
Program Officer
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

LI Xin
Finance and Office Manager
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

Wendra LIANG
Program Analyst
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

Jiang LIN
Vice President, The Energy Foundation
Director, China Sustainable Energy Program
1012 Torney Avenue #1
San Francisco, CA 94129, USA

MENG Fei
Program Associate
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

Alexandra WANG
Program Manager
China Sustainable Energy Program
The Energy Foundation
1012 Torney Avenue #1
San Francisco, CA 94129, USA

WANG Wanxing
Senior Program Officer
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

XIANG Mei
Program Associate
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

YANG Fuqiang
Chief Representative
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

ZHANG Ruiying
Senior Program Officer
China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
19 Jianguomenwai Dajie
Beijing 100004, P.R. CHINA

China Sustainable Energy Program
Senior Policy Advisory Council Member Biographies

Peter BRADFORD

Peter Bradford is one of the United States' most experienced public utility regulators. He is a Former Commissioner of the U.S. Nuclear Regulatory Commission, and was Chairman of the New York State Public Service Commission from June 1987 to January 1995 and the Maine Public Utilities Commission from July 1982 to 1987. He has also served as President of the U.S. National Association of Regulatory Utility Commissioners. Mr. Bradford currently teaches and consults on utility regulation and energy policy in the U.S. and abroad. He is Vice-Chairman of The Union of Concerned Scientists; a leading U.S. NGO seeking practical solutions to environmental problems based on rigorous science and innovative policy, and is the author of *Fragile Structures: A Story of Oil Refineries, National Security and the Coast of Maine*. Mr. Bradford is a graduate of Yale University and Yale University Law School.

CHEN Qingtai

Chen Qingtai is the former Vice Minister of the State Council Development Research Center, a member of the China Monetary Policy Committee, Deputy of the National Congress of the Communist Party of China, and a member of the Standing Committee of the 10th China People's Political Consultative Conference (CPPCC). He has extensive macro-economic management experience in both the private and public sectors. In the private sector, he has served as Chief Engineer, President, and Chairman of China No. 2 Automobile Works, Chairman and General Manager of the United Company of Dongfeng Auto Industry, and Chairman of Shenlong Automobile Company. He is also currently Independent Non-Executive Director of Sinopec Corp. In the public sector, he has served as Deputy Director of the State Council's Economic and Trade Office, and Deputy Minister of the State Economic and Trade Commission. Mr. Chen is a graduate of Tsinghua University where he studied power and dynamics engineering.

FU Zhihuan

Fu Zhihuan is Chairman of the Finance and Economics Committee of the 10th National People's Congress. Mr. Fu served as Minister of the Railways Ministry from 1997 to 2003, and has been involved in electric engine research and development for over 20 years, formerly serving as Chief Engineer and Director of the Railways Ministry's Science and Technology Department and President of the Harbin Railway Bureau.

HUANG Yicheng

Formerly Minister of Energy, Huang Yicheng works with the State Power Corporation—created out of the former Ministry of Electric Power—to help shape policies to restructure China's electric utility sector. Minister Huang is also Honorable President of the China Energy Research Society, a group of active and retired high-level energy policy makers from leading research institutes.

Thomas JOHANSSON

Thomas Johansson was formerly Director of the Energy and Atmosphere Programme at the United Nations Development Programme and is currently Director of the International Institute for Industrial Environmental Economics at Lund University, Sweden. He is also

International Co-Chairman of the Working Group on Energy Strategies and Technologies of the China Council on International Cooperation for Environment and Development, a founding member and current Chairman of the International Energy Initiative Board of Directors, Chairman of the United Nations Economic Commission for Europe's Energy Efficiency 2000 Project, a member of the Board of Directors of the Swedish State Power Board (Vattenfall), and Chairman of the United Nations Solar Energy Group for Environment and Development. Dr. Johansson also serves on the Editorial Board and Board of Directors of numerous energy and scientific journals. He was a recipient of the Volvo Environment Prize in 2000.

LOU Jiwei

Lou Jiwei is Vice Minister of the Ministry of Finance. Mr. Lou has considerable experience formulating China's fiscal and monetary policy: he has served as Deputy Leader of the State Council's Working Group on Public Financial and Monetary Policy, Director of the Cost Price Division in the Chinese Academy of Social Sciences's Institute of Economy and Trade, Deputy Head of the Shanghai Commission for Economic Restructuring, and Director-General of the State Commission for Economic Restructuring's Macro Regulation Department. Mr. Lou has also been Vice Governor of Guizhou Province. He has a Master's degree in quantitative economics from the Chinese Academy of Social Science.

LU Yongxiang

Professor LU Yongxiang is currently Vice-Chairman of the Standing Committee of the National People's Congress and President of the Chinese Academy of Sciences (CAS). He also serves as Co-Chair of InterAcademy Council (IAC) and is an engineering Professor at Zhejiang University. Professor Lu has made important contributions to the development of mechanical engineering, especially in the field of fluid power transmission and control and to higher education for engineering. He has achieved about 25 patents in China, Europe and USA, and published at home and abroad over 250 papers in research and engineering education. Professor Lu has been awarded the second prize of National Invention Award in 1988 and the National Engineering Higher Education Prize of China in 1989; the super prize for Guanghua Science Foundation in 1993. He received the Knight Commander's Cross (Badge & Star) of the Order of Merit of the Federal Republic of Germany in 2000 and the Gold Badge for Science and Culture of Public from the President of Italy in 2004. He was awarded the Abdus Salam Medal of the Academy of Sciences for the Developing World (TWAS) in 2006. He graduated from Zhejiang University in 1964 and earned his doctorate in Engineering (Dr.¨CIng) from the Technical University of Aachen, Germany in 1981

MAO Rubai

Mao Rubai is a member of the 10th National People's Congress (NPC) Standing Committee and Chairman of the NPC's Environmental Protection and Resources Conservation Committee. Mr. Mao has over 40 years of government service, previously serving as Vice Chairman of the Tibetan Autonomous Region's Government, Deputy Minister of the Ministry of Construction, and Chairman of the Hui Autonomous Region of Ningxia's People's Congress. Mr. Mao was also a member of the 15th Communist Party of China's Central Committee.

PAN Yue

Pan Yue is Vice Minister of the State Environmental Protection Administration, and in his first two years in that position has gained international recognition as a "courageous voice for a greener China." Before becoming a government official, he was a journalist, including three years as Vice Editor-in-Chief of China Youth Daily. Dr. Pan has also served as Vice Administrator of the State Administrative Bureau of State-Owned Assets, Vice Administrator of the State Bureau of Quality and Technical Supervision, and Vice Director of the Office for Economic Restructuring of the State Council.

QIU Baoxing

Qiu Baoxing is Vice Minister of the Ministry of Construction. He has a Ph.D. in Economics from Fudan University and a Ph.D. in City Planning and Design from Tongji University. Dr. Qiu is also a visiting professor at Zhengjiang University, Zhejiang University of Technology, and Fudan University, and a part-time professor at Nanjing University and Nanjing Finance and Economics University. He served as mayor of Hangzhou from March 1999 to October 2001.

QU Geping

Qu Geping has been a pioneer in environmental protection in China, working to integrate environmental protection policies into China's development strategies since 1972. He was Deputy Director of China's first environmental protection institution and the first Administrator of China's National Environmental Protection Agency. He also served as the first Deputy Director of China's State Environmental Protection Agency and chaired the Environmental Protection and Resources Conservation Committee under the National People's Congress. In recognition of his seminal environmental protection work in China, he has received prestigious international awards, including a Gold Medal from the United Nations Environment Programme in 1987 and the Blue Planet Prize in 1999.

William K. REILLY

William K. Reilly was the seventh U.S. Environmental Protection Agency (EPA) Administrator, serving from 1989 to 1993 under President George H.W. Bush and heading the U.S. delegation to the landmark United Nations Earth Summit in Rio de Janeiro in 1992. Mr. Reilly's work prior to his term as EPA Administrator was equally distinguished: he was President of both the World Wildlife Fund and The Conservation Foundation, Executive Director of the Rockefeller Task Force on Land Use and Urban Growth, a member of the President's Council on Environmental Quality under President Richard Nixon, and Chairman of the Natural Resources Council of America, an association of all major conservation groups. Mr. Reilly was also the Payne Visiting Professor at Stanford University in 1993-1994. Currently, Mr. Reilly is Founding Partner of Aqua International Partners, an investment fund in the water sector in developing countries, and Chairman of the World Wildlife Fund Board of Directors. He also serves on the board of directors of The David and Lucile Packard Foundation, the National Geographic Society, ConocoPhillips, DuPont, Ionics, and Royal Caribbean International.

WANG Yumin

Wang Yumin is Vice Chairman (Vice Minister) of the State Electric Regulatory Commission, to which she was appointed in 2004. She is also a member of the 10th National Committee of CPPCC for the Population, Resources and Environment Committee. She received a Ph.D.

in engineering from Wuhan Water Conservancy and Electric Power University, where she was also named Professor-Grade Senior Engineer, Ph.D. Student Supervisor, and Winner of Special Government Grant. Since graduating in 1972, Dr. Wang has worked as Operator and then Operation Master in the Electric Branch, Tongliao Power Plant, and as Deputy Chief Engineer, Deputy Director and Chief Engineer of Tongliao Power Plant. Since 1991, she was the Deputy Director-General and Chief Engineer of the Electric Power Construction Bureau, Northeast China Electric Power Administration, and the Chief Engineer for the Deputy Director-General of Northeast China Electric Power Administration. From 1998 to 1999, Dr. Wang was Deputy Director-General (Deputy General Manager) of Northeast China Electric Power Administration and Director-General of Liaoning Provincial Electric Power Bureau, becoming Board Chairman and General Manager of the Liaoning Power Bureau from 1999 to 2001. From 2001 to 2002, she held the position of Deputy Chief Economist of the State Power Company and Director-General of Grid Construction Department, State Power Company, and General Manager of Grid Construction Company, and was Deputy General Manager of State Power Company. Since 2002, she has been Board Chairman of the China Guangdong Nuclear Power Company (CGNPC), and in 2003 was named a Member of the Nuclear Power Steering Group of the State Council.

Susan F. TIERNEY

Susan F. Tierney has served as Assistant Secretary for Policy at the U.S. Department of Energy, Secretary for Environmental Affairs in Massachusetts, Commissioner of the Massachusetts Department of Public Utilities, Executive Director of the Massachusetts Energy Facilities Siting Council, and Senior Vice President and Managing Principal of Lexecon, Inc. Dr. Tierney is now Managing Principal of Analysis Group in Boston, Massachusetts, where she consults on energy policy, regulation, and economics, particularly in relation to the electric and gas industries. Dr. Tierney is also Chairwoman of the Board of Directors of The Energy Foundation and Clean Air-Cool Planet; a director of Catalytica Energy Systems Inc., the Northeast States Clean Air Foundation, the Electric Power Research Institute, and the Climate Policy Center; and a member of the Harvard Electric Policy Group, the Massachusetts Renewable Energy Trust Advisory Council, and the Environmental Advisory Council of the New York Independent System Operator. She has published widely and frequently speaks at industry conferences.

Colburn S. WILBUR

Colburn S. Wilbur is a current Trustee and former Executive Director and President of the David and Lucile Packard Foundation. Mr. Wilbur is Chairman of the China Sustainable Energy Program's Senior Policy Advisory Council, a member of the advisory boards of The Sierra Club Foundation, the Entrepreneurs Foundation, and the American Land Conservancy, as well as an advisor to other philanthropic organizations in the United States, Great Britain and China. He served as Executive Director and CEO of the Sierra Club Foundation from 1960 to 1976. Mr. Wilbur has also served as a Senior Fellow of the Council on Foundations and was honored with their Distinguished Grantmaker Award in 1999.

Xie Fuzhan

Xie Fuzhan, is a native of Tianmen City, Hubei province. He was born in 1954, and obtained a master's degree from the Huazhong University of Science and Technology. Xie worked as a researcher for the Development Research Center of the State Council until 1999, when he

became deputy director. In 2006 he became director of the National Bureau of Statistics. In 2007, he became a member of the 17th CPC Central Commission for Discipline Inspection.

XU Kuangdi

Xu Kuangdi is Vice Chairman of 10th National Committee of the China People's Political Consultative Congress (CPPCC) and President of the Chinese Academy of Engineering. From 1995 to 2001, he served as the Mayor of Shanghai, and he has also served as Executive Vice President of Shanghai Polytechnic University, Director of the Shanghai Municipal Higher Education Bureau, Director of the Shanghai Municipal Planning Committee, and Deputy Secretary of the Communist Party of China's (CPC) Shanghai Municipal Committee. Dr. Xu was an alternate member of the 14th CPC Central Committee and a member of both the 15th and 16th CPC Central Committees. He graduated from the Beijing Institute of Iron and Steel Engineering in 1959.

YANG Jike

Currently President of the South-North Institute for Sustainable Development, Yang Jike pioneered China's rural economic reform while Vice Governor of Anhui Province. Dr. Yang has also served as President of the China Energy Research Society, a member of the National People's Congress Standing Committee, and a member of the Standing Committee of the China People's Political Consultative Conference, the most senior advisory body to the National People's Congress and State Council.

ZHANG Guobao

Zhang Guobao**,** currently Vice Chairman of the National Development and Reform Commission, is one of the foremost figures in China's infrastructure, industrial, and high-tech development planning. He was formerly Vice Chairman of the State Development Planning Commission, and has helped formulate China's 6th, 7th, 8th, 9th, and 10th Five-Year Plans. Mr. Zhang also served in several director-level positions within China's State Planning Commission prior to its reorganization into the State Development Planning Commission.

New China Sustainable Energy Program Director

Jiang LIN

Dr. Jiang Lin has joined the Energy Foundation as Vice President and Director of the China Sustainable Energy Program. He brings deep technical expertise to our program, as well as years of experience with Chinese energy policy. Before joining the China Sustainable Energy Program, Dr. Lin was a Senior Scientist with the China Energy Group at Lawrence Berkeley National Laboratory (LBNL) in Berkeley, California. Since joining LBNL in 1994, Dr. Lin has been a leading researcher on China's energy efficiency and renewable energy policies, serving as an advisor to numerous Chinese agencies, the World Bank, and the United Nations Development Program. In addition to advising Shanghai on market-based policies to stimulate investment in energy conservation, he was also a long-time CSEP grantee, helping to develop several of China's appliance efficiency standards and low-carbon development scenarios. Dr. Lin received his Bachelor of Science in electrical engineering from Xi'an Jiaotong University in 1984, and his Ph.D. in demography from the University of California, Berkeley, in 1992. He conducted post-doctoral work at the University of Pennsylvania.

Presenter Biographies

DAI Yande

Professor Dai Yande is Deputy Director-general of the Energy Research Institute of the National Development and Reform Commission; Director of Project Management Office of the World Bank/Global Environment Fund China Energy Conservation Project; Chairman of the Board of Directors of the China Chemical Industry Energy Conservation Technology Association; Vice-chairman of the Board of Directors of the Beijing Energy Society; and standing member of the China Energy Research Society. He graduated from the Oil Refining Department of East China Petroleum University in 1982. Professor Dai's work has covered energy economics, energy development strategy and planning, energy system efficiency analysis, and information systems for energy management. Recently, he organized and led such projects as the "Study on the Mitigation Potentials and Corresponding Policies for Greenhouse Gas Emissions," "China Energy Conservation Strategy Study for the 21st Century," "Study on China's Transition in Energy Conservation Mechanisms," "Energy Development Strategy of the '10th Five-year Plan,'" "China's Sustainable Energy Scenarios for 2020," and "Study on Power System Reform and Demand Side Management (DSM) Policy."

FENG Fei

Feng Fei is Director of the Industrial Economics Research Department and Research Fellow at the State Council's Development Research Center (DRC). After completing doctoral and post-doctoral work at Tsinghua University, Dr. Feng joined DRC in 1993. His research focuses on industrial development policies, particularly those governing the restructuring and regulation of industrial-sector monopolies. He has participated in numerous research projects at DRC, including "Strategic Restructuring of China's Economic Structure, "WTO's Impact on the Auto Industry, Reforming and Restructuring Monopolies in the Industrial Sector," "Strategies for the Sustainable Development of China's Power Industry," and "Reforming Power Industry Regulation in China." Dr. Feng is also a senior consultant to several government departments and private firms. In addition to his studies at Tsinghua University, he studied public policy at Carleton University and the University of Toronto in Canada in 1994**.**

LI Mingzhi

Li Mingzhi is Vice Director of the Office of Economy under the Finance and Economy Committee of the National People's Congress. He received a bachelor's degree from the Department of Economic Management in the School of Economics at Beijing University (now renamed Beijing University Guanghua Management School) in 1990. In 1998, he also Common Law, EU law and English at Nottingham Trent University, and completed a M.S. in 2002 at Holland Utrecht University, studying Law Economics in the Law School. He is working on economic policy research and economic legislation in the Office of Economy under the Finance and Economy Committee of the National People's Congress.

WANG Yonggan

Wang Yonggan is the Secretary General and Spokesman of the China Electricity Council. A well-know electricity power policy expert, Mr. Wang has led and participated in many major policy research projects of China. He successively held the posts of Vice President of North China Electricity University; Vice Director of the Strategy and Planning Department and the Investigation and Research Department of the China Electricity Council; Secretary General of the Overseas IPO Office and member of the Electricity Regulation System Reform Committee of the former Ministry of Electricity; Chief Editor of "China Electricity Policy Research Journal;" Vice Secretary General of the China Electricity Council; and member of the leading group of the Electricity Marketerization Pilot Project Office. Mr. Wang has also authored publications, including "General Principals of Electricity Market."

YANG Fuqiang

Yang Fuqiang is Vice President of the Energy Foundation and Chief Representative of the Energy Foundation's (EF) Beijing Office. He also heads the Low Carbon Development Paths Program under EF's China Sustainable Energy Program (CSEP). He was awarded his doctorate in Industrial Engineering at West Virginia University in 1991. He received his B. S in Physics at Jilin University in 1977. Dr. Yang has nearly three decades of experience in energy and environment work. At CSEP, he leads efforts to support China's development of public policies aimed at cost-effective carbon emissions reductions through the deployment of energy efficiency and renewable energy technologies. Before moving to the U.S. in 1984, Dr. Yang worked with China's Energy Research Institute and State Planning Commission on renewable and rural energy policy, energy modeling and forecasting, project evaluation, and long term planning. In 1984, he received a World Bank fellowship to work on regional energy planning at Cornell University. Before joining EF, Dr. Yang was on the China energy and environment team at Lawrence Berkeley National Laboratory, publishing a number of reports during his tenure (1992-2000).

YE Rongsi

Professor Ye Rongsi is Vice President of the China Electricity Council. He also holds the post of Chairman of the Energy Law Association of the China Law Society. From 1985 to1993, he was Deputy Director of the Policy and Legislation Department of the Ministry of Water Resources and Electric Power and later the Ministry of Energy. He has been responsible for and has conducted research on China's power policy, legislation, and power sector reform.

Energy Conservation, Pollution Reduction, and Implementing an Energy Conservation Agreement in Shandong Province

WANG Junmin
Vice Governor, Shandong province
Standing Committee of CPC Shandong Province Committee

1. Basic Situation of Energy Conservation and Pollution Reduction in Shandong Province

The mainland area of Shandong is 157,200km2, the coastline 3,024km, the population 93.09million, and covers 17 cities and 140 counties (city and district), is a big province in terms of economy, resources as well as energy consumption. In Shandong, the oil production accounts for 1/3 of national total production, and the coal production accounts for 6%. Shandong province has discovered 128 mineral resources with verified deposits for 74 resources, among which the deposits for 30 mineral resources stand in top 10 in China. In 2006, Shandong province realized total GDP of CNY220.77billion that was about 10.5% of national GDP; the energy consumption was 260million ton in standard coal converted that is about 10.6% of national volume.

It is a question of drawing attention from CPC Shandong province committee and provincial government on how to resolve the contradiction between economic growth and energy consumption so as to achieve sustainable development. In particular, since 16th CCP Congress, we implemented seriously scientific development view and strategic deployment by central government and made the energy-conservation and pollution-reduction as the way to transform economic development and achieve the breakthrough of both fast and stable development, which had been put into the important items on the agenda. In 2003, Shandong province made the strategic decision of building an ecological province; in 2004, Shandong proposed to build a conservation-oriented society; in 2005, Shandong fully initiated the circular economy. Since 2006, the CPC Provincial Committee and Provincial government put the energy-conservation and pollution-reduction into the 11th Five-year plan and Government Work Report, stating that by the end of 11th five-year plan Shandong will reduce the GDP energy consumption by around 22% and further intensify the work so the work efficiency gradually emerge. In 2006, the energy consumption per 10,000 yuan GDP reduced by 3.46% compared to 2005 and 1,000 key enterprises saved the energy of 3.34million standard coal. In the first half of the year 2007, provincial 10,000 yuan GDP reduced by 4.7% compared to the same period of 2006 and 1,000 key enterprises saved the energy of 2.2283million standard cola. The below work has been done:

a. Strengthen organization and leadership, Improve the insurance system of energy-conservation and pollution-reduction. Last year, provincial government set up the Energy Conservation Office in particular. This year, the Energy-conservation and Pollution-reduction Work Leading Group is founded to coordinate and resolve the critical issues on energy conservation and pollution reduction, where Deputy Governor Jiang Daming is group leader and three Vice Governors are associate group leaders. The Energy Supervision Central Team is founded to strengthen law enforcement. All related departments in the cities also set up the related organizational institutions and established a smooth and effective working system. Strength the responsibility evaluation and

improve the veto system. Strengthen statistical analysis and establish robust statistical indicator system, audit system and monitoring system for energy-conservation and pollution-reduction, keep updating periodic energy-consumption Communiqué system. And organize the Civil Activity on Energy-conservation and Pollution-reduction.

b. Strictly control the projects and investments of "Two High" industry from the headstream. We strictly focused on the management of 6 requirements such as energy evaluation, environment evaluation, and security evaluation, and established the dynamic mechanism for project approval departments. The provincial and municipal investment departments won't issue the approval, authorization, and record keeping to the restricted new projects and eliminated projects that belong to the "Two High" industries such as Steel, metallurgy of Aluminum and Copper, Ferroalloy, Calcium Carbide and Coking, and to fixed assets investment projects that didn't go through energy evaluation, environment evaluation, and security evaluation. In the meantime, we established the Energy Increment Control System where all levels of investment departments won't approve, authorize and record the new projects whose expected energy consumption of 10,000 yuan GDP is higher than that of the same district last year.

c. Enhance independent innovation, optimize economic structure, and build a conservation-oriented and environment-friendly industrial system. We should always work to support the best and at the same time eliminate the worst. According to National Industrial Policy and provincial structural adjustment plan, surrounding market demand and "One Body and Two Wings" of district development and oceanic economic strategy, we selected a batch of new projects that could optimize the structures and achieve the "win-win" situation of energy conservation and faster and stable development. We will focus on developing high-tech industry, speed up the application of high technology and advanced practical techniques so as to upgrade traditional industries, cultivate the energy-conversation and environment-protection industry and the recycle energy, rigorously develop modern services, strive to optimize 3rd industrial structures, and increase the percentage of high-tech industries.

d. Speed up to eliminate the lagging production capability using market instruments and legal measures. We implemented differentiated electricity pricing for 13 high energy consumption industries such as Steel, Electricity and Coking so that all the differentiated charges would apply to the technological transformation for energy conservation and pollution reduction. We chose the big energy consumption enterprises such as Steel, Electricity, Cement and Paper and started the trial on price increase for excessive energy consumption so as to further promote after obtained the experience. We promoted the contractual energy management and clean development mechanism and facilitated the enterprises' marketization for energy conservation and pollution reduction We strictly implemented the regulations and industrial policies on energy-conservation and environment-protection and strived to eliminate the lagging capability of "Two High" industries. For the district that didn't complete the task to eliminate lagging production capability, we implemented "District Approval Limit". We properly resolved the issues of eliminated enterprises such as employee re-allocation and debts disposition based on the policy of Commensurable Elimination. With the arrangement of specific funds, we gave

the subsidies and awards to those enterprises that successfully completed the elimination tasks.

e. Focus on energy-conservation and pollution-reduction of key enterprises and key areas. We paid attention to basic work for key energy-consumption enterprises such as energy measurement, statistics, and quotation, and organized the energy audit, energy efficiency relative scale, energy signs and the certificate for energy-conversation products. With the support of 1,000 provincial enterprises, we focused on top 10 key energy-conservation projects surrounding Electricity, Steel, Chemical, Petrochemical, Coking, and Nonferrous Metal industries. We promoted 100 key energy-conservation techniques, 100 key energy-conservation equipments, and implemented 100 key energy-conservation demonstration projects. We stressed on follow-up and supervision of key energy-conservation and pollution-reduction projects that the country and province had supported and ensured the achievement of production and efficiency of the projects at the earliest. We organized to implement energy-conservation and pollution-reduction projects in Transportation, Constructions and Consumption. We strived to promote the application of highly efficient energy-conservation lamp. We supported the installation of Solar Thermal Collection System and implemented Sunny Hotels and Sunny Universities Projects.

f. Facilitate technological progress on energy-conservation and pollution-reduction. We set up specific governmental funds for energy-conservation and pollution-reduction, increased investments on energy-conservation and environment-protection, guided social capitals to invest in the technology research on energy-conservation and pollution-reduction through subsidy or reward, and facilitated the research and promotion of key technology on energy-conservation and pollution-reduction. We fully utilized financial rewards policy on national energy-conservation technology transformation and encouraged advanced technological equipments import policy, organized enterprises' refine projects, and actively strived for related preferential policies. We developed the services system of energy-conservation and environment-protection technology, and cultivated the services market for energy-conservation and environment-protection. We actively imported and promoted advanced energy-conservation and environment-protection technology, equipments and managerial experience abroad and improved international cooperation level of energy-conservation and environment-protection.

g. Strive to develop circular economy We seized the opportunity of Shandong province as the trial province for national circular economy, organized to implement the "123" project for circular economy, focused on the circular economic development of key industries such as Steel, Electricity, Coal, Paper, Brewery, Building Materials, and Nonferrous Metal. We actively carried out the preferential policy on synthesized use of resources that the country encouraged and guided the enterprises to implement synthesized use of resources. We strived to develop new technology of maize straw utilization and drove the industrialization of straw fuel, fertilizer and forage. We regulated the market order for recycle resources collection and focused on promoting the collection and recycle usage of waste and old materials such as old household appliances and electronic devices. We actively advocate clean production and strived to develop the application of clean

production technology and skill. We implemented compulsory clean production examination on the enterprises that did not achieve the objective of energy-conservation and pollution-reduction.

2. Practical situation of energy-conservation voluntary agreement in Shandong province

To explore new energy-conservation mechanism under market economy, with the guidance of National Development and Reform Commission and the support of the Energy Foundation, Shandong province launched the trial work on Energy-conservation Voluntary Agreement. In April 2003, the representative from provincial Economy and Trade Commission signed the first stage of Energy-conservation Voluntary Agreement with Ji Steel and Lai Steel, which was the first agreement in China. Up to date, Shandong province had implemented the energy-conservation agreements with 51 enterprises in 11 cities by three phases.

The work on Energy-conservation Voluntary Agreement by Shandong province mainly established four systems. Namely, establish organization, leading and supervision system of energy-conservation voluntary agreement in the government and enterprises, establish evaluation and appraisal indicator system of energy-conservation and environment-protection, establish target system of energy-conservation and environment-protection and establish political support system of energy-conservation voluntary agreement. During the trial process, provincial Economy and Trade Commission organized training classes and seminars for several times, invited domestic and overseas experts to the training, and walked into the enterprises to provide guidance; timely monitored the progress of the trial, coordinated to resolve the issues during the trial, kept improving evaluation methods, aroused the enthusiasm of the trial enterprises, facilitated the development of the trial in depth. Hence, the trial enterprises achieved remarkable results of energy-conservation.

Through the phase 1 trial period, Ji Steel in 2003 achieved the energy-saving of 292,000 ton standard coal, the rate of energy-conservation was 6.1%, the benefit was CNY 160.6million, the reduction of sulfur dioxide was 5,256 ton, carbon dioxide 175, 200 ton; Lai Steel in 2003 achieved the reduction of synthesized energy consumption per ton by 5%, the energy saved was 70,000 ton standard coal, the rate of energy-conservation was 1.13%, the benefit was CNY 60million, the reduction of sulfur dioxide was 1,258 ton, carbon dioxide 41, 940 ton. During the phase 2 trial period, the energy consumption for 10,000 yuan revenue in 3 trial enterprises in Jinan city reduced by 25.38% with the total saving of 280,000 ton standard coal; the synthesized energy consumption for 10,000 yuan of gross output reduced by 5% compared to last year in 4 trial enterprises in Zibo city with the total saving of 52,600 ton standard coal; and 4 trial enterprises in Jining city in total saved 62,500 ton standard coal. In the first half of this year, 38 enterprises that participated in the trial phase 3 saved in total 513,000 ton standard coal, achieved the saved value of CNY 282.15million, and reduced the emission of sulfur dioxide by 10,260 ton and carbon dioxide by 128.2 million ton.

During the 5-year trial, the market energy mechanism, Energy-conservation Voluntary Agreement, kept improving and gradually moved to maturity in Shandong province. National Development and Reform Commission organized domestic authorities to form an evaluation team that performed the evaluation on the trial work in Shandong province. For the trial on

Energy-conservation Voluntary Agreement in Shandong province, the evaluation team thought that the trial achieved the innovation on energy-conservation system in country; changed previous energy-conservation method of mainly administrative advocate and initially established the energy-conservation mechanism that fits the requirements of market economy; the trial achieved expected objectives, exerted positive impact, facilitated government's energy-conservation work, provided valuable experience and solid foundation for improving national energy-conservation market system, and had important promotional value. In next step, based on the summary of the first three trial experience, we will strengthen the cooperation with the Energy Foundation, study the support policy and keep promoting the energy-conservation agreement.

a. Expand the scope and promote and intensify the trial. From 2008 to 2010, we will organize 1,000 key energy consumption enterprises in Shandong province to promote energy-conservation agreement and facilitate the reduction of energy consumption.

b. Complete expert advisory organization. With support of Shandong University, we will establish the expert advisory system, cultivate intermediary institute for energy-conservation services, and provide intellectual support on the promotion of energy-conservation agreement.

c. Strength the cooperation with the Energy Foundation. We will carry out overall trial of energy-conservation on construction, transportation, electricity and new renewable resources.

d. Strength policy support. We will give financial reward to key enterprises that voluntarily sign the energy-conservation agreement and achieve stated objectives, improve the enthusiasm and initiative of the enterprises, drive the energy-conservation and pollution-reduction from passive to active, and facilitate the work on energy-conservation and pollution-reduction.

From the below measures, Shandong province has achieved remarkable results on energy-conservation and pollution-reduction, however, we still face rigorous challenges. The meeting provides a very good platform where we could study and share the experience on energy-conservation and pollution-reduction. In next step, under the guidance of 17th National Congress of the Communist Party of China (CPC), we will implement Comprehensive Work Scheme of Energy Conservation and Reducing the Discharge of Pollutants in an all-round way, study and learn carefully the good experience and methods of the enterprises, and further strengthen the work on energy-conservation and pollution-reduction. In the meantime, we cordially hope that the leaders and experts from all national ministries and the Energy Foundation will pay more attention and give your support to the work on pollution reduction, come to visit Shandong to guide and help us to do the work right, and make new and bigger contributions to establishing an ecological-civilization, energy-efficient and environment-friendly society.

Implementation Progress and Next Steps of the Top-1000 Enterprises' Energy Efficiency Program

DAI Yande
Deputy Director, Energy Research Institute
of the National Development and Reform Commission

I. The targets of the Top-1000 Enterprises' Energy Efficiency Action Plan

The planning of the "11th Five-year Plan" period of our country puts forward clear energy-saving targets that the energy consumption per unit of GDP of 2010 will be 20% less than that at the end of the "10th Five-year Plan" period. The energy consumed by industries accounts for approximately 70% of the total energy consumption of our country. The most energy-intensive enterprises of the energy-intensive industries consume most of the energy for industrial use. The aggregate energy consumption by these 1000 enterprises (with annual energy consumption of 180,000 tons of standard coal and above) accounts for approximately 33% of our total national energy consumption, or 47% of the total industrial energy consumption. The "Top-1000 Enterprises' Energy Efficiency Program" (Top-1000 Program) is designed to focus on carrying out sound energy conservation work for the energy-intensive enterprises of energy-intensive industries. This work will enhance the government's supervision and administration of energy conservation by key energy consumption enterprises, and will urge enterprises to accelerate their technology updates to save energy, strengthen energy conservation administration, and improve energy efficiency. As such, this program will guarantee that the energy conservation goals of the "11th Five-year Plan" period will be achieved. To this end, the "Top-1000 Enterprises' Energy Efficiency Program" was initiated jointly by the National Development and Reform Commission (NDRC) and other relevant ministries and commissions for the purpose of significantly improving the energy efficiency of these 1000 Enterprises. The plan will make the energy consumption per unit of main products reach the advanced level in their respective industries and reach the advanced level in the world or the leading position in the same industry. This will enable energy conservation efforts by all the industries concerned can to be pushed forward and the goal of conserving about 100 million tons of standard coal may be achieved.

II. Implementation progress of the 1000 Enterprises Energy Efficiency Program

Ever since the Top-1000 Program was launched by the government, the concerned departments of the government and the "1000 Enterprises" have carried out a series of significant measures, which mainly include:

- Comprehensive deployment of the Top-1000 Program. NDRC has comprehensively deployed the Top-1000 Program together with other relevant departments. They have set out the guiding principles and major goals, specified the work requirements and safeguard measures for action, and published the names of the concerned 1000 Enterprises. In October of last year, meetings on energy conservation with regard to the 1000 Enterprises were held by NDRC in five large regions (Shenyang, Jinan, Kunming, Changsha and Shijiazhuang) nationwide. The heads of all the local governments' energy administration departments and the heads of enterprises and people in charge of their energy conservation departments all were invited to attend the meetings. Around 2,200 people were present at the meetings. During the meeting, the requirements for the Top-1000 Program were put forward. In addition trainings on energy audits, formulation of energy conservation plans and enhancement of energy conservation administrations, etc were arranged. The National

Bureau of Statistics of China (NBSC) has organized the 1000 Enterprises to attend a series of energy statistic trainings. Each province (including each autonomous region and municipality directly under the Central Government, the same hereinafter) also has strengthened its monitoring and managing capabilities of the 1000 Enterprises in its area.

- Implementation of the examination and evaluation system on energy conservation targets. As required by the State Council, NDRC has decomposed the reduction targets of energy consumption set out by the "11th Five-year Plan" period for the GDP of per 10000 RMB Yuan, and allocated them to each province (including each autonomous region and municipality directly under the Central Government). NDRC also has signed responsibility documents on the 1000 Enterprises' Energy Conservation targets with the 30 provinces, Xinjiang Production & Construction Corps and 14 central enterprises. The governments of each province (autonomous region and municipality directly under the Central Government) have respectively signed responsibility documents on energy conservation targets with the 1000 Enterprises in its own area. They have also disaggregated the energy conservation targets at each level and strengthened the relevant appraisal. Some of them even have implemented an accountability system. Most of the 1000 Enterprises have disaggregated and carried out measures towards realizing energy conservation targets, and enhanced their internal appraisal thereafter.

- Reinforcement of the energy conservation administration of the 1000 Enterprises. The departments of each province in charge of energy conservation have enhanced their works on monitoring, examining and managing the energy conservation administration of the 1000 Enterprises in their respective areas. In some areas, the Top-1000 Program has been among the issues which are under strict monitoring and supervision in terms of energy conservation. The situations of energy use by these enterprises have been under examination and spot check. Most of the 1000 Enterprises have reinforced their construction of energy administration systems, enhanced their energy conservation structures, improved the instruments and devices for their third order measurement system, set control targets for each kind of energy consumption, brought the control of energy consumption into their administration systems and supervised each energy consumption process strictly in accordance with relevant production requirements. More than 95% of the 1000 Enterprises have established special institutions responsible for energy administration and appointed energy administration personnel.

- Development of the works on enterprises' energy audits and formulation of energy conservation plans. Under the organization and leadership of the governmental departments in charge of energy conservation at each level, the works on energy audits and formulation of energy conservation plans have been developed with the 1000 Enterprises since the fourth quarter of 2006. In the first half of 2007, the 1000 Enterprises basically have completed their works on energy audits and formulation of energy conservation plans. Each department of provincial level in charge of energy conservation has organized experts to collectively examine energy audit reports, and asked the enterprise to take measures for improvement if it failed to pass the examination. Up to August 31, 967 copies of energy audit reports and 836 copies of energy conservation plans had been received from the 30 provinces, autonomous regions and municipalities directly under the Central Government, respectively accounting for 97% and 84% of that which ought to be received. Among these reports, 942 copies have relatively complete data and may be used for summary statistics. The reports thus have been summarized and analyzed by the experts of the institutions appointed by NDRC. Firstly, the energy audit had a deep insight into the fundamental conditions of the enterprises. The valuable data obtained from the audits on the total quantity and constitution of energy consumption, level of energy efficiency, current administrative status, equipment conditions

and potential capacity of energy conservation of the enterprises provide a substantial basis either to the enterprises for carrying out energy conservation measures, or to the government for enhancing the supervision of energy conservation, or for assisting enterprises in technology reformation. Secondly, the energy audit has educated and trained the teams. The audits of quite a lot of the enterprises were carried out by energy conservation technology service centers or associations and other relevant energy conservation service institutions. Monitoring centers have done a lot of works for the energy audit works too. The teams thus have practiced their expertise and improved their capabilities. Thirdly, the energy audit has played a leading and exemplary role. Through the promotion of the energy auditing experiences and practices used for the 1000 enterprises by the departments of local governments in charge of energy conservation, other key energy consumption enterprises also has been mobilized to actively carry out their energy audit works and to formulate their energy conservation plans.

- Active promotion of the technology reformation of the 1000 Enterprises on energy conservation. Ever since the Top-1000 Program was launched, the central government has increased the support on the technology reformation projects of the 1000 Enterprises on energy conservation with its capital obtained from the issuance of government bonds and that under its investment budget. The local governments of each region also have increased their support for the 1000 Enterprises. Moreover, each enterprise has actively raised capital to enhance its research, development, promotion and application of new technologies, new crafts, new equipments and new materials on energy conservation, and has vigorously adjusted its products, crafts and the constitution of energy consumption, so as to promote the optimization of its production technology and the upgrading of its product structure.

- Promoting the administration of key energy consuming enterprises on energy conservation with the 1000 Enterprises Energy Conservation Action Plan. Each region has grasped the core issues of industrial energy consumption and actively carried out the Implementation Plan for the Top-1000 Program, along with which the monitoring and administrative works on other key energy consuming enterprises have also been enhanced. Most regions have organized local “1000 Enterprises Energy Conservation Action Plans”, “double hundred enterprises energy conservation action” and “one hundred enterprise energy conservation action” in order to promote the administration on the energy consumption of local key energy consuming enterprises.

During the past year, through the joint efforts of the government and enterprises, the Top-1000 Program has gotten its preliminary results. Compared with that of 2005, the levels of energy consumption per unit of the main products of the 1000 Enterprises all went down to some different extent, among which the levels of energy consumption per unit of cement, plane glass and crude oil have been near the advanced levels in the world, the levels of energy consumption per unit of thermal power, electrolytic aluminum, synthesis ammonia, calcium carbide, caustic soda and calcined soda have been better than domestic average levels. As accounted according to the data provided by NBSC for 2006 on the levels of energy consumption per unit of the main energy consuming products of the 1000 Enterprises, 14.92 million tons of standard coal have been saved as compared with that of 2005, and a total of about 20 million tons of standard coal have been saved as compared with that of 2005 if the energy saved by other products of the enterprises were added, among which the energy quantity saved by the four industries of steel, chemistry, power and oil & petrochemical accounts for 92% of the aggregated energy conservation.

In the first quarter of this year, the levels of energy consumption per unit of all 17 kinds of products of the 1000 Enterprises reduced to some different extent, 8 million tons of standard

coal have been saved, which also caused reduction of energy consumption per unit of GDP of the whole country.

III. Next step works for the 1000 enterprises energy conservation action

Although the Top-1000 Program has achieved its preliminary progress and initial results mentioned above, a lot of problems still exist and need to be resolved, which are mainly as following:

-Insufficient recognition exists with some enterprises. Some enterprises have insufficient recognition on the works of energy conservation. They always prefer to seek economic development, eagerly launch projects and extend enterprise scale, and see the extension of enterprise scale as the primary target and task, while regarding energy conservation and the reduction of pollution discharge as the subordinate target and task. Some of them even have not yet formulated energy conservation plans. As reflected from the summary of and analysis on the energy audit reports of the 1000 Enterprises, some enterprises have not completed their energy audit reports as required.

- Backward technologies and equipments that deserve to be eliminated are still being used by some enterprises. Also it was reflected from the energy audit that although the main equipments of some large scale enterprises are quite advanced, the auxiliaries and commonly used equipments are relatively backward, some of them even ought to be eliminated. The task of equipment elimination for these enterprises remains to be very arduous.

- Basic works such as energy accounting and measurement lag behind. There are imperfect statistical systems on energy consumption with some enterprises. Some enterprises have not followed relevant requirements to furnish equipments or devices for energy accounting and measurement. What ought to be especially mentioned on these enterprises are its relative low rate of third order measurement, insufficient and incomplete statistical ledgers, poorly reserved original records, inaccurate and delayed statistical data and relaxed data examination. Some enterprises have not yet established their systems on energy administration, basically have no accounting and measurement equipments or devices, nor statistical ledgers, as such are with weak administration foundation on energy conservation.

- Incentive policies and supervision mechanisms are imperfect. Many enterprises have not yet established or perfected their systems on energy conservation reward and punishment, nor have they set up any fund for energy conservation. Due to this, no entity or individual who/which has made achievements in energy conservation has been given a reward. Still other enterprises have not disaggregated the energy conservation targets into their branches and working units, and have not implemented responsibility system on energy conservation targets. The system on supervision of energy conservation covering each province has not yet been established, therefore the supervision on and administration of the energy conservation of key energy consuming enterprises have not been fully and substantially carried out.

Targeting the problems mentioned above, the direction for the next steps of the 1000 Enterprises Energy Conservation Action Plan is:

1. Further increasing the recognition of the significance of carrying out the 1000 Enterprises Energy Conservation Action Plan. The enterprises should be sufficiently informed that energy conservation and energy efficiency improvement are significant strategic tasks for our country that may affect the whole modern construction or long term development of our country. The implementation of the 1000 Enterprises Energy Conservation Action Plan not only is urgently needed both for pushing forward the development of the enterprises themselves, but for coping with global climate change.

2. Strengthening the accountability of the enterprises. The Notice of the State Council on Issuing the Comprehensive Work Plan for Energy Conservation and Reduction of Pollution Discharge has definitely required that enterprises must strictly abide by the laws, regulations and standards on energy conservation and environmental protection, implement target accountability, enhance administrative measures and consciously conserve energy and reduce pollution discharge. Meanwhile, supervision on key energy consuming enterprises should be strengthened and carried out on a regular basis. NDRC also has set out the Plan for Implementing Examination and Evaluation of Energy Conservation Target Responsibility after its research. The Plan sets the implementing status of energy conservation targets as the important basis for evaluating the administrative achievements either of the leading staff of each government at provincial level, or of the head of each key energy consuming enterprise.

3. Preventing heavy energy consuming and/or heavy pollution discharge industries from growing faster by comprehensive measures. The administration on projects of fixed asset investment of heavy energy consumption and/or heavy pollution discharge enterprises must be strict. The two gates of land provision and credit provision must be strictly held. The conditions for entering the markets of energy conservation and environmental protection must be increased. The interaction mechanism between approval authorities and accountability systems on project approval ought to be established for the administration of newly commenced projects. In addition, more attention and restriction should be paid or put on the approval of energy evaluation and environmental protection. More restrictive conditions should be put on enterprises in key regions and/or of key industries for them to enter markets. The Catalogue for the Guidance of Foreign Investment Industries ought to be adjusted so as to strictly and effectively prevent heavy energy consuming, heavy pollution discharge and/or low level enterprises entering into China. Each policy on restricting export of heavy energy consuming and/or heavy pollution discharge products also should be put into practice. The government now is studying the formulation of the work plan for eliminating the obsolete production capacity of heavy energy consumption and/or heavy pollution discharge industries subject to different regions and different years, and will subsequently publish the list of enterprises with obsolete production capacity that ought to be eliminated. As such the responsible subjects will be clear and definite and are able to be under social supervision.

4. Carrying out comparative standard activity for key energy consuming enterprises with their energy efficiency levels. NDRC has issued the Implementing Plan for Developing Comparative Standard Activity with the Energy Efficiency Levels of Key Energy Consuming Enterprises, and launched the comparative standard activity being carried out between the energy consuming levels of key enterprises and the advanced levels of the same domestic and/or international industries. It's predicted that through this activity, the energy conservation works of the enterprises will be advanced to a higher level, the energy consumption per unit of the main products and that of the main working procedures of key energy consuming enterprises will be greatly reduced, the energy efficiency levels of some enterprises will reach the advanced levels of the same respective industries in the world, or reach the leading levels of the same respective industries in China, and the overall industrial energy efficiency levels will get a great advancement.

5. Enhancing the technology reformation of the enterprises' energy conservation. In August of this year, the Interim Measures on Administration of Financial Reward Funds for Technology Reformation of Energy Conservation was issued jointly by Ministry of Finance People's Republic of China (MFPRC) and NDRC in order to provide appropriate support and rewards to 10 key large energy conservation projects by means of "rewards instead of subsidies", i.e., linking rewards with energy conservation quantity, rewarding each enterprise

which has realized the energy conservation target for the project undertook by it, more saving, more rewards, as such the actual effects for the technology reformation project on energy conservation are able to be ensured. For this year, the central government increases 7 Billion RMB Yuan which is mainly used for the key energy conservation projects such as supporting the use of residual hot and pressure, optimizing energy systems, reforming industrial boiler (kiln), saving and substituting oil and the energy conservation of machines.

6. Strengthening the administration of energy conservation. The government will require each of the 1000 Enterprises to establish or specify its special administrative institution being responsible for energy conservation, furnish full-time management personnel, improve its administrative system on energy conservation and implement accountability systems on energy conservation targets. A direct online report system based on nationwide network will be established and improved for the data reports of the 1000 Enterprises and key energy consuming enterprises. The enterprises' energy audit works also will be carried out under regulations. The government further plans to establish an energy manager professional evaluation system at current stage for directing key energy consuming enterprises to employ in priority those energy managing personnel who has a energy manager certificate, and expects that for some years later, an energy manager system for key energy consuming enterprises will gradually be put into practice.

The Approach and Policy for Meeting Energy Conservation Targets in the 11th Five-Year Plan Period

FENG Fei
Director, Industrial Economics Research Department
Development Research Center, State Council

A. Fully understand the difficulties and essence of energy conservation targets in the 11th Five-Year Plan period

1. The driving factors for energy conservation have changed. Since 2002, we have faced a totally different situation than previous years: structural factors are not the driving factors for energy conservation; rather, they have become the factors that lead to a rise of energy consumption per unit GDP. Therefore, structural factors have reversed the effects on unit GDP energy consumption. The root cause for current difficulties in energy conservation is this change of driving factors, or the change in the internal mechanism for energy conservation. Under new situations, it is urgent to build a new internal mechanism for energy conservation, which should be a comprehensive one of multiple factors.

2. Systematic deficiencies exist in various aspects, such as energy conservation management, policy and law. The government's efforts in intervention scope, intervention method and intervention extent, etc for energy conservation have obvious defects. This is exemplified in the deficiencies in fiscal, tax, price and other instruments used to encourage energy conservation. These deficiencies include the absence of laws, rules and regulations, and standards that can adapt to a new situation; an unsmooth energy management system which, includes energy conservation; and a weakened ability for management of energy. In addition, the market mechanism under system transformation is still immature and incomplete. Different forms of deficiencies in these aspects, when accumulated, constitute a systematic deficiency.

3. Energy conservation targets are more difficult to achieve, because the current economic growth is much faster than the conditions were when the targets were set. The energy conservation targets were set based on the assumed 7.5% of average yearly growth rate for GDP during the 11th Five-Year Plan period. It is expected, with this growth rate, that the total energy conservation amount (in absolute value) realized by 2010 is 640 million tons of standard coal. For each percentage point of economic growth higher than the planned conditions, then the aimed energy conservation amount will grow by about 4.7%. If GDP increases at a speed of 8.5% or 9.5%, the aimed energy conservation amount should be 670 or 700 million tons of standard coal respectively. Because the economy is developing at a speed much higher than planned, the targets for energy conservation are more difficult to achieve.

B. It is imperative to establish a new and long-term energy conservation mechanism

1. Four principles for promoting energy conservation.

First, comprehensive measures should be adopted and economic incentives stressed. Economic, legal and administrative means are all vital for effectively advancing energy conservation. Economic means based on energy prices and tax policy is a fundamental instrument to encourage all social members to conduct energy conservation consciously

under market economies, so as to avoid too much dependence on administration. **Second, the central government and local governments should work jointly to enforce their respective responsibility.** On the one hand, energy conservation tasks should be divided and assigned to local governments in a more feasible way, with a scientific supervision mechanism and appraisal system established; on the other hand, energy conservation responsibilities of various departments of the central government should be clarified, and the cases of simply transferring the responsibilities to a lower level should not be allowed. **Third, both temporary and permanent solutions should all be created, with focus on control over sources.** Both temporary and permanent solutions are necessary to achieve the targets of energy conservation during the 11th Five-Year Plan period, especially in order to understand the root cause for the unreasonable growth in energy consumption. These root causes include: consumption modes; newly added investment in energy-intensive industries; and export of energy-intensive products. **Fourth, short- and long-term measures should be combined, but with a focus on establishing a long-term mechanism.** Concerning a long-term mechanism, there are three basic system guarantees: **First, a market mechanism. Second, a policy mechanism that advances sustainable development. And third, a regulation mechanism.** The interrelationship among the three mechanisms are: the market mechanism is the basic system arrangement for the new mechanism on long-term energy conservation; the policy mechanism to advance sustainable development is the comprehensive system arrangement for realization of speciifc targets of energy conservation; and the regulation mechanism is for direct management of such microscopic subjects as enterprises.

2. Focus efforts on key industries in order to realize energy conservation targets. The general energy conservation targets for the 11th Five-Year Plan period should not only be broken down to specific local governments, but to energy-intensive industries. Management on key energy consumption enterprises should be conducted to make them take on their individual responsibilities.

C. Only by bringing the three energy conservation approaches into full play together may the target of 20% energy conservation be accomplished.

The three energy conservation approaches are: structural energy conservation, technical energy conservation and institutional (or management) energy conservation. After making analysis of the four policy scenarios under average yearly GDP growth rate of 7.5%, 8.5%, 9.5% and below 9.5% for the 11th Five-Year Plan period, we find: **First, it is totally impossible to accomplish the energy conservation targets without further energy conservation measures. Second, GDP growth rate has a decisive role in the realization of energy conservation targets.** A rate of 9.5-10% of average yearly GDP growth for the 11th Five-Year Plan period is proper; and a faster rate will lead to failure of energy conservation targets. **Third, structural energy conservation is the key to the realization of energy conservation targets.** Structural energy conservation will have a contribution rate of 60-70% for realizing energy conservation targets, and technical energy conservation will have about 30-40%. **And fourth, quickening technical progress and raising energy prices are two critical measures for realizing energy conservation targets.** If the average yearly GDP growth rate during the 11th Five-Year Plan period is less than 9.5%, it is possible to accomplish the energy conservation targets via adjusting structures, quickening technical progress and raising energy prices. But comprehensive countermeasures are needed.

D. Technical energy conservation has great potential, but it can only be partially realized during the 11th Five-Year Plan period.

Technical energy conservation has huge potential. According to the incomplete statistics, it is equivalent to approximately 700 million tons of standard coal, with only 210 - 280 million tons achievable in the 11th Five-Year Plan period, as estimated. On the other hand, it is impossible to meet the energy conservation targets for the 11th Five-Year Plan period at the current pace of technical progress, which, therefore, should be quickened. **First, energy conservation in newly added investment is one of the key measures for realizing technical energy conservation. Second, quickening the elimination of backward production capacity is also critical for the realization of technical energy conservation as well.** In 2005, energy consumption by SME in China accounted for about 50% of the entire industry section, and energy consumption per unit product by SME was 30%-60% higher than that by large-scale enterprises. In general, the three approaches to technical energy conservation are newly added investments' energy conservation, elimination of backward production capacity and reformation for energy conservation.

E. Policy suggestions that can be adopted in the near future

1. To mobilize all administrative resources to strengthen energy conservation management. First, at the level of the central government, we recommend the formation of a comprehensive energy management agency as soon as possible, to establish a national energy conservation center; and functions of departments of the central government should be clarified and implemented. Second, we recommend the formation of scientific supervision mechanisms and appraisal systems, so as to regard the fulfillment of targets for energy conservation and environmental protection as one of the important factors that appraise the performance of government officials. Third, we recommend the break-down of energy conservation targets for different industries. For the major energy-intensive industries as well as other major energy consumptive fields, such as transportation and construction. Their energy conservation targets should be clarified, and specific energy conservation policies should be made. Fourth, regulation of energy conservation should be enhanced. The regulation over the implementation of energy conservation standards should be enhanced for the purpose of changing the current situation of "available standards are not followed" in construction and other fields. And the regulation of key energy consumption organizations should be enhanced, and energy audit teams and their capabilities should be strengthened. And fifth, to summarize experience and lessons in break-down of energy conservation targets into local governments, and to study the comparatively scientific methods for break-down of indexes, so as to lay a solid foundation for future improvement of this task.

2. To make an effective fiscal and tax incentive policy. First, it is urgent to change the current situation that both investment scale of energy conservation and such investment's proportion in energy industry are all low, and try to significantly increase investments in energy conservation. Total energy conservation investment in the 11th Five-Year Plan period will be about 1 trillion yuan, and energy conservation investment's proportion in total energy industry investment will reach up to 15%. Second, to enforce income tax preferential policies. Currently, it is necessary, by referring to the tax policies for hi-tech enterprises and enterprises that implement integrated utilization of resources and taking the opportunity for income tax amalgamation of domestic and foreign capital enterprises, to grant certain favorable income tax policy towards those enterprises that produce energy conservation products. Third, to enlarge the levying scope of consumption tax. Taxes on high energy

consumption industries and products should be adjusted based on the consumption tax's structure. Fourth, to levy the fuel tax as soon as possible. The earlier the fuel tax policy is launched, the more remarkable its positive effects will be on energy conservation. Fifth, to deepen the reform of resource tax, with raising resource tax's taxation amount standard as the first step and, as the second step, changing resource tax' taxation base from volume-based to price-based. Sixth, to study the feasibility of levying energy tax. It is suggested that the levy of energy tax should be taken into account during the 12th Five-year Plan period, with the tax rate increasing gradually. And the related plan should be published to the society as early as possible. And seventh, to improve policies on export tax rebate and tariff policies.

3. To push forward the reform of energy price formation mechanism. It is necessary to establish a price formation mechanism that can reflect the scarcity of resources, the market supply and demand relationship, and the cost of environmental pollution and ecological destruction, so as to gradually rationalize price system.

Table Targets for reform of price formation mechanism in different sectors of energy industries

	Upstream	Mid-stream	Downstream
Electricity	Generation	Transmission and distribution	Sales of electricity
	Market-led pricing	Governmental modulation	Market-led pricing
Coal	Survey and exploitation	Transportation	Wholesales and retails
	Market-led pricing	Market-led pricing	Market-led pricing
Oil	Survey and exploitation	Finished oil	Wholesales and retails
	Market-led pricing	Market-led pricing	Market-led pricing
Natural gas	Survey and exploitation	Pipeline transportation	Wholesales and retails
	Market-led pricing	Governmental modulation	Market-led pricing

4. To create the energy-efficiency entry approval system and the backward production capacity exit mechanism. First, energy-efficiency entry approval conditions should be specified for energy-intensive industries, and energy-efficiency entry approval standards for these industries be raised significantly, so as to form a new market entry approval system based on energy-efficiency, environmental protection, and security. Second, to establish and improve a product energy-efficiency standard identification system for high energy consumption products. And third, to create a backward production capacity exit mechanism. The following two works should be strengthened: First, the backward production capacity exit mechanism. The exit ordered purely by arbitrary administration has obvious deficiencies and after-effects; thus, other means such as fiscal measures should be used to build an assistance mechanism for backward production capacity's exit. And second, more economic measures should be applied. By raising energy products' prices, we can make the backward production capacity backward not only in terms of energy efficiency but also in economic benefits. When the production capacity that is backward in all aspects is eliminated by the market, the previous unfavorable circle of "elimination, reemergence, re-elimination, and reemergence again" can be avoided. Such market means as generation rights trade often

adopted in the developed countries can also be introduced to address, via market, the post-elimination development of backward production capacity.

5. To strengthen environmental supervision for win-win of energy conservation and environmental protection. Energy conservation and emission reduction are complementry and mutually beneficial to each other. It will strongly support the realization of energy conservation targets to strengthen environmental supervision and achieve emission reduction goals. First, in order to change the passive and subordinate situation of current environmental supervision (governing mainly in the back end), it is necessary to strengthen environmental supervision at root causes, so as to truly make the environmental protection influence the endogenous decision-making variables of economic development. Second, to strengthen the procedure supervision, to form a multi-layer environmental protection system with government's regulation, public's participation and enterprise's commitment, to improve and strict regulate the rules on fees for sewage discharge, to strengthen the efforts on punishing the environmental offences, and to substantially increase the costs of violation. Third, based on the summary of experiences, to strengthen vertical management of environment protection, avoiding interference of environmental supervision by local protectionism. Fourth, to research and build emission trading system, so as to maximize environmental benefits with the minimum economic costs. And fifth, to increase the investment in environmental protection, and to strengthen environment protecting teams and their capabilities.

New Progress on the Research and Drafting of the Energy Law in China

YE Rongsi
President of the Energy Law Academy, China Law Society
Deputy Chief of the expert team for the drafting of the Energy Law

Ladies and Gentlemen:
I am very happy to take this opportunity to share with you the research and drafting of China's first comprehensive Energy Law.

(A) Progress on research and drafting

The research for China's comprehensive the Energy Law was initiated in the early 1980s. By the early 21st century, much research had been conducted by government agencies, some universities, research institutes and experts, and some National People's Congress (NPC) representatives and Chinese People's Political Consultative Conference (CPPCC) committeemen also put forth relevant proposals. At the beginning of 2005, the Energy Bureau of the National Development and Reform Commission (NDRC) entrusted the Energy Law Academy of the China Law Society to conduct "China Energy Law System Research" and proposed the drafting of a comprehensive Energy Law as soon as possible.

On Sep. 22 and 23, 2005, respectively, Vice-Premier Zeng Peiyan, and Premier Wen Jiabao indicated that research and drafting of the Energy Law should be conducted as soon as possible.

In early Dec. 2005, the State Council ratified the Energy Law drafting plan ("the plan") submitted by the National Energy Office (NEO) and NDRC, as well as the Legislative Affairs Office of the State Council.

In Jan. 2006, according to the plan approved by the State Council, NEO, NDRC, and the Legislative Affairs Office of the State Council formally started the drafting of the Energy Law.

On Jan. 24, 2006, the Energy Law's drafting team was formed, composed of 15 ministries, commissions and offices, including NPC, relevant departments of the State Council, and the Central Organization Establishing Committee Office. Ma Kai, Director of NDRC and NEO, was named team leader, and the secretariat position was given to NEO.

On March 22, 2006, the expert team for the drafting of the Energy Law was founded, composed of 16 senior experts in energy, economy, law, and public administration, with four permanent members working with the secretariat.

In early Nov. 2006, the Energy Law working draft (outline) was finished based on the research of critical problems related to the Energy Law.

In early March 2007, the Energy Law's working draft (1st version) was finished.

In late May 2007, the Energy Law's working draft (2nd version) was finished.

In late June 2007, the Energy Law's working draft (3rd version) was finished.

In early July 2007, the Energy Law working draft (4th version) was finished.

On July 27, 2007, a meeting for soliciting opinions was held, with participation by some provinces' and cities' Development and Reform Commissions, Economic and Trade Commissions, and some energy companies. Director Ma Kai attended the meeting in person and delivered key opening and closing speeches. Afterwards, three meetings for soliciting opinions were held for Southern China, Northern China and South-western China, hosted by the leaders of NEO. In addition, the leaders of NEO convened three draft expert team meetings. In total, nearly 200 leaders and experts have participated in discussion and modification.

On the basis of these opinions, and in accordance with the drafting plan ratified by the State Council, requirements of the State Council leaders, and directions of the Energy Office leaders, and after extensive analysis of all perspectives and modification, the Energy Law's discussion version was formed in early Oct. 2007. In mid-October, the current Energy Law (draft for soliciting opinions) was completed, and has been distributed to local governments, relevant departments, all energy industry associations, and some energy companies, for soliciting opinions. It is expected that a version for review will be submitted to the State Council in early 2008.

During drafting, the principles of democratic and scientific legislation are followed, socialist democracy is promoted, and beneficial proposals and opinions from all walks of life are comprehensively studied and adopted, thus guaranteeing the participation by the general public in Energy Law legislation in many ways. In the first half of 2006, 1000 proposals and opinions from 2000 citizens were collected via the internet. On April 27, 2007, the International Workshop on China's Energy Law was held in Beijing, with participation by almost 200 guests from home and abroad. Many foreign experts offered valuable suggestions and opinions on the drafting of China's Energy Law, while introducing international experiences. Over the past two years, almost 1000 leaders and experts have attended various workshops, symposiums and meetings for soliciting opinions organized by the drafting team's secretariat, many provinces (or municipalities and autonomous regions), energy associations, and large firms. Relevant agencies are preparing to publish the full text of the Energy Law (draft for soliciting opinions), so that citizens can discuss it and offer opinions. Opinions and proposals from the international community are also welcome.

(B) The positions and design principles of the Energy Law

1. The position of the Energy Law. The drafting of China's Energy Law is guided by the real demands left by the various existing energy laws. First, we need a proper overall position for the law. After repeated discussion, the nature of the Energy Law as the basic law of the energy field has been widely accepted. According to Premier Wen Jiabao's requirement to perfect the Energy Law system, the systems and specifications put forth by the Energy Law should reflect the law's position as the leader of separate energy legislations. The Energy Law should settle the most critical issues, the issues of overall significance, the comprehensive issues and the strategic issues of the energy field, as well as those aspects that are not and cannot be regulated and solved by individual laws, such as the overlaps amongst various types of energy laws and the coordination of local and central government interests. Other issues can be settled by separate laws.

2. The core concepts behind the Energy Law: implementing the national concept of scientific development that is "humane, to realize holistic, coordinated and sustainable development"; based on China's actual situation; learning from international experiences; maintain the concepts of reform and opening-up; honoring the rules and constraints of energy itself; securing energy security; improving energy efficiency; and focusing on environmental protection via legal regulations, while promoting harmony.

3. The design principles of the Energy Law. The principles of "full comprehensiveness, highlighting critical points, and focusing on coordination" are used to design the law's framework and major systems.
   a) "Full comprehensiveness" means that the scope of the Energy Law covers all actions and activities in the energy field, including such elements as energy exploitation, production, supply, and utilization, as well as reforms, progress, and the role of the market and government in the energy sector.
   b) "Highlighting critical points" refers to the fact that the Energy Law cannot give equal attention to all aspects; rather, it is focused on critical issues of strategic significance and that are urgently needed in real practice. These issues are the following: (1) the framework design is focused on a comprehensive system, enhancing "wide applicability" and guidance for separate energy laws and combining energy exploitation and utilization processes; (2) the system design is focused on addressing the critical issues of the entire energy field; and (3) in the important legal provisions, those key sub-systems that need to be incorporated into the Energy Law should be stressed, and some regulations pertaining to specific energy fields can be left to be regulated by separate energy laws.
   c) "Focus on coordination" means that the Energy Law is expected to enhance law and policy coordination among all sectors of the energy field and highlight the energy field's overall development issues as well as the common and overlapping problems between different energy types and procedures. Meanwhile, attention should be given to coordination with other related laws, such as the resource law, the environment law, the fiscal and tax law, the science and technology progress law, the real right law, the anti-monopoly law, and the emergency response law, with the goal of eliminating conflicts and duplication, with innovation in addressing the energy field's critical issues.

(C) The framework and major contents of the Energy Law (discussion version)

The Energy Law (draft for soliciting opinions) has 132 articles in 15 chapters: general principles, energy management, energy strategy and planning, energy exploitation and processing for conversion, energy supply and services, energy conservation, energy reserves, energy emergency responses, rural energy, incentives and restrictions in finance and tax policy, energy science and technology, international energy cooperation, supervision and inspection, legal responsibility and supplementary articles.

1. General Principles set forth the legislation's purpose, scope of application, and 8 critical legal principles, including the following: priority to conservation, coordination between energy and ecological environment, security of energy safety, resource allocation through the market, widespread services, science and technology innovation, international energy cooperation, and unified energy management.

2. Energy management articles lay out the responsibilities of, and the coordination

mechanisms between, governments at all levels as well as their energy departments and assistant departments; energy supervision organizations' responsibilities; roles of energy industry associations; and the general public's participation in energy decision-making. In particular, these articles set forth the property rights for investment, import and export management, price mechanisms, energy statistics, alarms and forecasting; standardization of management, and other critical aspects of comprehensive management.

3. Energy strategy and planning. This section establishes that "national energy strategy is the overall strategy that plans and directs national energy development and secures energy safety," and that "energy planning is the action plan for implementing national energy strategy". These provisions enhance the authority of energy strategy and planning, establishing their role in the energy policy system. Meanwhile, this section puts forth the guiding principles, their basis, essence, legal backing, and procedures for drafting, modifying, enforcing, and supervising energy strategy and planning.

4. Energy exploitation and processing for conversion. This section sets forth the principles for energy exploitation and processing, ownership of energy resources, initiation of resource exploitation projects and processing for conversion, energy conservation, clean energy and alternative energy, development and utilization of nuclear energy for civilian use, protection of the factory sites, the building of energy bases, enterprises' responsibilities for safety and environmental protection, ecological compensation, and the processing of nuclear waste disposal, among other issues.

5. Energy supply and service. These articles set forth the principles for energy supply, the main body of the supply market, entry into the supply business, the construction and protection of supply infrastructure, the opening-up of transportation pipes and networks, universal energy service, the obligations of energy users, and other issues.

6. Energy conservation. This section sets forth the enforcement of priority for conservation in national policy, energy conservation through optimization of industry and consumption structure, technological energy conservation, management of energy conservation, energy conservation in key fields, market mechanisms for energy conservation, and safeguards for energy conservation.

7. Energy reserves. This section addresses the management, types, products, and utilization of energy reserves, as well as local energy product reserves.

8. Energy emergency response. This section stipulates the scope, classification, prior plans, initiation, handling, conditions and restraints, key security areas, responsibilities of involved parties, and post-emergency handling of energy emergency responses.

9. Rural energy. This section sets forth the development principle, planning and enforcement, safeguards, and optimization of consumption structure for rural energy, as well as the electricity support for remote areas, rural biomass energy development, rural energy conservation, rural energy technology promotion and service system construction, and other issues.

10. Fiscal and tax incentives and constraints. This section sets forth the energy expense budget system and scope for the budget and government investments, special funds for energy development, the energy saving in government purchases, the incentives and constraints in energy taxes, taxes and levies on energy resources, energy consumption taxes, and application of taxation policy.

11. Energy science and technology. This section puts forth guidelines for development, investment, innovation, key fields, promotion and application, incentives, education, and popularization of energy science and technologies.

12. International energy cooperation. This section lays out cooperation methods for energy cooperation domestically and internationally, in land and transportation, science and technology, security, education, and other areas.

13. Supervision and inspection. This section establishes supervision by the NPC, with administrative supervision, social supervision, the authority of competent departments and supervisory organizations in the on-site inspection and material acquiring, the necessary administrative measures, and mandatory disclosure of information by energy-intensive enterprises.

14. Legal responsibility. These provisions sets forth the responsibilities of government, special energy companies', common energy companies, and energy users, as well as punitive measures for illegal acts, criminal responsibility, state compensation and civil responsibility, administrative remedies, and other issues.

15. Supplementary articles. These articles address the handling of legal conflicts, explanation of terms, and effective dates for the law.

Thank You!

Key Issues in Implementing the Revised *Energy Conservation Law*

LI Mingzhi
Vice Director, Economic Office,
Financial and Economic Committee of the National People's Congress

The revised Energy Conservation Law (ECL) was adopted at the 30th Meeting of the Standing Committee of the Tenth National People's Congress on Oct 28th, 2007. It can be considered a "new" law in that it has one added chapter, the number of articles increased from 50 to 87, and it establishes several institutional systems for energy conservation.

The next three years will be critical for realization of the energy saving goals of the "Eleventh Five-Year Plan". The new ECL provides stronger support for these goals, but results will still depend on our efforts in implementing regulatory measures in the ECL. There are ten key conservation policies and measures that urgently need to be launched, which are listed below.

I. Existing energy standards should be updated.
The provincial governments should play a larger role because the new law authorizes them to set up stricter local standards, especially in the buildings sector. Based on these updated standards, the energy efficiency labels and certification will gradually be applied to major appliances.

II. An evaluation and examination system for energy consumption of large-scale investment projects should be established.
The specific administrative measures for doing so shall be formulated by the administrative department for energy conservation under the State Council.

III. The power grid should provide priority in grid-connection service to the efficient power plants and the plants that generate power by using residual heat and pressure.

IV. Energy Conservation in the Civil Building Code should be promulgated by the State Council as soon as possible.
Several important systems in the building areas should be established and implemented, especially a system for energy conservation supervision for buildings under construction, and a system for indoor temperature control of public buildings with air-conditioners. The administrative department for construction under the State Council should formulate the relevant administrative measures, and be responsible for supervision of implementation. A system of measuring household heating consumption and basing fees on consumption level should be adopted. The real estate developers should be responsible for disclosure of the energy conservation information for their buildings.

V. Energy conservation in public institutions should be strengthened through budget control.
The finance department should, along with the relevant departments, set quotas for energy consumption and expenditures for public entities of equal administrative level.

VI. Enhance monitoring of the major energy-consuming entities with regard to energy conservation.

A major energy-consuming unit shall, in accordance with the relevant state regulations, submit an annual report on the previous year's energy consumption to the department for energy conservation. If a major energy-consuming unit does not comply with the regulation, the department can take further action, e.g. mandatory energy audits.

VII. Formulate a catalogue to promote energy-saving technologies and products.
In accordance with Article 61 of the ECL, a catalogue to popularize energy–saving technologies and products should be formulated and published by State, and these products should receive favorable tax policies. Further financial subsidies should be used to promote energy efficient lighting appliances.

VIII. Both central and local governments should devote more money to special funds for energy conservation.
This year, the central government allocated 5 billion RMB for energy saving, and added another 7 billion in the second half of the year.

IX. Price policies should be issued to favor energy conservation.
An effective incentive mechanism, with fiscal, tax and price policies, will enlarge the market for energy saving.

X. Regulations on legal responsibility should be improved, and the authority and restrictive power of the ECL should be strengthened.
Punishments should be made more stringent, to clarify, specify, and enhance the legal responsibilities of government agencies, enterprises, and private bodies. The State Council should set energy savings targets for provincial governments, and meeting these targets should be one of the criteria in evaluating local governments. The State Council and local people's congresses at or above the county level should draw up and implement long- and medium-term programs and annual plans specifically for energy conservation. The governments should report energy conservation progress to NPC or its Standing Committee at the same administrative level. Energy conservation is one of the focuses of the work of the Finance & Economics Committee of the 10th NPC.

China Sustainable Energy Program
Sustainable City Program Strategy

Overarching goal: Bring about sustainable urbanization and transportation in new and existing Chinese cities by promoting integrated, sustainable urban planning practices through green buildings and clean, multi-modal transportation systems that save energy, reduce carbon emissions, and enhance the quality of life.

Goal #1: Develop four-to-six "eco-city" pilots that demonstrate minimized urban sprawl, urban growth boundaries, maximized mixed-use planning, efficient and dependable mass transit systems with transit-oriented development (TOD). Encourage the replication of these pilots nationwide.

Means:

We can achieve this goal by helping China do the following:

1. Develop integrated sustainable urban design criteria, based on both international best practice and China's own "green city" principles, for application in four-to-six "eco-city" pilots.
2. Launch four-to-six "eco-city" pilots in cooperation with central, provincial, and local governments in order to demonstrate sustainable urban design criteria and the net public benefits of these criteria.
3. Train China's mayors in sustainable urban design criteria, including through developing curricula for the Ministry of Construction's Mayor Training Program;
4. In cooperation with central, provincial, and local governments, replicate sustainable urban design practices nationwide.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress:

1. The success of eco-city pilots, as measured by the volume of energy savings and resultant carbon emissions savings due to new green buildings and sustainable mass transit systems, particularly bus rapid transit systems (BRT),
2. The degree of political commitment at the national, provincial, and local levels to spreading sustainable urban design criteria.
3. Whether training programs for mayors and local officials in the elements of sustainable urban design, green buildings, and sustainable transportation are established and widely implemented.
4. The extent to which transit-oriented development (TOD) policies and implementation create compact, walkable communities centered around public transportation systems.
5. Whether land-use policies and plans include mixed-use planning, and the percentage of mixed-use land in eco-city pilots.
6. Whether urban growth boundaries, green belts, and green space are implemented and enforced.

7. The extent to which streetscapes create diverse transportation systems, more accessible communities, more attractive urban environments, and more livable communities.
8. The amount of energy saved and carbon emissions reduced due to the replication of sustainable urban design and practices in China.

Goal #2: Help China develop sustainable transportation systems, especially bus rapid transit systems (BRT) and non-motorized modes (NMM), in order to reduce private vehicle miles traveled, improve urban air quality, and cut carbon emissions from the transportation sector.

Means:

We can achieve this goal by helping China do the following:

1. Develop BRT policies and technical guidelines to stimulate the spread of BRT systems to major cities throughout the country.
2. Help develop comprehensive BRT systems in six-to-eight major Chinese cities.
3. Educate central, provincial, and municipal authorities about the net public benefits of sustainable transportation systems.
4. Develop city pilots to demonstrate the net public benefits of congestion charging and parking policies to reduce car use, in order to improve urban air quality, cut carbon emissions, and create increased demand for the use of sustainable transportation systems particularly BRT.
5. Develop preference policies and planning to support NMM systems.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. Overall progress includes these metrics:

1. Whether superior BRT systems are established in six-to-eight Chinese cities.
2. Whether policies promoting BRT are adopted and enforced in each pilot city, and whether these policies are replicated nationwide.
3. Whether policies to constrain car use are adopted and enforced.
4. The amount of carbon savings that result from development of sustainable transportation systems.

China Sustainable Cities Program Ongoing Projects

Association of Mayors of Guangxi

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop policies encouraging municipal BRT development in Guangxi province.

Grant Date: 9/1/2006 **Duration:** One year **Amount:** $100,000

Description: To develop policies encouraging municipal BRT development in Guangxi province.

Beijing Changdatong Bus Ltd. & China BRT Association

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $200,000

Description: To assist the Beijing municipal government with improving and implementing the near-term BRT network development plan.

Beijing Transportation Research Center

Grant Date: 8/1/2007 **Duration:** One Year **Amount:** $200,000

Description: To support the Beijing Transportation Research Center with developing public transportation reform plans and related policies.

Grant Date: 4/1/2005 **Duration:** Two years **Amount:** $150,000

Description*:* To develop plans for the operation and management of Beijing's first bus rapid transit (BRT) corridor and help Beijing implement its near-term BRT network development plan.

Chang'an University

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $150,000

Description: To support Chang An University and Xi'an Urban Planning Institute to assist the government to develop BRT systems and optimize Xi'an's public transit system.

Grant Date: 11/1/2005 **Duration:** One year **Amount:** $120,000

Description: To develop plans for a bus rapid transit (BRT) network, including detailed plans for demonstration corridors, in Xi'an.

China Academy of Sciences

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $100,000

Description: To conduct studies on development trends in China's urbanization and the corresponding impact on energy, water resources and the environment.

China Academy of Urban Planning and Design

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $200,000

Description: To support the China Academy of Urban Planning and Design to assist the Ministry of Construction with formulating the "National Public Transit Systems Development White Paper" and "BRT Development Technical Manual."

Grant Date: 7/1/2007 **Duration:** One Year **Amount:** $100,000

Description: To research the features and principles of "eco-cities" in China and internationally.

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $75,000

Description: To study transit-oriented development (TOD) and its features in China.

China Academy of Urban Planning and Design & Global Village Beijing

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $200,000

Description: To support China Academy of Urban Planning and Design and Global Village Beijing to promote public awareness, acceptance, and support for public transportation.

China Society for Urban Studies

Grant Date: 7/1/2007 **Duration:** One Year **Amount:** $120,000

Description: To develop a comprehensive paper on the overall strategy, regulations and guidelines for sustainable urban development, and help the China Society for Urban Studies to coordinate the progress of all reports that will contribute to this paper.

Chongqing BRT Coorporation

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $75,000

Description: To assist Chongqing municipal government in develop BRT demonstration project in the city.

Development Research Center of the State Council

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $80,000

Description: To assess the strategic role of China's urban development in regional development.

Environment Impact Assessment Center of SEPA

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $65,000

Description: To conduct studies on integrating environmental impact assessment with eco-city planning.

Jinan Urban Planning Institute

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support Ji'nan Urban Planning Institute to search and implement mixed-use and transit-oriented development principles in demonstration zones, to inform the city's detailed zoning plans.

Kunming Urban Transportation Planning Institute

Grant Date: 6/1/2007 **Duration:** One year **Amount:** $80,000

Description: To continue improving Kunming's bus priority transit into a full-fledged bus rapid transit system.

Shangdong University

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $60,000

Description: To assist the Jinan municipal government to optimize its public transit systems.

Shenzhen Urban Transport Planning Center

Grant Date: 111/2007 **Duration:** One year **Amount:** $60,000

Description: To conduct research and develop policies to further transit-oriented development in Shenzhen.

Southwestern Jiaotong University

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support the Chengdu municipal government to develop a public transit system to harmonize the urban and rural development, and to promote Transit Oriented Development (TOD) with a BRT focus.

Tongji University

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop a guidance for sustainable development planning in Chinese cities.

Tsinghua University

Uouo

uou **Grant Date:** 7/1/2007 **Duration:** One year **Amount:** $60,000

Description: To conduct research on urban governance and reform of the functions of government bodies.

China Sustainable Energy Program

Sustainable City Projects Update

***Goal #1: Develop "eco-city" pilots* that demonstrate minimized urban sprawl, urban growth boundaries, maximized mixed-use planning, efficient and dependable mass transit systems with transit-oriented development (TOD), and encourage the replication of these pilots nationwide.**

Studies to Develop the Elements of Sustainable Urbanization in China

Urbanization Trends and Their Impact on Energy, Water Resources, and the Environment

China is experiencing rapid urbanization, the pattern and speed of which will directly impact the sustainability of China's development, and China's global competitiveness. This study: (1) establishes the impact of different urbanization rates on energy, other resources, and the environment; (3) compares urbanization in China and internationally; and (4) analyzes the impacts of different urbanization patterns, to inform decision-making in China.

The Strategic Role of China's Urban and Regional Development

Urban development is interlinked with growth across the region, and contributes to national development. This study (1) analyzes the role of cities in the development of the surrounding region; (2) examines the key elements supporting development that are supplied by the region (e.g. labor, raw materials, food); (3) assesses inter-city and inter-regional interactions; and (4) examines how to link city and regional development in a synergistic way.

Planning Sustainable Development in Chinese Cities

Sustainable urbanization requires a comprehensive approach, integrating historical, economic, political, cultural, resource-related and environmental perspectives. This study (1) examines traditional urban planning practices; (2) discusses current experiences, challenges and barriers in urban planning; (3) evaluates the prospects for sustainable urban planning; (4) summarizes positive experiences internationally and in China's history, with regard to urban planning; and (5) addresses the critical role of legislation and government regulation in promoting urban planning.

Urban Governance and Government Function Reform

Currently, China lacks sufficient mechanisms for coordinating various government agencies in urban planning and management, which is essential to formulating and implementing sustainable development. This project examines past experiences with

urban management in China, determines barriers to cooperation, and formulates policy recommendations to promote integrated urban management.

Principles of Eco-Cities: Chinese & International Experiences

Several eco-city demonstration projects are underway in China; however, "green" criteria vary among ministries. This study compares evaluation methodologies and criteria to identify basic principles and common features of what comprises "green," "sustainable" cities, in comparison to international experiences. The aim is to establish a unified evaluation criteria and methodology for eco-cities, which will facilitate the implementation of demonstration projects.

Harmonizing Environmental Impact Assessments (EIA) and Eco-City Planning

The National People's Congress has published a law stating that urban planning decisions must be accompanied by environmental impact assessments (EIAs) and evaluated by SEPA. This study examines how to foster communication and cooperation between SEPA and MOC, such that the goals and procedures for EIAs and urban planning are mutually-promoting.

Transit-Oriented Development (TOD) and its Features in China

To support China's exploding vehicle population and the automobile industry, the government has prioritized road construction, resulting in urban sprawl and crippling congestion. This cost-benefit analysis examines China's current transportation development path relative to a more sustainable path, one that incorporates TOD and multimodal transportation systems (bus rapid transit, bicycle lanes, pedestrian walkways, etc.). With assistance from international experts, the study identifies quantitative relationships between urban design, transportation planning, resource-use, energy intensity reduction, and pollution reduction. The goal is to develop a road map for developing cities that are not dependent on private automobiles.

Mayors' Training Program

Sustainable urban development curricula can be built into the Ministry of Construction's (MOC's) 20 year-old mayor training program, thus facilitating mayors' ability to achieve their obligations to the central government—including achieving energy intensity improvement targets—using a range of sustainable energy policies. This study brings together MOC and international experts to (1) develop a curriculum for public officials on sustainable urban planning, sustainable transportation, green buildings, green energy, and livable communities; and (2) integrate this curriculum into periodic training programs required of all officials.

Development Methodology for Pilot City Selection

A major objective of this year's Senior Policy Advisory Committee (PAC) Meeting and Mayors' Forum is the establishment of sustainable urban planning criteria, which can be

implemented in pilot cities. This allocation will support surveys and research to determine criteria for pilot cities, including such factors as local political will, technical capacity, status as either a "new city" or as a city surrounded by currently unoccupied land that will soon become satellite cities, and existence of on-going CSEP/CSCI projects.

Implementing Sustainable City Pilot Projects

With pilot city criteria in place, we look forward to implementing sustainable urbanization measures in two to three demonstration cities, to be expanded to five to six as soon as cities demonstrate, on a competitive basis, their willingness and ability to implement green, sustainable urban development criteria. Once cities are identified, international consultants will be added to meet the specific needs of each city, and will: (1) assist CSCP staff to develop a comprehensive program strategy; (2) provide technical support to pilot cities; and (3) promote sustainable urban development through training efforts with local government officials, including government meetings, workshops and conferences, and technical analysis.

Developing Urban Transit Technical Manuals

The Ministry of Construction (MOC) has expressed interest in formulating technical manuals for comprehensive urban transit systems (moving beyond the BRT manuals already published) and urban planning. While the development of these manuals has not yet been launched, the aim of this project is to inject sustainability principles into these highly influential national documents.

Developing a National Urban Planning White Paper

With the rapidity and scale of China's urbanization, the integration of sustainable development objectives into national strategies is crucial. To help the Ministry of Construction (MOC) to develop specific guides and policies for urban planning in a **"**National Urban Planning Development White Paper," we support the China Academy of Urban Planning and Development (CAUPD, the top think tank for MOC for urban planning and design and public transportation), to analyze existing studies on the trends and impacts of urbanization and to find quantitative relationships among urban design, transportation, resource-use, energy intensity reduction, and pollution reduction.

Goal #2: **Help China develop sustainable transportation systems, especially bus rapid transit systems (BRT) and non-motorized modes (NMM), in order to reduce private vehicle miles traveled, improve urban air quality, and cut carbon emissions from the transportation sector.**

Formulating the "National Public Transit Systems Development White Paper" and "BRT Development Technical Manual"

MOC is developing specific guides and policies for urban transportation system development. The first phase of this multi-year program is focused on deepening our understanding of the field and working with MOC to develop an annual National Public Transit Systems Development White Paper and a BRT technical guide. The Chinese Academy of Urban Planning and Design (CAUPD) and international consultants are leading a group of influential Chinese experts to prepare the white paper and formulate the technical manual; in addition, the project team has assisted local cities with Public Transit Week and Car-Free Day operations, and will establish a website on which MOC will publish the technical guidance and other public transport-related information.

Promoting Public Transportation

National-level political support for limiting motorization and promoting public transport has increased rapidly in recent years. However, increasing public awareness and support is also essential for successful transportation system reform. MOC has launched "Public Transportation Week" and "Car Free Day" activities, accompanied by media and public awareness campaigns. This year, 108 cities participated in the campaign, which was coordinated by CSEP-supported Global Village Beijing (GVB) and CAUPD. The project team (1) assisted with the coverage of campaign-related media events, including television advertisements, radio announcements, billboards, and brochures; (2) coordinated the production of a television program and DVD film about the benefits of public transportation; and (3) provided assistance on related projects.

Continuing Support to the China Sustainable Transportation Center (CSTC)

With the central government's prioritization of public transit, cities are increasingly interested in BRT implementation. CSTC was established in 2005 to meet the need for greater local technical capacity. In the past year, CSTC served as the technical assistance center to cities in the process of BRT planning and construction, particularly Beijing, Jinan, Xi'an, Chengdu, and Shenzhen; translated and introduced documents on international best practices to local staff; built an information exchange platform for international and domestic experts; and assisted with technology transfer and capacity improvement of local staff. CSTC also trained its own staff, and now is able to operate independently to provide technical assistance, seek funding, and support the development of BRT systems in such cities as Xi'an, Hefei, Shenzhen, and Chengdu.

Developing Public Transportation Reform Plans and Related Policies in Beijing

Beijing has taken aggressive action to improve and increase sustainability of its public transit system. It plans a comprehensive system reform and an increase of public transportation trip share to 40 percent by 2010. Having lowered bus fares, Beijing is now working to integrate different transportation modes and existing bus routes, and to increase designated bus lanes. We now support the Beijing Transportation Research Center (BTRC), in collaboration with the Beijing University of Technology, to assist government agencies and bus operation companies with the following: (1) optimization of bus routes and integration of transportation modes through a detailed transportation survey and demand analysis; (2) development of the plan and design for bus terminals and transfer hubs; (3) improvement of the bus lane priority system for public transportation and construction of an additional 285 km of exclusive bus lanes; and (4) ticket price adjustments.

BRT Development, TOD, and Urban Development in Beijing

After successfully demonstrating its BRT system, Beijing now plans to construct at least three additional corridors by 2010, including Chaoyang Road, Anli Road, and Fushi Road. Proper planning will optimize efficiency and integration with other transport modes—especially the metro system—and promises to dramatically improve the overall public transit system. With continued support from CSEP, Beijing Changdatong Bus Ltd. and the China BRT Association are improving the current BRT systems and developing future plans through the following: (1) increasing BRT Line 1 efficiency, especially in operations and integration with other traffic modes; (2) assisting with the design and construction of the Chaoyang and Anli Road corridors; (3) conducting preliminary planning for BRT development along the third ring road and Baiyi road, two of the main public transit corridors in Beijing; (4) analyzing the effects of further BRT expansion; and (5) disseminating Beijing's BRT experiences to further the adoption of BRT policies.

BRT successes have also made way for other sustainable urbanization measures, including public transit prioritizing, TOD, traffic demand management (TDM), green belts, and urban boundary controls. Over the last two years, Beijing has shifted from a gross expansion to a controlled approach to growth, exhibited by the following: (1) formulation of a new urban development master plan to ensure expansion through contained, high-density satellite cities, rather than sprawl; (2) BRT and metro development; (3) on-going optimization of the conventional bus system, along with transfer terminal and station development; and (4) the launch of a program to implement TOD along metro and BRT corridors. In the coming year, we hope to participate in Beijing's study of TOD, to establish principles and criteria for urban development.

Upgrading Kunming's Bus-Priority System

Kunming is a public transportation pioneer and was the first Chinese city to have a centralized dedicated-bus-lane system. In past years, CSEP supported the Kunming Urban Transportation Planning Institute (KUTPI) to upgrade Kunming's dedicated-bus-lane into a

world class BRT system. Last year, the project team created conceptual designs and plans to establish several new BRT corridors, one of which (5 km) opened in 2006. This corridor integrates most BRT features, such as exclusive bus lanes and level boarding, and will serve as a model for BRT development in Kunming. The team also created plans to optimize routing and operational management, improve bus-lane infrastructure, and create a new ticketing system. KUTPI is now working to continue sustainable transit development, with a focus on the integration of urban planning with BRT development. KUTPI will (1) assist the municipal government to refine the design of the existing dedicated bus lanes; (2) expand the system and integrate additional BRT characteristics; (3) work with the municipal government and bus companies to establish a ticketing system more integrated with the bus system; and (4) promote the concept of Transit Orientated Development (TOD) along BRT corridors, pushing for high density mixed-use construction and areas conducive to walking and biking.

Developing BRT, mixed-use and TOD principles in Ji'nan

As a relatively small city, Ji'nan, with a population of 1.5-2 million, faces the budget constraints that make BRT a promising strategy for meeting its urban transportation pressures, including congestion and diminishing air quality. The construction of Jinan's BRT system is already underway: begun in March 2006, two corridors are now running, with a total length of 25 km. To ensure that the system continues to develop efficiency, we are supporting (1) further study of vehicular and passenger volume; (2) development of a plan to integrate BRT with existing bus service routes to optimize convenience and efficiency; and (3) development of management regulations to identify the roles of each partner and of profit-sharing methods.

In addition, Ji'nan is in the process of reworking its urban master plan. To promote the inclusion of mixed-use and TOD principles, we are supporting (1) international experts to assist the local team to develop general principles and to refine and increase the sustainability of detailed city zoning plans; (2) analysis of the relationship between transit systems and land use, to ensure the quality and sufficiency of public transit for each zone; and (3) a demonstration program for the planning and design of one or two city zones, combining mixed-use principles and TOD.

Developing BRT in Xi'an

Xi'an recently was approved for a $240 million World Bank loan to strengthen its transportation infrastructure. Grantees, having convinced Xi'an over the past several years to incorporate BRT within the city's master urban plan, are now working to promote BRT as a centerpiece of the World Bank project and to provide foundational analysis for the World Bank's investment. With CSEP support, Logit Group is assisting the Xi'an Urban Planning Institute and Chang'an University to (1) conduct a survey and complete a model for urban transportation; (2) identify the most appropriate passenger corridors for BRT development based upon demand analysis; (3) complete plans for infrastructure design, bus route integration, ticketing systems, and BRT operations and management; (4) identify candidate

vehicles and ITS technology; and (5) recommend financial and institutional structures for long-term BRT development and implementation.

Developing BRT in Chongqing

After years of debate, Chongqing has finally committed to public transit reform. In July 2007, the Chongqing government publicly announced that it will begin BRT development. CSEP is assisting Chongqing BRT Corporation to set up a BRT-dedicated team, which will work to convince the government to commit to a whole-system rather than a segmented approach to BRT development. The team will work under the direction of international consultants to: (1) survey public transit demand and construct a model to project temporal and spatial ridership for BRT development; (2) develop a conceptual BRT network plan and implementation phase plan; (3) analyze the economic and traffic effects of various development scenarios for the BRT system; and (4) promote the integration of various public transit modes.

Developing BRT in Chengdu

Chengdu and Chongqing constitute China's fourth special economic zone (SEZ). In order to harmonize the development of urban and rural districts, promote equity, and encourage environment-friendly growth, Chengdu is developing a public transit system, using BRT to link the city center with new satellite cities. Grantee Southwestern Jiaotong University is now promoting BRT and transit-oriented development (TOD) in Chengdu's developing areas, by assisting the municipal government with the following: (1) development of a survey of public transit demand and construction of a model to project temporal and spatial ridership for BRT development; (2) development of plans for the BRT network and phased implementation; (3) analysis of economic and urban development in various satellite cities to develop TOD pilots in one or two satellite cities; and (4) analysis of development trends in downtown areas and satellite cities, to encourage the implementation of mixed-use development and integration with public transit.

Developing BRT in Guangxi

With intensive training and technical support, a BRT pilot project in Nanning, Guangxi's capital, has great potential to influence public transit development in over 20 cities throughout the province. With CSEP support, the Association of Mayors of Guangxi will continue to provide technical support and coordination, with the following tasks: (1) cooperating with the Nanning municipal government to organize a local team to conduct the technical work for BRT network planning and corridor design; (2) organizing technical teams from other cities to study Nanning's methodologies and development experiences; and (3) providing intensive technical training for public transit development planning.

Developing BRT in Jiangsu

Jiangsu is one of China's wealthiest provinces, but is suffering from declining urban air quality, eutrophication of nearly all its major lakes, and other environmental problems.

Realizing the role of public transit in reducing energy consumption and emissions, the Jiangsu Provincial Construction Bureau is now accepting CSEP support to organize an expert team for the following: (1) development of a provincial policy framework to encourage local cities to develop sustainable public transit systems; (2) provision of training courses to enhance the capacity of local technical groups; and (3) provision of technical support for two to three cities with public transit priority pilots projects (e.g., BRT, traffic mode integration).

Furthering TOD and Car Restriction Policies in Shenzhen

Since the development of its BRT system, Shenzhen is now considering TOD and car restriction policies. Local government and research teams have conducted studies on congestion pricing, and are examining options for TOD along BRT and metro corridors. If approval is received by the local government early next year, this project will support a group of experts to (1) review the current integration of urban development and urban transportation development; and (2) develop principals and concepts, policies and incentives, and site demonstrations for TOD in Shenzhen.

Recommendations:

- The central government should develop succinct criteria defining the elements of "green," "sustainable" cities, to include transit-oriented development, protected green space, urban growth boundaries, dense in-fill development, and mixed-use neighborhood development. To become sustainable, China's cities should be designed more for pedestrians than for cars.
- The central government should designate BRT as the centerpiece of sustainable urban transportation in China, providing financial support and encouraging BRT development in all major cities.
- China should develop BRT systems in several cities to serve as domestic and international models for replication.
- China should develop incentive policies and provide technical guidance to promote BRT development across the country.

China Sustainable Energy Program
Buildings Program Strategy

Overarching goal: Increase building energy efficiency through the use of appliance energy efficiency standards, building energy codes and green building initiative

Goal #1: Increase the energy efficiency of household appliances and equipment by using energy efficiency standards and energy labels.

Means:

We can achieve this goal by helping China do the following.

1. Train government research institutes and other parties involved in energy efficiency policy development and implementation in appliance standards analysis.
2. Develop and adopt a mandatory energy efficiency standard for at least one new appliance each year, per China's plans.
3. Develop energy labels.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. The amount of energy saved and amount by which carbon emissions are reduced through the use of appliance standards.
2. Whether a national energy efficiency standard and energy label are adopted for one new appliance annually.
3. The extent to which appliances actually meet energy efficiency standards.
4. Whether a regular process of standards updates ("reach standards") becomes institutionalized at the national level.
5. Whether China increases its appliance energy efficiency standards development, implementation, and enforcement budgets.

Goal #2: Help China develop and implement residential and commercial building energy codes in its central and southern climate zones, and to develop green building initiatives in pilot eco-cities.

Means:

We can achieve this goal by helping China do the following.

1. Build institutional capacity in energy analysis, standards development, energy efficient building design and operation, and policy formulation.
2. Ensure building energy codes in China's central and southern climate zones are enforced.
3. Green building codes and policy at the national level, and the implementation of green buildings incentive policies at the local level, particularly in the 3-4 eco-city pilots.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. The amount of energy saved and amount by which carbon emissions are reduced due to new building energy codes and green building development.

2. Whether major cities in China's central and southern climate zones adopt and effectively implement new building energy codes.
3. The extent to which newly-constructed buildings comply with new codes.
4. Whether effective national building code implementation incentive policies, regulations, and penalties are adopted and enforced at the local and national levels.
5. Whether the analytic capacity of domestic institutions is increased, facilitating future code development.
6. Whether effective national green building code implementation incentive policies, regulations, and penalties are adopted and enforced at the local and national levels, especially in pilot eco-cities.

China Sustainable Energy Program
Buildings Program Ongoing Projects

American Council for an Energy Efficient Economy

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $15,000

Description: To assist China in the revision of the refrigerator energy efficiency "reach" standard.

Alliance to Save Energy

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $20,000

Description: To help China implement an energy efficient windows labeling and certification program.

Beijing University of Technology

Grant Date: 4/15/2007 **Duration:** one year **Amount:** $70,000

Description: To recommend appropriate policies and incentives for scaling-up the application of renewable energy in the building sector.

China Academy of Building Research

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $50,000

Description: To support the China Academy of Building Research to develop testing standards for public buildings.

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $50,000

Description: To support the development of a design standard for green buildings in China.

China National Institute of Standardization

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $50,000

Description: To support the China National Institute of Standardization to develop energy efficiency information labels for lighting products.

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $45,000

Description: To assist China with revisions to the rice cooker energy efficiency standard.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $45,000

Description: To assist China in the revision of the refrigerator energy efficiency "reach" standard.

Chongqing Construction Technology Development Center

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $25,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

Chongqing University

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $60,000

Description: To develop energy performance standards for both central air conditioners and large-scale commercial buildings in the Hot-Summer Cold-Winter (Central China) region.

Fuzhou Sixin Science and Technology Promotion Center

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $25,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $30,000

Description: To develop policies improving the energy efficiency of large commercial buildings in China.

Guangzhou Institute of Building Science

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $30,000

Description: To develop policies improving the energy efficiency of large commercial buildings in China.

Information Center of the Ministry of Construction

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $55,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $20,000

Description: To develop policies improving the energy efficiency of large commercial buildings in China.

Grant Date: 3/1/2006 **Duration:** One year **Amount:** $110,000

Description: To improve building energy code implementation in China's Hot-Summer Cold-Winter (Central China) climate zone based on successful implementation mechanisms developed in Shanghai and Chongqing.

Institute for China and Global Environmental Sustainability

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $60,000

Description: To support the Institute for China and Global Environmental Sustainability to complete a report on international green building practices.

Lawrence Berkeley National Laboratory

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $220,000

Description: To support LBNL working with Chinese institutions on standards and labels development and implementation.

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $45,000

Description: To assist China with revisions to the rice cooker energy efficiency standard.

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $60,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $40,000

Description: To assist China in the revision of the refrigerator energy efficiency "reach" standard.

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $60,000

Description: To help China implement an energy efficient windows labeling and certification program.

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $40,000

Description: To develop mechanisms to monitor and enforce compliance with appliance energy efficiency standards in China.

Grant Date: 3/1/2006 **Duration:** One year **Amount:** $60,000

Description: To accelerate the adoption of a reach energy efficiency appliance standards for room air conditioners in Beijing and Shanghai.

Research Institute for Standards and Norms

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $50,000

Description: To assist China with the development of an energy efficient building standards system.

Shanghai Energy Conservation Supervision Center

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the Shanghai Energy Conservation Supervision Center's work to promote energy efficiency standards implementation in Shanghai.

Shenzhen Institute of Building Research

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $25,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $30,000

Description: To develop policies improving the energy efficiency of large commercial buildings in China.

Tsinghua University

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $80,000

Description: To help China develop national implementation plans for green buildings.

Wuhan Testing Center of Buildings Energy Efficiency

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $25,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

Xiamen Academy of Building Research

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $30,000

Description: To develop policies improving the energy efficiency of large commercial buildings in China.

Xihua University

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $25,000

Description: To survey the energy consumption of public buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing.

China Sustainable Energy Program
Buildings Program
Projects Update

Goal #1: Increase the energy efficiency of household appliances by using energy efficiency standards and energy labels.

Developing Appliance Energy Efficiency Standards

With the rising use of consumer appliances, energy efficiency standards and energy labels have tremendous potential to reduce overall energy consumption in China. To date, grantee-developed standards for refrigerators, room air-conditioners, fluorescent lamps, washing machines, television sets and gas water heaters have been adopted by the Chinese government. Standards for power supplies and variable-speed air conditioners (VSAC) are currently under consideration by the Standardization Administration of China, and will hopefully be approved this year. In addition, grantees China National Institute of Standardization (CNIS) and Lawrence Berkeley National Laboratory (LBNL) are working to upgrade refrigerator standards, and developing a new standard for rice cookers.

Recommendation: The Standardization Administration of China should step up its approvals and enforcement of appliance efficiency standards and labels, including establishing onerous financial penalties for appliance manufacturers that fail to achieve and fully implement "reach" energy efficiency standards benchmarked to best practice efficiency levels.

Developing Appliance Energy Efficiency Labels

In addition to energy efficiency standards, we promote two kinds of labels to increase purchases of efficient products: (1) endorsement labels, which are affixed to products whose energy efficiency is substantially higher than required; and (2) information labels, which categorize products according to their energy efficiency levels, providing consumers with information of appliances' efficiency and lifecycle energy costs. With our support, both endorsement and information labels are currently in use in China. To date, grantees have developed endorsement labels for six products: DVD players, copiers, printers, fax machines, set-top boxes, and power supplies. In addition, mandatory information labels have been adopted for four products: room air-conditioners, refrigerators, washing machines, and unitary air-conditioners. CNIS is currently working on information labels for lighting products.

Enforcing Appliance Energy Efficiency Standards and Labels

It is widely acknowledged that China's appliance efficiency standards are not comprehensively enforced; there are no material penalties should manufacturers fail to comply. Compliance requires that accurate information on implementation status can be collected and assessed.

CNIS and Lawrence Berkeley National Laboratory (LBNL) are now working to improve the implementation of appliance energy efficiency standards by developing mechanisms to monitor and enforce manufacturers' compliance. CNIS and LBNL are developing an appliance standards monitoring and enforcement framework for consideration by the Standards Administration of China (SAC) and the National Development and Reform Commission (NDRC). CNIS and LBNL are also advising pilot cities Shanghai and Beijing to develop local policies for standards and labeling implementation and enforcement.

Recommendations:

- The Chinese government needs to establish mechanisms to enforce appliance energy efficiency standards and labels, and to penalize manufacturers for non-compliance.
- Government budgets should be increased to further the adoption of appliance standards, as well as to hire and train new monitoring, inspection, and verification personnel. Enforcement teams are needed to inspect appliance factories and retail stores for use of available energy efficiency labels, and to verify that all appliances sold comply with the latest energy efficiency standards.

Developing Tax and Fiscal Incentive Policies for Energy-Efficient Products

Efficient appliances are typically more expensive to buy, but deliver net consumer savings through reduced lifecycle energy consumption costs. Higher upfront prices, however, impede the market for energy efficient appliances and equipment. The Ministry of Finance's Research Institute for Fiscal Science (RIFS) and CNIS are working to overcome the market barriers to efficient products by developing incentive policies. RIFS and CNIS researched international tax and fiscal incentive policies to promote energy efficient products, and formulated near- and medium-term policy recommendations and administration procedures. RIFS also developed the first catalogue of energy efficient products to be given tax incentives by assessing the cost effectiveness of various energy efficient products. RIFS and CNIS submitted their recommendations to officials at MOF and NDRC; tax incentives for energy efficient equipment are likely to be adopted soon.

Recommendation: NDRC and MOF should expedite the development of national tax and fiscal policies to promote energy efficient products, recognizing that the "all-in" social and lifecycle benefits of energy efficient appliances and equipment outweigh concerns about slightly higher upfront prices.

Goal #2: Help China develop and implement residential and commercial building energy codes in its central and southern climate zones, and help develop green building demonstrations in pilot eco-cities.

Developing and Implementing Residential Building Codes in Central and Southern China

With CSEP support, China developed residential building codes for the Hot-Summer Cold-Winter (HSCW, central China) and Hot-Summer Warm-Winter (HSWW, southern China) Climate Zone. These national codes were issued by the Ministry of Construction (MOC) in

2003 and 2005, respectively. To ensure effective implementation, grantees are pursuing both "bottom-up" and "top-down" approaches.

At the local level, we supported successful implementation pilot programs in Guangzhou, Shenzhen, Fuzhou, and Xiamen in the HSWW climate zone, and in the two largest cities in the HSCW zone, Shanghai and Chongqing. Grantees helped local municipal governments to develop three- to five-year implementation plans, local implementation regulations and policies, and monitoring systems for building energy efficiency (BEE) design. Grantees also developed design software and supporting technical standards for building materials and construction processes.

At the central level, grantees are promoting the institutionalization of building code implementation similar to those in pilot cities, and are disseminating information on strategies to increase code compliance in other cities in the HSCW and HSWW Climate Zones. The Information Center of the Ministry of Construction (ICMOC) is (1) setting up a website and forum to disseminate policy and technical information on building energy efficiency; (2) establishing mechanisms for collecting up-to-date building energy efficiency information as it becomes available; and (3) providing training, technical support, and outreach encouraging cities throughout the HSCW and HSWW Climate Zones to establish supervision systems based on the successful mechanisms developed in pilot cities.

With CSEP support, MOC has developed and submitted the *National Provisions for Building Energy Efficiency* to the State Council, a national plan and policy framework to promote building code compliance. The *Provision* is likely to be approved this year. In addition, CSEP is supporting the China Building Energy Efficiency Association (CBEEA) to develop more stringent national reach residential building codes, which could be adopted in the next few years.

Developing and Implementing National Public Building Codes

After working with MOC to develop public building codes, grantees are also working on national implementation of codes for commercial buildings. Projects furthering national building codes are as follows:

Energy Performance Standards Development for Central Air Conditioners

Per unit area, the energy consumption of public buildings in China is ten times more than residential buildings. Given the rates of construction, the electricity consumption of newly built, large-scale public buildings could reach 200 billion kilowatt-hours (kWh) by 2020 unless energy efficiency can be substantially improved. Because heating, ventilation and air conditioning (HVAC) systems consume between fifty and sixty percent of the total energy of public buildings, increasing the energy efficiency of these systems is key to achieving overall energy efficiency gains.

Beginning in December 2006, CSEP has supported Chongqing University to survey HVAC efficiency levels in Chongqing and Shenzhen, and to draft an energy efficiency standard for public building HVAC systems. Chongqing University is also generating policy recommendations for HVAC energy savings strategies applicable to other areas in China.

Survey of the Energy Consumption of Public Buildings in Shenzhen, Fuzhou, Wuhan, Chengdu, and Chongqing

The Ministry of Construction (MOC) seeks to curb energy use in public buildings, especially in government offices and luxury hotels. However, the energy-use characteristics of larger-scale buildings are not well understood. This project supports MOC's efforts to investigate the energy consumption of public buildings in several pilot cities, including Shenzhen and Fuzhou in the HSWW area, and Chongqing, Chengdu, and Wuhan in the HSCW area.

This project operates at both the national and local levels, with policy development coordinated by the Information Center of the Ministry of Construction (ICMOC). At the national level, ICMOC works with national and international experts to develop uniform methodologies, technical requirements, and content for energy use data. ICMOC is organizing trainings for the five local teams, which are conducting surveys, establishing a database, and developing local policies.

Developing Testing Standards for Public Buildings in China

MOC issued the *National Codes for Public Buildings* in 2005, which requires public buildings to reduce energy consumption by 50 percent relative to the 1980s. Implementation of these codes requires the support of additional standards, such as a testing standard for verification of the energy efficiency levels. This project supports the China Academy of Building Research (CABR) to develop "National Testing Standards for Public Buildings."

CABR is working with national, local, and international experts to (1) develop methods for measuring energy use in public buildings; (2) test the energy consumption of various building components (e.g. envelope structure, heating, ventilation and cooling systems, lighting); (3) hold workshops and meetings; and (4) conduct pilot projects.

Promoting Green Buildings

Driven by urbanization and rising standards of living, the resource consumption of China's buildings is expected to increase dramatically in the coming decades. China's central government has thus called for the "four-savings": landing-saving, energy-saving, water-saving and material-saving. Green buildings are a promising way to meet these goals. High performance green buildings are environment-friendly, using resources more efficiently and requiring less maintenance costs than conventional buildings while also providing healthier living and working environments. Beginning this year, CSEP is supporting green building development in pilot eco-cities in China, with the following projects:

International Green Building Practices

Developers and consumers in China are growing more aware of the benefits of green buildings. However, China currently lacks a national definition or standards for what constitutes a "green building," which is hindering the development of this industry. Examining international best practices can help to establish standards that combine integrated design and advanced technologies, and to guide China's green building strategy, policy development, and design. This project will support the Institute for China and Global Environmental Sustainability (ICGES) to review the elements of top green buildings designs,

government policies, regulations, fiscal instruments, financial incentives, and research in the international green buildings industry.

National Green Building Design Standards

National green building design standards will provide developers and consumers with a basis for combining integrated design and advanced technologies in the building sector. To this end, the China Academy of Building Research (CABR) will conduct studies of (1) green buildings design methodologies; (2) parameters and quantitative indicators for green buildings; (3) applied technologies for green buildings; and (4) application principles to suit local conditions.

National Implementation Plans for Green Buildings

To translate awareness of the benefits of green building into actual market penetration, China needs to develop a national implementation plan, laying out existing technology options, research and development plans, government support policies (e.g. subsidies and tax incentives), and regulations for supervision and evaluation. This project will support MOC to develop a *National Implementation Plan for Green Buildings.*

Renewable Energy Application in Buildings

The use of renewable energy technology in the building sector can account for 18 percent of the building sector's energy savings target for 2006-2010, equivalent to 80 million tons of carbon dioxide in that period. In September 2006, MOC and the Ministry of Finance (MOF) issued *Implementation Views on Promoting Renewable Energy Application in Buildings,* which calls for the application of solar and geothermal energy in 50 percent of newly constructed buildings in 2020. In addition, MOC and MOF established a public benefits fund to support technology demonstrations, testing, pilot projects, and replication in different types of buildings, and MOC has selected pilot demonstration projects for five cities. This project supports MOC and its affiliated technical institutes to develop designs, incentives, and other policies to implement the integration of renewable energy into green buildings.

Implementing China's Energy Efficient Windows Program

Windows account for an average 25 to 30 percent of buildings' energy loss. Efficient windows are thus essential to the construction of green buildings. With international assistance from LBNL, energy code expert John Hogan, and the Alliance to Save Energy, the Research Institute of Standards and Norms (RISN) worked to design a labeling program for efficient windows. The program is aimed at developers and designers needing to meet energy-efficiency code requirements, and is designed to eliminate inefficient windows from the market, increase building code compliance, reduce heating and cooling energy consumption by up to 30 percent, and reduce discomfort and noise within buildings. After a pilot program was conducted in Guangdong Province by the Guangdong Provincial Academy of Building Research (GABR), RISN submitted the program and implementation plan to MOC in early 2006. MOC approved the energy efficient windows labeling program in early 2007. Grantees are now supporting capacity building for national implementation of this program.

Development of an Energy Efficient Building Standards System

MOC is working to make building code implementation more robust by incorporating energy efficiency and implementation standards into a comprehensive building codes system. This project supports RISN to evaluate the available options for implementing a buildings energy efficiency standards system. The main research areas are (1) comparative buildings energy efficiency standards systems; (2) integrating the codes for various building structures and material types into one building codes implementation system; (3) the drafting of a policy framework for a comprehensive codes implementation system; (4) evaluation of various products for incorporation into the codes implementation system; and (5) assessment of trends in green building technology.

Recommendation: MOC should further strengthen codes implementation nationwide, and should develop more stringent reach codes for residential and public buildings. In addition, MOC should promote green buildings that minimize energy throughput, use recycled or recyclable materials, incorporate renewable and energy-efficient power generation systems, and minimize water use and waste output.

China Sustainable Energy Program
Industry Program Strategy

Overarching goal: Help China develop and implement policies that increase energy efficiency in the industrial sector.

Goal #1: Help China develop and utilize industrial energy efficiency agreements to increase the energy efficiency of its most energy-intensive industrial enterprises.

Means:

We can achieve this goal by helping China do the following.

1. Set energy efficiency targets for China's highest-energy-consuming industrial sectors.
2. Develop regulations and incentive policies, particularly tax and fiscal policies, to compel enterprises to set and meet strong energy efficiency targets.
3. Evaluate and monitor companies' progress in reaching energy efficiency targets.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. The number of metric tons of coal equivalent (tce) of industrial energy saved and amount by which carbon emissions are reduced through the use of industrial energy efficiency agreements.
2. Whether energy consumption per unit industrial output decreases.

Goal #2: Help China develop and implement mandatory energy efficiency standards for industrial equipment.

Means:

We can achieve this goal by helping China do the following.

3. Develop and implement mandatory energy efficiency standards for major industrial equipment, focusing on the most carbon-intensive equipment first.
4. Develop energy labels for industrial equipment.
5. Establish supervision systems at the national and provincial levels to monitor standards compliance and labels use.
6. Develop incentive policies to promote the manufacture and use of energy efficient equipment.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

7. The number of metric tons of coal equivalent (tce) of industrial energy saved and amount by which carbon emissions are reduced through the use of industrial equipment standards.
8. Whether mandatory energy efficiency standards and energy labels for major equipment are adopted.
9. Whether manufacturers implement energy efficiency standards effectively.
10. Whether a regular process of standards updates ("reach standards") becomes institutionalized at the national level.

China Sustainable Energy Program
Industry Program Ongoing Projects

Peking (Beijing) University

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the development of implementation regulations for China's newly revised Energy Conservation Law.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $40,000

Description: To develop policies to guide the National Development and Reform Commission's Top-1,000 Enterprise Energy Efficiency Program.

Beijing Energy Efficiency Center

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $120,000

Description: To develop a benchmarking program in China.

China Chemical Energy Conservation Technology Association

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $60,000

Description: To support the development of implementation regulations for China's newly revised Energy Conservation Law.

China Electricity Council

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the development of implementation regulations for China's newly revised Energy Conservation Law.

China Energy Conservation Association

Grant Date: 4/1/2006 **Duration:** One year **Amount:** $18,000

Description: To promote the nationwide use of energy efficiency agreements in the industrial sector through an information exchange platform.

China Energy Conservation Investment Corporation

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the China Energy Conservation Investment Corporation with developing the Energy Conservation Technology Catalogue in support of the Top-1000 Enterprises Energy Efficiency Program.

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the development of implementation regulations for China's newly revised Energy Conservation Law.

China Iron and Steel Association

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $60,000

Description: To assist the China Iron and Steel Association with developing an incentive policy pilot plan for China's iron and steel sector.

China National Institute of Standardization

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $30,000

Description: To develop standards governing the amount of energy consumed to produce key industrial products.

Chinese Academy for Environmental Planning

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support the Chinese Academy for Environmental Planning's efforts to promote energy efficiency through pollution levy policies.

Energy Research Institute

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $200,000

Description: To assist the Energy Research Institute with an energy auditing review of the Top-1000 Enterprises Energy Efficiency Program.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $90,000

Description: To develop energy efficiency evaluation indicators to monitor the energy use of industrial enterprises participating in China's Top-1,000 Enterprises Energy Efficiency Program.

Lawrence Berkeley National Laboratory

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $175,000

Description: To support comprehensive implementation of the Top-1,000 Enterprises Energy Efficiency Program, including implementation pilots in two provinces.

Grant Date: 4/1/2006 **Duration:** One year **Amount:** $100,000

Description: To help China set energy efficiency targets and develop regulations, incentive policies, and monitoring mechanisms for the *Top-1000 Enterprises Energy Efficiency Program*.

Shandong Association for Resources Comprehensive Utilization

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $50,000

Description: To create a province-wide energy efficiency agreement program in China's Shandong province.

Shanghai Energy Conservation Supervision Center

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the development of implementation regulations for China's newly revised Energy Conservation Law.

South-North Institute for Sustainable Development

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $40,000

Description: To support the development of implementation regulations for China's newly revised Energy Conservation Law.

World Resources Institute

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $50,000

Description: To support the World Resources Institute's work on the Enterprises Energy Management System.

China Sustainable Energy Program
Industry Program
Projects Update

Goal #1: **Help China develop and utilize industrial energy efficiency agreements (EEAs) to increase the energy efficiency of its most energy-intensive industrial enterprises.**

Piloting Industrial Enterprise Energy Efficiency Agreements

China's government is starting to use Energy Efficiency Agreements (EEAs)—originally developed in Europe—to improve the energy efficiency of major industrial enterprises. EEAs are voluntary agreements in which individual enterprises or sectors pledge to meet specific energy savings or emissions reduction targets; EEAs are a flexible method of reaching national energy savings and air quality goals because enterprises are able to choose the energy efficiency-improving mechanisms that are most cost effective. In a pilot EEA program, the Jinan Steel and Iron Group and Laiwu Steel and Iron Group entered agreements with the Shandong provincial government in 2003 to reduce carbon emissions by one million metric tons over the following three years. The program was a tremendous success: both steel mills met their energy savings and carbon emissions reduction targets, reducing their carbon dioxide emissions by 3.67 million tons ($MtCO_2$) from 2003 to 2006. Following such results, the Shandong provincial government established an Energy Conservation Fund to support the expansion of the EEA program throughout the province.

The Shandong Association of Resources Comprehensive Utilization (SARCU) is now helping the Shandong Economic and Trade Commission (SETC) to establish a province-wide EEA program, aiming to require energy efficiency improvements in Shandong's 100 most energy-intensive enterprises. This "Shandong Top-100 Enterprises Energy Efficiency Program" (Shandong Top-100 Program) is expected to reduce carbon dioxide emissions by 36.7 $MtCO_2$ by 2010, and will bring Shandong closer to its energy intensity reduction goal of 22 percent by 2010. The program serves as a model for the National Development and Reform Commission's (NDRC) implementation of its "Top-1000 Enterprises Energy Efficiency Program."

Designing China's Top-1000 Enterprises Energy Efficiency Program

After the success of the Shandong pilot, China's central government launched the national *Top-1000 Enterprises Energy-Efficiency Program* (Top-1000 Program) in April 2006. The goal is to improve industrial energy efficiency nationwide by targeting China's 1000 highest-energy-consuming enterprises; these enterprises currently consume 50 percent of total industrial sector energy. The strategy for energy intensity reductions is based on EEAs, similar to the Shandong pilot. The carbon dioxide emissions reduction potential—242 $MtCO_2$ in 2010—is enormous.

Ensuring that the Top-1000 Program is well designed and effectively implemented will be the Industry Program's major focus over the next several years. Grantees will support NDRC by helping to develop implementation policies, and by injecting international best practice expertise in reducing industrial energy usage through EEAs. Support is growing for the program to be modeled after the successful U.K. Climate Change Levy (CCL) and Climate Change Agreements (CCA) Program, which together provide an incentive for carbon emissions reductions by levying an energy consumption tax, 80 percent of which is refunded

if enterprises voluntarily meet quantified carbon emissions reduction targets. In the U.K., the CCL and CCA programs have proved enormously effective, with participating enterprises exceeding their targets three-fold, while increasing profits. To help design the Top-1000 Program, we support the Lawrence Berkeley National Laboratory (LBNL) and Beijing University; recently, our team has also grown to include James Godber, a member of the U.K. team that implemented the CAA Program, seconded from the U.K. Department for Environment, Food and Rural Affairs (Defra) to CSEP's Beijing office.

Implementation of the China Top-1000 Enterprises Energy Efficiency Program

The Top-1,000 Program was launched on July 27, 2006 when China's largest enterprises signed EEAs with the central and provincial governments. The National Energy Conservation Center oversees provincial energy conservation centers that provide technical outreach and support to participating enterprises.

If successful, the Top-1,000 Program would be the world's single most ambitious energy efficiency program; however, implementation will be a monumental undertaking, requiring (1) stepped-up technical input from international best practice experts from the U.S., Europe, and Japan; (2) benchmarking and energy auditing training of the national and provincial energy conservation centers and participating enterprises; (3) targeted assistance to all energy-intensive sectors (our grantees are focusing on steel and cement); and (4) comprehensive implementation (grantees are focusing in at least two provinces).

Lawrence Berkeley National Lab's (LBNL) Lynn Price is coordinating the international expert team, which provides the energy conservation centers with training in benchmarking, energy auditing, and technical upgrades recommendations. The team, working with their Chinese counterparts (coordinated by the Energy Research Institute and Peking University), are assisting at least two energy-intensive industrial sectors (steel and cement) in at least two provinces (e.g., implementation of the Shandong Top-100 Program). The goal of these more focused efforts is to save actual carbon emissions while helping NDRC succeed in implementing its national program goals.

Project teams are (1) working with steel and cement enterprises in two provinces to set enterprise energy use baselines and targets; (2) developing performance indicators for each sector; (3) distributing enterprise energy auditing and benchmarking guidelines; (4) developing a database for tracking enterprise energy use; (5) developing incentive policies encouraging enterprises to reach and surpass their energy savings targets; (6) developing model EEAs for each participating industrial sector; (7) providing training to the National Energy Conservation Center and its provincial affiliates in all EEA steps and implementation measures; and (8) coordinating with the Ministry of Finance (MOF) and the State Administration of Taxation to develop incentive policies and efficiency financing policies to support enterprises' technical upgrades.

Promoting the Use of Energy Efficiency Agreements

In addition to NDRC's Top-1000 Program, many cities and provinces are considering the use of EEAs, and the NDRC/UNDP/GEF End-Use Energy Efficiency Program (EUEEP) will soon launch its own EEA demonstration program. Educating industrial enterprises, industry associations, and government officials on how to design effective EEA programs will help ensure this momentum leads to real action and yields energy-savings results.

The China Energy Conservation Association (CECA) is now publicizing and advocating EEAs throughout China. Specifically, CECA is (1) publishing newsletters on the progress of EEA programs, including the Shandong pilot, EUEEP pilot, and the Top-1000 Program; (2) holding training and cross-project workshops; (3) maintaining a website and internet forum on EEA use in China; (4) advocating EEAs at domestic and international meetings and workshops on industrial energy efficiency; and (5) investigating opportunities to utilize EEAs in mid- and large-scale energy-intensive enterprises.

Developing an Incentive Policy Pilot for China's Iron and Steel Sector

This year, the Ministry of Finance (MOF) will submit a proposal to the State Council to establish a special fund for promoting energy efficiency. This project is to help MOF and the China Iron and Steel Association (CISA) to develop a pilot for the steel and iron sector, in which the special fund will provide incentives for industrial energy efficiency investments. The aim is eventual application of pilot experience in other sectors.

CISA will work with enterprises and tax policy experts to develop the pilot plan and policy recommendations, comparing various financial support mechanisms and identifying the optimal model for motivating energy savings. The team will also develop methodologies for measuring the energy savings and carbon reductions from such projects.

Developing a Benchmarking Program for the Top-1000 Program

Now that China's Top-1,000 Program is underway, the next step is to benchmark enterprises' energy performance against international best practices. This project supports the Beijing Energy Efficiency Center's (BECon) cooperation with sector associations and with LBNL to develop benchmarking methodologies in four-to-five key energy consumption sectors and to conduct benchmarking demonstrations in one or two enterprises within each sector. Specifically, BECon will (1) identify and develop benchmarking methodologies for target sectors; (2) identify pilot enterprises and provide personnel training; (3) conduct benchmarking and assess methodology; and (4) provide recommendations to NDRC on the expansion of benchmarking to all enterprises in all key energy consumption sectors. LBNL's Lynn Price will deliver international best practices through technical assistance to BECon, to be followed by CSEP-supported benchmarking training programs for provinces and sectors.

Recommendation: To facilitate energy efficiency improvement through the Top-1000 and other programs, NDRC should establish a best practices database for industry benchmarking, accessible to local governments and enterprises.

Developing Industrial Energy Use Indicators

The success of the Top-1000 Program depends on sound statistical indicators and data collection methods to track the energy use of participating enterprises. China's National Bureau of Statistics (NBS) needs to determine which statistics to use in monitoring enterprises' energy use, and how these statistics will be measured and analyzed.

Since 2005, the Energy Research Institute (ERI) has been working with NBS and NDRC to develop statistical indicators and calculation methods for industrial enterprise energy use,

which is nearing completion. ERI is also developing software for data analysis and data collection training programs for local officials and industries. Collaborating with international experts including LBNL, ERI is conducting case studies to test the effectiveness of its evaluation system, and generating policy recommendations for NDRC regarding energy-use evaluations of the Top-1,000 Program. Beyond supporting the implementation of the Top-1000 Program, these energy use indicators and data collection methods will facilitate a national integrated energy supply-and-demand statistical system.

Developing Policies Guiding the Development of the Top-1000 Program

LBNL's Lynn Price, Defra's James Godber, and Wang Xuejun and his team from Beijing University are assisting NDRC, MOF, and the State Administration of Taxation to devise a comprehensive approach to implementing the Top-1000 Program, including (1) outreach and training to the new National Energy Conservation Center and to provincial energy conservation centers on EEAs, benchmarking, energy auditing, and technology upgrades; (2) training of enterprises in evaluating energy benchmarks and setting aggressive efficiency targets; (3) facilitating provincial government involvement in monitoring and evaluating EEA progress; (4) development of incentive policies for enterprise participation in the Top-1,000 Program, including analysis of how pollution levies can encourage enterprises to meet and/or exceed the targets under their EEAs; and (5) development of tax and fiscal policies to spur investment by enterprises in advanced energy efficiency technologies.

Developing Enterprise Energy Management Systems

Effective benchmarking requires an energy consumption accounting system consistent with international best practices. This project supports the World Resources Institute (WRI) to develop an energy consumption tracking tool based on the Green House Gas (GHG) Protocol, the most widely-used method internationally for quantifying, analyzing, and managing energy use associated with GHG emissions. WRI is developing software, formulating and piloting a common accounting framework for integrated energy and GHG management, and building the capacity of Chinese businesses to apply the framework to tracking their energy performance. In addition, WRI is cooperating with ERI and the China Business Council for Sustainable Development (CBCSD) to test the program with pilot Top-1000 Enterprises.

Energy Auditing Reports for Top-1000 Enterprises

As required by NDRC, the Top-1,000 Program enterprises have been conducting energy audits to identify additional energy savings opportunities. By March 2007, most enterprises completed their energy auditing reports. This project is supporting ERI to assist NDRC and local officials to review these reports, working with provincial energy conservation centers and industry associations to identify energy savings potential and determine common challenges in the auditing process. ERI will complete a comprehensive Energy Audit Review and Analysis Report, develop Best Case Studies for nine industry sectors, and develop detailed Energy Auditing Guidelines. The team will also provide training to enterprises and auditing institutions.

Energy Conservation Technology Catalogue

Improving industrial efficiency requires investment in technology, the application of which is facilitated by enterprise awareness, government publicity, and government financial support. This project is helping the China Energy Conservation Investment Corporation (CECIC) to develop the Energy Conservation Technology Catalogue, which will publicize energy-saving technologies. The catalogue will be submitted to NDRC for consideration in allocating

subsidies, and will be distributed to sectors and enterprises to inform their production and equipment decisions.

CECIC is working with industry associations to (1) identify up-to-date energy saving technologies; (2) study international best technologies applicable to Chinese enterprises; (3) conduct site visits to determine technology upgrades suitable to specific sectors or regions; (4) determine the necessary amount of investment; and (5) determine the time needed to recoup costs. CECIC will also hold workshops and meetings, and publicize the Energy Conservation Technology Catalogue on a website.

Redesigning China's Pollution Levy System

The success of the Top-1000 Program depends on strong penalties for polluting behavior; enterprises will not "pick up" positive market incentives unless compelled to do so through a robust threat of regulation (without such a threat, enterprises will continue "business as usual"). Thus, strong pollution levies are crucial if the Top-1,000 Program is to be successful. China's current pollution levy originated in the early 1970s, and, despite 2003 revisions, needs further tightening—including substantially increased penalities—to compel substantial emissions reductions. Beijing University and LBNL are formulating the following policy proposal: enterprises that commit to meeting aggressive energy-efficiency targets are provided pollution levy refunds, which are then used to fund efficiency-producing mechanisms. Beijing University and the Chinese Academy for Environmental Planning (CAEP) are developing program details and implementation plans, at the request of the State Environmental Protection Agency (SEPA). CAEP will identify pilot cities for these policies, the experiences of which will be the basis for CAEP's recommendations for policy revision.

Recommendation: NDRC and SEPA should augment the pollution levy system substantially, and work to hold local officials accountable for levy enforcement. This is a prerequisite to the successful use of incentive policies and EEAs across China. NDRC and SEPA should provide levy refunds to those enterprises that successfully meet their EEAs.

Increasing Industrial Production Energy Efficiency

The amount of energy used to produce key industrial products in China is, on average, 30 to 40 percent higher than international best practices, a statistic that is largely attributable to the use of outmoded technologies in China and to the many small-scale, inefficient industrial facilities in operation. To facilitate the Chinese central government's efforts to phase out the most inefficient facilities, the China National Institute of Standardization (CNIS) is developing standards for the amount of energy that should be consumed in producing certain industrial products. CNIS is working with industrial associations to develop standards for key industrial products, including steel, cement, petrochemicals, and electricity, by reviewing and comparing production energy consumption to international best practices. In addition to providing a basis for the development of technology upgrade requirements and other such policies, these standards constitute a baseline for setting production efficiency targets, and can be used by industries to benchmark energy use.

Developing Tax and Fiscal Policies To Increase Investment in Energy-Saving Technologies

There is little capital investment in energy-saving technologies in China, due in part to the difficulty faced by enterprises in obtaining loans for technical upgrades: China's state-owned banks are unaccustomed to providing small energy efficiency loans. Energy cost savings are treated as taxable revenue, creating an investment disincentive. Based on cost-benefit analysis and European, Japanese, and U.S. best practices, LBNL and CECIC recently formulated several tax and fiscal policies to correct these market failures, including programs to aggregate small energy efficiency loans, and thus to substantially increase energy-saving technology investment in the industrial sector.

Improving Implementation of the *Energy Conservation Law*

If China's *Energy Conservation Law* (ECL) were fully implemented, China's total energy consumption would be reduced by 800 million metric tons of coal equivalent in 2020. However, the ECL is currently too general for successful implementation. In consultation with several Chinese and international experts, the South-North Institute for Sustainable Development (SNISD) assessed the strengths and weaknesses of the ECL and compared it to international best practices. SNISD recommended specific energy efficiency and renewable energy policies to make the ECL more concrete and effective.

With China's ambitious energy intensity reduction target for 2010, NDRC is considering regulatory initiatives to support the target's achievement. Beijing University, the China Chemical Energy Conservation Technology Association (CCECTA), the China Electricity Council (CEC), the China Energy Conservation Investment Corporation (CECIC), the Shanghai Energy Conservation Supervision Center (SECSC), and SNISD are developing management regulations for the implementation of China's revised *Energy Conservation Law* (ECL), including the following:

(1) *Management Regulations forKey Energy Intensive Units:* This regulation applies to industrial enterprises or public buildings with annual energy consumption above 5,000 or 3,000 tons of coal equivalent (tce), respectively. The regulation requires that an energy supervision system be established to monitor and manage energy use within enterprises, and to be supervised by the government. Professor Wang Xuejun at Beijing University is leading the drafting of this regulation.

(2) *Management Regulations for Energy Managing Technicians:* This regulation will require key energy-intensive units to hire an Energy Management Technician to oversee energy conservation, efficiency investment, monitoring of enterprises' energy use, and data collection. The China Chemical Energy Conservation Technology Association is leading the drafting of this regulation, and will develop training materials for energy management technicians in the petrochemical and chemical industries. These industries will act as pilots for a larger Energy Management Technicians System.

(3) *Management Regulation for Energy Efficiency of Fixed Capital Investment*: This regulation will require all new investment projects to include energy savings plans for both construction and operations, and will include the guidelines and standards by which new investment projects are reviewed by national and local officials. CECIC is responsible for this project.

(4) *Management Regulation for Electricity Saving*, to be developed by CEC, will set pricing policies to encourage the use of energy efficient products and technology, and to curb the development of energy intensive sectors.
(5) *Management Regulation for Energy Conservation Supervision* will require provincial and municipal governments to establish Energy Conservation Supervision Agencies and to define the areas of supervision and liability of these agencies. SECES leads the drafting of this regulation.
(6) SNISD is working with the Shanghai government to develop a local model implementation regulation for the new ECL.

Industrial Enterprise Energy Efficiency Investment

The vast potential for industrial energy efficiency improvement is hindered by poor policy enforcement capacity, information channels, and incentives. With matching funds from the China National Petroleum Corporation and help from the China National Petroleum Corporation's Advisory Center, Tsinghua University's School of Economics and Management is working to address all three of these problems, and is researching the following: (1) policies and budget changes to bolster the policy enforcement capacity of government institutions regulating industrial energy efficiency; (2) energy efficiency technology information dissemination systems to educate industrial enterprises about energy efficiency technologies; and (3) policies to stimulate industrial enterprises' investment in energy efficiency.

ACEEE Summer Study 2007

The American Council for an Energy-Efficient Economy (ACEEE) hosts a "Summer Study on Energy Efficiency in Industry" every two years. The event is one of the leading conferences on industrial efficiency worldwide. Participation enhances the experience of Chinese delegates working on industrial projects, as the conference brings together approximately 250 leading international energy-efficiency practitioners and covers topics relevant to energy-savings work in China's industrial sector. This year, six Chinese experts participated in the ACEEE summer study, and had the opportunity to engage in formal and informal sessions, and to share their experiences with industrial efficiency programs in China.

Goal #2: Help China develop and implement mandatory energy efficiency standards for industrial equipment.

Developing Reach Standards for Electrical Motors

CNIS is developing "reach" energy efficiency standards for energy-intensive equipment. Once established, manufacturers are typically given three years to raise product efficiency to the new standard. Assisted by the American Council for an Energy-Efficient Economy (ACEEE), CNIS has developed a reach standard for electric motors, which was approved by Standardization Administration of China (SAC) in December 2006. The motor standard matches those in Australia and New Zealand, is just below electric motor standards in the U.S., Canada, and Mexico, and is substantially more stringent than the electric motor standard in Europe. If adopted and effectively implemented, the standard will save 44 million tons of coal equivalent (tce) and reduce carbon dioxide emissions by 77 $MtCO_2$ in 2020.

Developing Reach Standards for Water Pumps

ACEEE and CNIS recently completed a reach energy efficiency standard for clean water centrifugal pumps, the pumps most commonly used in industrial processes. ACEEE and CNIS already submitted the standard to SAC; hopefully, the standard will be adopted in 2007, and will go into effect in 2010.

Recommendation: NDRC and SAC should accelerate the development and implementation of energy efficiency standards for industrial equipment, including motors, pumps, and compressors. MOF should substantially increase budgets for standards development and implementation personnel at the national, provincial, and local levels.

China Sustainable Energy Program
Renewable Energy Program Strategy

Overarching goal: Encourage bulk purchases of renewable energy by China's electric utilities and independent power producers in order to drive down the cost and speed the adoption of renewable energy technologies.

Goal #1: Help China set and meet aggressive targets for national and provincial renewable energy deployment, particularly by using renewable portfolio standards, public benefits charges, incentives for distributed generation technologies, and renewable energy pricing regulations.

Means:

We can achieve this goal by helping China do the following.

1. Per *Renewable Energy Law* mandate, adopt and enforce a legally-binding national renewable energy target.
2. Develop renewable energy feed-in tariff and cost-sharing mechanisms, and conduct pilot programs to assay their effectiveness.
3. Grant wind concessions to increase investment in large-scale wind energy development.
4. Encourage investment in distributed generation technologies and develop renewable energy microgrids.
5. Establish "green pricing" programs to increase local markets for renewable energy.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. Whether national renewable energy feed-in tariff mechanisms are established in China and how effectively they are implemented. (Target: at least 10 percent of all electricity to come from renewable energy sources, particularly wind, by 2020.)
2. The number of megawatts of new renewable energy facilities installed as a result of provincial renewable energy policies, e.g., mandatory market share (MMS) policies and system benefits charges.
3. Whether a national wind concession policy is adopted and the amount of investment in large-scale wind development within the government-awarded concessions.
4. Whether rural microgrids are established, augmenting volume purchases of renewable energy.
5. Whether major utilities adopt green pricing programs to increase new renewable energy development.

China Sustainable Energy Program
Renewable Energy Program Ongoing Projects

Beijing Oriental Environment Research Institute

Grant Date: 11/1/2006 **Duration:** One year **Amount:** $40,000

Description: To develop a monitoring and evaluation mechanism supporting the implementation of the National *Renewable Energy Law* and regulations.

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $70,000

Description: To develop stringent environmental policies to increase the incentive for renewable energy investments.

Center for Renewable Energy Development, Energy Research Institute

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $80,000

Description: To analyze the impact of the Renewable Energy Law and its implementation regulations on China's wind industry, and to develop a quality control system for wind turbines.

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $120,000

Description: To continue to support the refining of China's renewable energy policies and the implementation of the Renewable Energy Law at the provincial level.

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop policies and a roadmap for biomass energy development in China.

Center for Resource Solutions

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $180,000

Description: To provide international best practice training and capacity building for the CSEP renewable energy program.

China Energy Conservation Investment Corporation

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $65,000

Description: To support the compilation of technical codes for a feasibility study for biomass power generation projects.

China General Certification Center

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $80,000

Description: To develop wind turbine certification regulations.

Fujian Energy Research Society

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $60,000

Description: To continue to support the refining of China's renewable energy policies and the implementation of the Renewable Energy Law at the provincial level.

Gansu Huineng New Energy Design and Research Institute

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $60,000

Description: To continue to support the refining of China's renewable energy policies and the implementation of the Renewable Energy Law at the provincial level.

Institute of Energy, Environment, and Economy, a project of the Tsinghua University Education Foundation

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $90,000

Description: To support three fellowships in renewable energy study at Tsinghua Unversity, ,and assist the Beijing government to formulate Renewable Energy Law implementation regulations.

Renewable Energy Research Institute, Hohai University

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $70,000

Description: To continue to support the refining of China's renewable energy policies and the implementation of the Renewable Energy Law at the provincial level.

Sichuan University

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $77,000

Description: To continue to develop and implement a mandatory market share policy for renewables in Sichuan.

China Sustainable Energy Program
Renewable Energy Program Project Updates

Goal: Encourage bulk purchases of renewable energy by China's electric utilities and independent power producers in order to drive down the costs and speed the adoption of renewable energy technologies.

Capacity Building to Implement the *Renewable Energy Law*

Approved in February 2005, China's *Renewable Energy Law* (RE Law) went into effect on January 1, 2006. The RE Law calls for China to set renewable energy development targets and instructs the national and provincial governments to develop and execute plans for meeting these targets. Fifteen percent of all energy consumed in China is to come from renewable energy resources and China must have a total of 135 GW in renewable power generation capacity—30 GW of wind, 30 GW of biomass, and 75 GW of small hydro—by 2020. To support the development of renewable energy in China, the National Development and Reform Commission (NDRC) has set forth regulations and policies such as renewable energy tariff-setting and cost-sharing mechanisms.

To build national and provincial government capacity to implement the *Renewable Energy Law* (*RE Law*) and its supporting regulations, CSEP is supporting the Center for Renewable Energy Development (CRED), Tsinghua University, and the Beijing Oriental Environmental Research Institute (BOERI). Grantees have held seminars and drafted reports on the status of implementation, aimed at influencing implementation practices and national policies.

CRED and Tsinghua University organized two training seminars in the past year, with one targeted at provincial government officials, and one targeted at renewable energy entrepreneurs. Training contents included renewable energy policy and strategic planning, development status and trend of different renewable energy technologies, as well as development strategies of renewable energy enterprises. Earlier this year, CRED and BOERI conducted field investigations and interviews on the actual implementation of the RE Law over the course of 2006, producing three reports: "China Renewable Energy Law Implementation Review and Evaluation (2006)", "China Renewable Energy Industry Development Report (2006)", and "Renewable Energy Law and Supporting Regulations Compilation."

These reports were distributed at the RE Law Implementation Review Seminar, held in April 2007 by the Environmental Protection and Resources Conservation Committee of the National People's Congress (NPC) and NDRC, assisted by CRED and BOERI. While researchers and industries generally gave favorable reviews of *RE Law* implementation, they raised the following concerns: (1) a number of the major supporting regulations have yet to be formulated; (2) some regulations lack sufficient detail for effective enforcement; (3) some state-owned wind developers and local governments over-emphasize installed capacity over actual energy output; and (4) relatively low wind turbine quality and wind tariffs (determined through the concession approach) may threaten the development of a stable wind market.

In recent months, the Chinese government was striving to address the irrational elements in the existing policies and regulations. Actions taken included (1) the National Development and Reform Commission (NDRC) granted a total of 1.17GW wind projects in Hebei Province to five generation companies in the way of government assignment, which is considered a big

breakthrough of the traditional concession approach; and (2) the State Electricity Regulatory Commission (SERC) issued a regulation that requires grid companies to formulate grid construction plans for integrating renewable power, give priorities to renewable power in power dispatch, and settle account with renewable power generators on time, backed up by penalty terms.

Recommendation: NDRC and other government agencies should promulgate the policies and regulations necessary for *Renewable Energy Law* implementation as soon as possible. They should ensure that all provinces develop renewable energy development targets, and have the ability to meet these targets.

Promoting Renewable Energy Development at the Provincial Level

In response to the total volume renewable energy target in the *RE Law*, NDRC recently drafted its *2020 Renewable Energy Development Plan*, which sets forth ambitious national targets: by 2020, 15 percent of all primary energy consumed in China is to come from renewable sources and China must have 135 gigawatts (GW) of renewable power generation capacity. Achieving the national goal requires province-specific renewables targets and detailed implementation programs. To date, we have selected Fujian, Sichuan, Gansu, Jilin and Jiangsu to expedite provincial implementation of the *RE Law*.

Since 2004, Fujian and Sichuan, with assistance from CRED, have been working to develop provincial RE targets, plans, and policies, and have set targets of 14 and 10 percent, respectively, to be reached by 2015. Gansu Province began a pilot study last year. Now, the Fujian Energy Research Society, Sichuan University, and Gansu Huineng New Energy Design and Research Institute (GNEDI) are working on detailed action plans to develop wind power and biomass energy projects.

This year, we have also begun to support Jilin and Jiangsu provinces. Jilin Energy Conservation Research and Design Institute (JECRDI) is focusing on a renewable energy resources survey and the development of a renewable energy plan. In Jiangsu, Hohai University is focusing on practical obstacles to renewables development, by (1) obtaining detailed data on wind resources; (2) working out an optimal wind farm and turbine layout for efficient power generation; (3) resolving grid connection barriers; (4) tracking the construction and operation of existing wind farms; and (5) linking the site-ing and approval of biomass projects with the optimal biomass feedstock locations.

Recommendation: NDRC should require provinces to develop mandatory renewable energy targets and implementation plans to meet the overall national targets set in its Renewable Energy Development Plan for 2020.

Facilitating Wind Power Industry Development

To date, China has relied primarily on imported wind turbines, but increasing local capacity and reducing costs for large commercial wind projects requires further development of local manufacturing markets. China has succeeded in developing a moderate domestic market through a series of wind concession projects: by the end of 2006, NDRC approved four

rounds of wind concession projects, totaling 2450 MW and with winning bids of 4.8 to 6.8 U.S. cents/kWh (a significant reduction from pre-concession costs). However, domestic manufacturing, service, and maintenance capacity are still insufficient. In addition, winning bids are often unrealistically low. Both are key challenges to overcome if China is to meet NDRC's latest plan to install at least 30 GW of wind generation capacity by 2020

In 2006, CRED formulated a wind industry development roadmap delineating the most effective ways to build wind turbine manufacturing capacity in China, and analyzed the impact of the current wind power pricing mechanisms on the cultivation of a stable wind market. CRED's policy recommendation to bind wind turbine manufacturing with wind development has been adopted by NDRC for the granting of wind concession projects. However, CRED's proposal to adopt a preferential feed-in tariff for wind power has been put on hold by NDRC, fearing the impact on overall power tariffs. This year, CRED has continued efforts to revise the wind power pricing mechanism and to convince the government to develop mandatory quality control systems to ensure wind turbine reliability to support a fast growing wind market. The China General Certification Center (CGC) is working with the China National Certification and Accreditation Administration (CNCA) to improve wind turbine certification standards and develop certification regulations.

Recommendation: China should encourage bulk wind energy projects to increase market demand for local wind turbines and attract investment in the wind industry. China should also impose mandatory certification requirement on wind turbine products.

Promoting Biomass Energy Development

Development of biomass resources has the potential to optimize China's energy mix, improve the income and health of rural residents, and protect the environment. Already, China's Medium- and Long-term Renewable Energy Development Plan mandates that China develop 30 GW of biomass power, 10 million tons of bioethanol, and 2 million tons of biodiesel by 2020. In addition, China has set a preferential fixed grid connection tariff for biomass power generation. However, China's biomass industry is still in its infancy; robust policies are needed to guide the development of biomass technologies and prevent local governments and industries from responding with unrealistic local targets and rushed investment decisions.

This year, CSEP is supporting CRED to develop a roadmap and incentives for biomass industry development. We are also supporting the China Energy Conservation Investment Corporation (CECIC) to develop technical codes for compiling feasibility studies on biomass power generation projects.
.

Recommendation: China should quickly initiate a national biomass resource survey and formulate a biomass utilization program backed up by actual projects and investment. To ensure the healthy development of the biomass industry, China also needs to develop incentive policies and technical standards and codes.

China Sustainable Energy Program
Electric Utilities Program Strategy

Overarching goal: Steer investments in China's power sector away from conventional fossil fuel-based electricity generation toward energy efficiency, renewable energy, and coal gasification with carbon sequestration.

Goal #1: Help China develop and implement policies that maximize energy efficiency and renewable energy use in the power sector.

Means:
We can achieve this goal by helping China do the following.

1. Develop national policies, e.g., public benefits charges, renewable portfolio standards, tax incentives, distributed generation policies, and integrated resource planning, to minimize overall power usage and maximize renewable energy generation.
2. Conduct energy efficiency and renewable energy policy pilot projects worthy of national replication in at least two provinces.
3. Apply integrated resource planning principles when siting and developing new generation facilities to inject least-cost planning principles into competitive generation markets.

Evaluation Criteria (Key Performance Indicators):
We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. Whether national energy efficiency and renewable energy policies are adopted and how effectively they are implemented.
2. Whether at least two provinces conduct energy efficiency and renewable energy policy pilot programs and the extent to which the policies are effective.
3. The amount of energy saved, amount of renewable energy deployed, and amount by which carbon emissions are reduced due to energy efficiency and renewable energy policies affecting the electric utilities sector.

Goal #2: Help China establish strong emissions and energy efficiency regulations for power plants in order to shift China's electricity generation investments away from coal-fired power plants toward cleaner generation facilities and demand-side energy efficiency.

Means:
We can achieve this goal by helping China do the following.

1. Adopt a cap-and-trade program for power plants based on "generation performance standards" (GPS).
2. Conduct GPS pilot programs in at least two provinces.

Evaluation Criteria (Key Performance Indicators):
We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. Whether national power plant emissions and energy efficiency policies are adopted and the extent to which they are effectively implemented. (Target: GPS-based policies to limit SO_2 emissions to 4.3 g SO_2/kWh by 2010 and 3.2 g SO_2/kWh by 2020.)
2. Whether at least two provinces conduct GPS pilot programs and the amount by which the programs decrease emissions and increase energy efficiency.
3. The amount of investment in cleaner generation facilities and amount of energy savings effected by GPS-based policies.

Goal #3: Introduce policies that catalyze advanced coal gasification technology with carbon dioxide capture and sequestration in order to replace conventional thermal power plants with carbon-neutral technologies.

Means:
We can achieve this goal by helping China do the following.
1. Incorporate IGCC and polygeneration into its energy development plans.
2. Develop regulatory and incentive policies aimed at accelerating the deployment of IGCC and polygeneration technologies, including private-public partnerships to get chemical/polygeneration companies into the electricity business.
3. Establish environmental regulatory reforms to put upward pressure on coal prices.
4. Increase funding for IGCC and polygeneration development.
5. Conduct studies and targeted seminars to help China's top leaders grasp the sever health impacts of coal combustion, and comparative benefit of IGCC/polygeneration with CCS.

Evaluation Criteria (Key Performance Indicators):
We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.
1. Whether IGCC/polygeneration is incorporated into China's energy development plans.
2. Whether policies encouraging the research, development, demonstration, and widespread deployment of IGCC/polygeneration are adopted.
3. Amount of investment in IGCC/polygeneration in China.
4. The amount of energy saved and amount by which carbon emissions are reduced due to the construction of IGCC/polygeneration facilities in China.

China Sustainable Energy Program
Electric Utilities Program Ongoing Projects

Beijing Energy Conservation and Environmental Protection Service Center

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $70,000

Description: To design an energy efficiency power plant (EPP) program and conduct an EPP pilot in Beijing.

Beijing Energy Efficiency Center

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $90,000

Description: To develop national DSM policies and to coordinate provincial DSM pilots.

China Electric Power Promotion Council

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $60,000

Description: To identify least-cost ways to meet China's growing energy demand using integrated resource planning (IRP), build IRP capacity in China, and select pilot cities to demonstrate IRP principles in the planning of power sector development.

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop a national power sector strategy to deal with greenhouse gas emissions and climate change

Chinese Academy for Environmental Planning

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $80,000

Description: To develop regulations for enforcing a cap and trade program for national power sector pollutant emissions, and to conduct local pilot programs.

Electric Power Research Institute of Guangdong Grid Corporation

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $60,000

Description: To formulate power market regulations to implement a cleaner and more efficient power dispatching policy, and to conduct local pilots.

Energy Research Institute

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To institutionalize an investment mechanism for end-use energy efficiency and renewable energy in China, through the establishment of a national public benefit fund (PBF)

Environment, Resource and Development Economics Department, School of Economics, Peking University

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $110,000

Description: To formulate power market regulations to implement a cleaner and more efficient power dispatching policy, and to conduct local pilots.

Hebei Demand-Side Management Instruction Center

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $80,000

Description: To design and implement energy efficiency power plant (EPP) programs and conduct EPP pilots in Hebei,

Institute of Economic Research

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $90,,000

Description: To develop innovative power pricing mechanisms to spur investment in end-use energy efficiency and renewable energy.

Institute of Economic System and Management

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $80,000

Description: To develop regulatory capacity at the State Electricity Regulatory Commission and its branch offices for integrating renewables and energy efficiency into China's power sector.

Institute of Engineering Thermophysics, a project of the Chinese Academy of Sciences

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop policies and incentives that accelerate the development and demonstration of integrated coal gasification combined cycle (IGCC) technologies with carbon capture and sequestration (CCS).

Institute of Rock and Soil Mechanics, the Chinese Academy of Science

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $80,000

Description: To survey geological sites in China and to assess their potential for carbon capture and sequestration.

Natural Resources Defense Council, Inc.

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $50,000

Description: To develop policies and incentives that accelerate the development and demonstration of integrated coal gasification combined cycle (IGCC) technologies with carbon capture and sequestration (CCS).

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $250,000

Description: To develop national DSM policies and to coordinate provincial DSM pilots.

Regulatory Assistance Project

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $230,000

Description: To provide technical support and comprehensive best regulatory practices training on integrating energy efficiency and renewable energy into China's power sector reforms.

Shanghai Energy Conservation Supervision Center

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $70,000

Description: To design and implement energy efficiency power plant (EPP) programs and conduct EPP pilots in Shanghai.

State Grid Corporation Demand-Side Management Instruction Center

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To design and implement energy efficiency power plant (EPP) programs and conduct EPP pilots in Jiangsu.

State Power Economic Research Institute

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $65,000

Description: To develop national DSM policies and to coordinate provincial DSM pilots.

China Sustainable Energy Program
Electric Utilities Program Project Updates

Goal #1: Help China develop and implement policies that maximize energy efficiency and renewable energy use in the power sector.

Power Sector Regulatory Reform

In 2002, China's electric utility monopoly, the state-owned State Power Corporation (SPC), was divided into five power generation and two transmission companies. To oversee the utilities and to carry out further reform, the State Council—following recommendations from a multi-ministerial project that was headed by the Institute of Economic System Management (IESM)—established an independent regulatory body, the State Electricity Regulatory Commission (SERC), in 2003. To date, SERC staff totals about 1,000 members for its several provincial offices, six regional offices, and headquarters.

Per SERC's request, CSEP international grantees, particularly the Regulatory Assistance Project (RAP), have worked with IESM to train SERC personnel. In 2005, IESM's work focused on helping SERC establish regional regulatory agencies and to formulate regulations encouraging clean energy generation and demand-side management. The following year, IESM aimed to establish utilities reporting requirements and a system of indicators, used to monitor utilities' compliance with regulations on renewable power generation, emission levels, demand-side energy efficiency, and power market operation. In 2006, IESM participated in SERC's review and assessment of China's electricity reform practices since 2002. This work then led to the State Council's issuance of *Opinions on the Implementation of Power Sector Reform in the 11th Five-year Plan Period*. IESM also assisted SERC to publish the *China Electricity Regulatory Report 2006* – SERC's first annual report since its establishment.

Following the government's call for the adoption of a new dispatching policy favoring clean and efficient generation, CSEP is assisting SERC and its Southern Regulatory Bureau to develop power market rules and regulatory measures to put the new dispatching policy into practice. Recently, the newly established National Climate Change Leading Group headed by Premier Wen Jiaobao instructed SERC to develop a national strategy for the power sector addressing greenhouse gas emissions and climate change. Our grantee the China Electric Power Promotion Council (CEPPC) is assisting SERC on this task.

Recommendation: Electric utilities generate more revenue than any other enterprises, and government regulation of electric utilities is justified because of the substantial public interest in having reliable, efficiently- and cleanly-produced electricity. China's utility regulatory bodies will largely determine utilities' environmental impact on the public good. Policymakers should:

- Mandate that utilities spend at least two percent of total revenue to mitigate the public health and environmental impact of fossil-fuel-based electricity generation;

- Design utility sector regulations that reduce the environmental impact of electricity production;
- Require utilities to supply or purchase a specified amount of electricity from renewable sources;
- Require utilities to invest in energy saving end-use technologies when doing so is cheaper than increasing production capacity; and
- Provide utilities with a return on energy efficiency investment equal to or greater than returns on increased production.

Developing and Advocating Demand-Side Management (DSM) Policies

China has primarily met its escalating power demand with new generation capacity and load management practices. Institutional and policy barriers, particularly insufficient mechanisms to fund efficiency programs through electricity revenue, have prevented China from aggressively pursuing the cost-effective approach of improving end-use efficiency. With assistance from international DSM experts at the Natural Resources Defense Council (NRDC) and RAP, the State Power Economic Research Institute (SPERI) and the Beijing Energy Efficiency Center (BECon) are beginning to tackle barriers faced by utility-financed DSM programs, educating central government policy makers in DSM and its strategic importance in improving energy efficiency.

With the assistance of SPERI, BECon, NRDC, and RAP, DSM pilot programs in Jiangsu, Shanghai, and Guangdong are already producing significant electricity savings. Jiangsu, in particular, has become a national example for DSM implementation: between 2003 and 2005, over 1.4 billion RMB (US $180 million) in public and private DSM investment have yielded annual energy savings of over 930 million kilowatt-hours (kWh), reducing peak demand by 350 MW and saving 590 million RMB (US $76 million). In Shanghai, our grantee the Shanghai Energy Conservation Supervision Center (SECSC) initiated a major green lighting program, installing over 600,000 energy efficient lamps, equivalent to annual electricity savings of 45 million kWh.

We are also supporting the development of Energy Efficiency Power Plants (EPPs), end-use energy efficiency projects designed to deliver energy and capacity equivalent to large conventional power plants. An EPP is "constructed" by requiring utilities to purchase the energy saved through energy efficiency projects; these utility costs are then recovered through power rates. CSEP has helped Jiangsu, Shanghai, and Guangdong to complete the design of EPPs, and has secured local officials' commitment to implementation.

The Jiangsu EPP project—developed by the State Grid Corporation DSM Instruction Center (SGC-DSMIC) with international assistance from NRDC and RAP—could cut peak electricity demand by over 600 megawatts (MW) at only a third of the cost of building a new power plant of equivalent production capacity. In 2006, Jiangsu completed one part of the project with the construction of a 150 MW EPP, which focused on energy-intensive industrial sectors and has the potential to save an annual 880 million kWhs of electricity and 800,000 tons of carbon dioxide. In September, we funded an EVO expert to conduct training to Jiangsu Economic and Trade

Commission officials, SGC-DSMIC staff, and the provincial and municipal utilities staff on the measurement and verification of EPP programs and projects.

Recently, Beijing and Hebei also joined our EPP program and are in the initial stages of market survey and potential assessments. Guangdong has essentially completed the design of its EPP plans with a $600,000 grant from Asia Development Bank (ADB), which will be followed by an additional $100 million loan from ADB for implementation.

RAP and NRDC are providing international best practice guidance for the Guangdong EPP project.

Recommendation:
- China should reform its tariff structures so that utilities recoup their investment in demand-side energy-saving technologies.
- SERC should adopt a revenue cap on utilities' electricity rates to eliminate potential conflicts of interest for utilities when implementing DSM projects.

Power Sector Scientific Planning Method Studies

China's response to power shortages has mirrored its response to the general increase in energy demand: supply-side options, such as the addition of new power generation capacities, are explored before tapping into cost-effective DSM. In the last three years, China has installed over 200 gigawatts (GW) of new generation capacity, 80 percent of which is coal-fired, and a significant proportion of which dodged proper planning processes and environmental evaluation.

We are supporting the China Electric Power Promotion Council (CEPPC) to conduct an Integrated Resources Planning (IRP) study, the first phase of which is now finished. CEPPC has highlighted the deficiencies of China's current power sector planning practice, and laid out the major issues to address and the processes necessary to establish a power sector plan. The new planning method is based on the principle of least-social cost, and thus prioritizes clean generation and DSM. CEPPC's next step is to disseminate information and conduct training on the new power sector planning measures, and to select a regional power pool in which to test and pilot the new planning methodology. This project will proceed in conjunction with our energy efficiency and environmental dispatching pilots in the eastern and southern China power markets.

Recommendation: Government planning and electric utility regulatory agencies at the national, regional, and provincial levels should ensure that utilities meet energy needs through the lowest "all-in" cost methods, and pursue cost-effective energy efficiency and renewable energy programs before adding generation capacity.

Power Tariff Study to Encourage Clean Generation and Energy Efficiency

China's power tariff-setting practices have two main deficiencies: neglect of the environmental and public health externalities of fossil fuel-fired power generation, and discouragement of cost-effective energy efficiency improvements by utilities. To promote changes in current practices, the Chinese Research Academy of Environmental Sciences (CRAES) conducted a study on environment-friendly pricing solutions for coal-fired power plants. In addition, the Institute of Economic Research (IER) evaluated China's existing power pricing methods and proposed measures for power pricing reforms, including improving the design of differential and time-of-use pricing and using electricity tariff surcharges to supporting energy efficiency and clean power generation.

Grantees' recommendations were included in NDRC's *Implementation Methods for Power Tariff Reform (2005),* including economic incentives for coal-fired power plants fitted with sulfur scrubbers, as well as energy pricing options for inefficient industries. In tariff adjustments last June, NDRC added a surcharge of 0.24fen/kWh for desulphurization, a surcharge of 0.13fen/kWh for renewable energy power generation, and an increase of 0.979fen/kWh to account for the increased price of coal. In 2007, upon IER's recommendation, NDRC reduced the interconnection tariff for small coal-fired power plants, and began to collect surcharges from on-site power plants at energy intensive enterprises to pay for public benefits (e.g. renewable energy). In the next phase of these activities, IER will design power tariff-setting mechanisms that give greater support to clean power generation and DSM.

Recommendation:

- China's electricity tariffs should fully internalize the environmental costs of electricity generation to create a level, competitive playing field for energy efficiency and renewable energy.
- China should supplement electricity tariffs with pollution levies and other environmental policies.

Establishing Public Benefits Funds to Support Energy Efficiency and Renewable Energy Development

Public Benefits Funds (PBFs), also know as system benefits charges, are small surcharges collected from either generators or consumers on all kWh flowing through the transmission and distribution grid. These funds can be used to support energy efficiency, renewable energy, and energy technology research and development programs. NDRC's Energy Research Institute (ERI), Institute of Economic Research (IER), and MOF's Financial Research Institute have been working towards the establishment of a PBF in China for the past few years.

This project experienced a substantial breakthrough in early 2005, when the newly-passed Renewable Energy Law mandated the establishment of a public benefits fund (PBF) to support renewable energy development. Since 2006, grantee efforts have concentrated on advocating the establishment of a PBF for energy efficiency. Hebei, Fujian, and Jiangsu provinces have already

established local PBFs supporting the implementation of DSM programs, which are serving as models for the development of a national PBF. Although China has not yet established a national PBF for energy efficiency, total government investment in energy conservation projects has exceeded 21.3 billion yuan in 2007, a 12-fold increase from 2006.

Recommendation: China should establish a national PBF that provides matching funds to provinces for energy efficiency programs.

Goal #2: Help China establish strong emissions and energy efficiency regulations for power plants in order to shift China's electricity generation investments from coal-fired power plants to cleaner generation facilities and demand-side energy efficiency.

Developing and Advocating Generation Performance Standards Programs

Generation performance standards (GPS) cap power plant emissions based on the amount of electricity produced, encouraging energy efficiency and cleaner electricity generation. Over the past three years, the CRAES and local grantees have helped GPS gain widespread acceptance in China. In 2004, after conducting GPS pilots in Zhejiang, Shandong, Shanxi, and Jiangsu provinces, CRAES developed GPS for sulfur dioxide emissions and a policy and regulatory framework ensuring GPS monitoring and enforcement.

SEPA has taken significant steps to implement GPS programs in the past few years. In 2005, CAEP convinced SEPA to build a GPS-based total emissions control mechanism to limit thermal power plant emissions for China's *11th Five-Year Plan*, and to design and conduct a province-level test for a supplemental emissions trading program. The following year, SEPA signed SO2 emissions reduction contracts with China's major power generating companies and provinces, which put forth reduction targets and laid out specific actions to be taken by each party. In the 11th Five-year Plan, SEPA also adopted a total emissions cap requiring 10 percent reductions in major pollutant emissions, using GPS to allocate provinces' emissions allowances. Aside from the provincial allocations, the plan specified SO2 allowances for the power sector, committing China's five major generating companies to reduce SO2 emissions by 25 to 40 percent from 2005 to 2010.

This progress is important; however, the free allocation of emissions allowances means that prices are unlikely to reflect resources' full social costs. In 2007, with the support of SEPA and MOF, CAEP has been carrying out (1) research on payable permits allocation schemes and permit trading mechanisms; and (2) several corresponding provincial pilot projects.

Recommendation:

- SEPA should develop multi-pollutant (including carbon dioxide) generation performance standards for power plant emissions, and develop regulations for GPS enforcement.

- SEPA should accelerate the adoption and application of a national payable permits allocation and trading mechanism.

Goal #3: Introduce policies that catalyze advanced coal gasification technology with carbon dioxide capture and sequestration in order to replace conventional thermal power plants with carbon-neutral technologies.

Accelerating the development and demonstration of integrated coal gasification combined cycle (IGCC) technologies with carbon capture and sequestration (CCS)

In 2006, China's coal-fired power generation reached 484 gigawatts (GW)—78 percent of total power generation. Experts project that even aggressive efforts to increase energy efficiency and develop renewable energy will only reduce coal's share to 50 percent by 2050. Given that coal has the highest carbon content among fossil fuels and accounts for 80 percent of China's carbon dioxide emissions, the development and deployment of integrated coal gasification combined cycle (IGCC) systems with carbon capture and storage (CCS) is crucial. China has already listed IGCC/polygeneration as a priority in its National Medium- to Long-Term Program for Science and Technology Development (2006-2015), but demonstration projects must overcome higher capital and operational costs, necessitating government support in the form of tax breaks, loan guarantees, higher on-grid tariffs, etc.

To address these challenges, the Institute of Thermophysics (IET) of the Chinese Academy of Science and NDRC are working to: (1) perform a baseline study of the gaps between commercialized systems—including ultra super-critical, circulating fluidized-bed, and pulverized coal—and IGCC/polygeneration in terms of scale, efficiency, coal requirements, and capital and production costs; (2) develop and refine an IGCC/polygeneration RD&D roadmap; (3) identify the technical, financial, and policy support needed to implement the roadmap; (4) seek central and local government support to expedite demonstration projects; (5) conduct a study of the incentives and policy frameworks needed to spur the deployment of IGCC/polygeneration; and (6) study the necessary sitting and design conditions for capture-ready IGCC projects. Beginning in November 2007, we are starting to fund the Institute of Rock and Soil Mechanics (IRSM) of the Chinese Academy of Sciences to survey geological sites in China and to assess their potential for carbon capture and sequestration.

Recommendation: China should
- Add IGCC/polygeneration to its energy development strategy;
- Increase IGCC-related RD&D investment and accelerate commercial demonstrations;
- Initiate a national survey to assess China's CO_2 geological sequestration potential;
- Adopt regulations that place a carbon-reducing obligation on coal power generation; and
- Develop and implement fiscal and tax policies and preferential tariffs to encourage commercialization of IGCC/polygeneration+CCS.

China Sustainable Energy Program
Transportation Program Strategy

Overarching goal: To reduce carbon emissions, slacken fuel consumption growth, and improve air quality from the transportation sector by promoting cleaner vehicles, cleaner fuels, and transportation system reform.

Goal #1: Increase the fuel efficiency of conventional-technology vehicles.

Tasks (in 3-5 years):

1. Continue to promote establishing fuel efficiency standard systems that cover all vehicle types.
2. Develop the mechanism which automatically keeps tightening the standard systems to lead the fuel efficiency technology development and commercialization.
3. Develop implementation and enforcement regulations and policies to ensure the compliance of the standards.
4. Develop information systems including labeling systems to enhance the public awareness.
5. Develop fiscal policies that a) change people's driving behaviors to reduce personal vehicle usage; b) encourage more fuel efficient vehicle technologies by linking taxes/price rate with fuel efficiency; and c) encourage international transfer of advanced vehicle technologies.

Means:

We can achieve this goal by helping China do the following.

1. Support China Automotive Technology and Research Center (CATARC) to develop heavy duty vehicle fuel efficiency standards in the next 2-3 years.
2. Support CATARC to develop the phase III/IV fuel efficiency standards for light duty vehicles.
3. Support Tsinghua University, CATARC, Energy Research Institute (ERI), and other organizations to conduct analyses on the fuel saving and other impacts from various fuel efficiency related policies including all the fiscal policies.
4. Influence the decision making by distributing analytical results and international best practices to government agencies
5. Use other venues such as Development Research Center (DRC) and State Council Policy Research Office (SCPRO) to deliver information on vehicle energy conservation concepts to senior leaders.

Goal #2: Reduce air pollutant emissions dramatically from the transportation sector.

Tasks (in 3-5 years):

1 Keep tightening vehicle emission standards to catch up with the international best levels (such as Euro IV and beyond)
2 Adopt Euro IV fuel requirements nationwide with an urgent implementation schedule for gasoline and diesel, especially mandatory diesel fuel standards, and a national schedule for near zero sulfur fuel for a long run
3 Promote production and use of biofuels such as non-grain-based ethanol and biodiesel.

4 Remove methylcyclopentadienyl manganese tricarbonyl (MMT) from gasoline and other harmful addictives from fuels
5 Promote the usage of diesel particulate traps for all new diesel vehicles
6 Promote retrofitting of in-use large-size diesel vehicle fleets with DPF technologies

Means:

We can achieve this goal by helping China do the following.

1. Encourage State Environmental Protection Administration (SEPA) to cooperate with Standardization Administration of China (SAC) and other related government agencies to develop aggressive fuel quality standards and vehicle emission standards in the next 3-5 years by conducting conferences and workshops and producing reports
2. Collaborate with local governments (especially Beijing, Guangzhou, Shenzhen, Shanghai, Chongqing, and Chengdu) to implement fuel and vehicle standards ahead the national implementation schedule, which, in turn, helps develop an urgent national schedule.
3. Support technical groups to conduct detail analyses for developing fuel quality and vehicle emission standards.
4. Working closely with key government agencies and stakeholders such as SAC, National Development and Reform Committee(NDRC), Ministry of Finance (MOF), Sinopec, PetroChina and local governments to carry out pilot projects
5. Support research efforts on vehicle emissions factors, emission inventory, air pollution exposure rates, public health impacts of air pollution, and cost-effectiveness analysis of air pollution control.
6. Support diesel vehicle retrofit demonstration projects in various cities.
7. Conduct conferences, workshops, and official visits of other countries to identify emission control opportunities, remove air pollution barriers, and promote innovative concepts.
8. Provide technical assistance to local organizations to develop local air pollution control plans through which various agencies cooperate to adopt emission standards, regulations, and fiscal policies for sustainable transportation systems and scrappage of old dirty vehicles.
9. Use other venues such as DRC, SCPRO to deliver information on motor vehicle emission control and sustainable transportation concepts to senior leaders.
10. Strengthen key research institutions' capacity to conduct transportation sector-related technical analyses, especially their ability to model the effects of transportation sector policies on air quality and to estimate the impacts of fuel quality standards on the cost of clean fuel production and benefits of clean fuel use.

Goal #3: Introduce advanced, electric-drive vehicles into Chinese vehicle fleet with significant volumes.

Tasks (in 3-5 years):

1. Support several cities to operate hybrid fleets with large volumes and to develop preferential policies to create market for hybrid technologies.
2. Develop national policies, especially financial incentives, to encourage developm ent and commercialization of hybrid electric vehicles.
3. Support efforts to encourage Ministry of Science and Technology (MOST) invest its R&D funds in key hybrid technologies so that China can develop its own hybrid technologies

4. Support key research organizations to research, develop, and deploy hybrid electric vehicle technologies.

Means:

We can achieve this goal by helping China do the following.

1. Select three to four cities to promote hybrid fleet demonstration and develop incentive policies to encourage hybrid vehicle introduction; help local governments in selected cities to select the best hybrid technologies for demonstration.
2. Develop policies and standards encouraging the development and market penetration of hybrid vehicles.
3. Secure significant fund for the development and commercialization of advanced technology buses, trucks, and cars from the Asian Development Bank, European Union, United Nations Development Program, World Bank, and other international development organizations.
4. Conduct conferences, workshops, and analyses to publicizing energy and emission benefits of electric drive technologies.

China Sustainable Energy Program
Transportation Program Ongoing Projects

Association of Mayors of Guangxi

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop policies encouraging municipal BRT development in Guangxi province.

Grant Date: 9/1/2006 **Duration:** One year **Amount:** $100,000

Description: To develop policies encouraging municipal BRT development in Guangxi province.

Beijing Automotive Research Institute

Grant Date: 9/1/2007 **Duration:** One year **Amount:** $80,000

Description: To support the Beijing Automotive Research Institute Co., Ltd. to develop diesel retrofit policies in Beijing.

Grant Date: 9/1/2006 **Duration:** One year **Amount:** $80,000

Description: To develop an action plan to retrofit Beijing's diesel vehicle fleet.

Beijing Changdatong Bus Ltd. & China BRT Association

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $200,000

Description: To assist the Beijing municipal government with improving and implementing the near-term BRT network development plan.

Beijing Hybrid Bus Demonstration Allocation

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support the Beijing Environmental Protection Bureau to carry out the hybrid bus demonstration project.

Beijing Jiaotong University

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop a national emissions model to create transportation-related pollution control policies.

Beijing Transportation Research Center

Grant Date: 8/1/2007 **Duration:** One Year **Amount:** $200,000

Description: To support the Beijing Transportation Research Center with developing public transportation reform plans and related policies.

Grant Date: 4/1/2005 **Duration:** Two years **Amount:** $150,000

Description: To develop plans for the operation and management of Beijing's first bus rapid transit (BRT) corridor and help Beijing implement its near-term BRT network development plan.

Chang'an University

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $150,000

Description: To support Chang An University and Xi'an Urban Planning Institute to assist the government to develop BRT systems and optimize Xi'an's public transit system.

Grant Date: 11/1/2005 **Duration:** One year **Amount:** $120,000

Description: To develop plans for a bus rapid transit (BRT) network, including detailed plans for demonstration corridors, in Xi'an.

Center for Renewable Energy Development, ERI

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $80,000

Description: To develop a guidance manual and management rules for national biofuel pilot projects.

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $70,000

Description: To develop a national development strategy for biofuels.

China Academy of Urban Planning and Design

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $200,000

Description: To support the China Academy of Urban Planning and Design to assist the Ministry of Construction with formulating the "National Public Transit Systems Development White Paper" and "BRT Development Technical Manual."

China Academy of Urban Planning and Design & Global Village Beijing

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $200,000

Description: To support China Academy of Urban Planning and Design and Global Village Beijing to promote public awareness, acceptance, and support for public transportation.

China Automotive Technology and Research Center

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $270,000

Description: To develop the next rounds of fuel economy standards for passenger cars and heavy-duty vehicles.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $75,000

Description: To analyze the effects of implementing the fuel economy standard for passenger cars.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $100,000

Description: To develop a vehicle purchase tax that encourages the purchase of fuel efficient and cleaner-burning technologies and vehicles.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $150,000

Description: To develop a fuel tax for China aimed at encouraging fuel consumption savings and the adoption of fuel efficient technologies.

Grant Date: 9/1/2006 **Duration:** One year **Amount:** $80,000

Description: To develop a heavy-duty vehicle fuel economy standard.

Chongqing Academy of Environmental Science

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $50,000

Description: To develop a comprehensive vehicle emissions control strategy for Chongqing.

Chongqing BRT Coorporation

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $75,000

Description: To assist Chongqing municipal government in develop BRT demonstration project in the city.

The Department of Thermal Engineering, Tsinghua University

Grant Date: 1/1/2007 **Duration:** One year **Amount:** $30,000

Description: To support DTE in promoting IGCC+C sequestration technologies in developing coal-based fuels.

The Department of Chemical Engineering, Tsinghua University

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $50,000

Description: To support the Department of Chemical Engineering, Tsinghua University to carry out bio-diesel pilot projects and develop policy recommendations for local governments and state decision makers.

Innovation Center for Energy and Transportation

Grant Date: 4/1/2007 **Duration:** One Year **Amount:** $70,000

Description: To support The Innovation Center for Energy and Transportation with the organization of workshops promoting green vehicle and fuel technologies and policies in China.

IER Environmental Technology Center

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $250,000

Description: To support the Shenzhen municipal government to develop transportation policies, including traffic demand management, diesel retrofit, and hybrid vehicle usage, to improve local air quality and reduce carbon dioxide emissions.

International Sustainable Systems Research Center

Grant Date: 12/1/2007 **Duration:** One year **Amount:** $80,000

Description: To support ISSRC to test heavy-duty diesel vehicle emissions; train Chinese grantees in data collection, analysis, and model development and simulation; and assist Chinese groups with building an emissions database and developing an emissions model.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $80,000

Description: To support ISSRC to test heavy-duty diesel vehicle emissions, develop a Chinese-based emissions model, and assist Chinese grantees in building an emissions database.

Jiangsu Provincial BRT Development Allocation

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support Jiangsu Provincial Construction Bureau to develop incentive policies and technical training courses to encourage the cities in Jiangsu to develop sustainable urban transportation system.

Kunming Urban Transportation Planning Institute

Grant Date: 6/1/2007 **Duration:** One year **Amount:** $80,000

Description: To continue improving Kunming's bus priority transit into a full-fledged bus rapid transit system.

Machinery Industry Agricultural Vehicles Research and Development Center

Grant Date: 10/1/2006 **Duration:** One year **Amount:** $50,000

Description: To develop an agricultural vehicle fuel economy management system.

Research Institute of Petroleum Processing

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support the Research Institute of Petroleum Processing to develop Euro IV gasoline standard and Euro III diesel standard.

Shangdong University

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $60,000

Description: To assist the Jinan municipal government to optimize its public transit systems.

Southwestern Jiaotong University

Grant Date: 11/1/2007 **Duration:** One year **Amount:** $100,000

Description: To support the Chengdu municipal government to develop a public transit system to harmonize the urban and rural development, and to promote Transit Oriented Development (TOD) with a BRT focus.

Tsinghua University Education Foundation

Grant Date: 8/1/2007 **Duration:** One year **Amount:** $50,000

Description: To support Tsinghua University's research on criteria pollutants and the carbon dioxide reduction potential of transportation system improvements, especially for the development of public transportation systems and bus rapid transit.

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $100,000

Description: To develop a model to analyze the effects of implementing supporting fuel economy policies in China.

China Sustainable Energy Program
Transportation Program Project Updates

Goal #1: Increase the efficiency and reduce the emissions of conventional-technology vehicles.

1. Improving Vehicle Fuel Efficiency

Improving the Implementation of Passenger Car Fuel Economy Standards

Phase I of the passenger car fuel economy standards has been implemented, with enforcement dates for new and old passenger models set for July 1st, 2005 and July 1st, 2006, respectively. Evaluating the impact of implementation is fundamental to verifying the effectiveness of standards, and to formulate fuel economy standards for future rounds of upgrades and for other vehicle types. The China Automotive Technology and Research Center (CATARC) is examining the effect of standards implementation on fuel economy; identifying challenges and barriers to implementation; providing recommendations for implementation of phase II standards; and providing data relevant to the development of fuel economy standards for other vehicles.

Developing the Next Rounds of Fuel Economy Standards for Passenger Cars

Meeting Euro Phase II standards is well within the reach of auto manufacturers: preliminary analysis of the impact of passenger car fuel economy standards indicates that 76.3 percent of the 417 new models can meet requirements ahead of the mandated schedule. With Phase II required for 2008, the next round of standards should be developed as soon as possible, to allow manufacturers adequate time for preparation. CATARC is leading a research team to (1) project the effects of further tightening passenger car fuel economy standards; (2) investigate the technology options and cost effectiveness of stricter limits; (3) propose the next phase limits for passenger car fuels; and (4) submit implementation recommendations.

Developing the Fuel Economy Standards for Heavy-Duty Vehicles

Having played an instrumental role in developing fuel economy standards for passenger cars and light duty commercial trucks, CATARC has been working to formulate fuel economy standards for heavy-duty vehicles since 2006. Moving forward, CATARC will (1) research international experiences in heavy-duty vehicle fuel economy regulation; (2) investigate the available technologies in the Chinese market and the development trends in China and abroad; (3) study heavy-duty vehicle driving cycles and prepare testing methods for fuel consumption; and (4) analyze the effects of fuel economy standards on manufacturers of engines and heavy-duty vehicles.

Developing a Model to Analyze the Impact of Fuel Economy Standards

To support the push for more stringent fuel economy standards, CSEP aims to develop a comprehensive model to inform policy amendments, through analysis of the following: (1) the impact of the policy on all vehicle types, including passenger cars, light duty trucks, heavy duty vehicles, motorcycles, and agricultural vehicles; (2) future fuel consumption projections; and (3) historical data on vehicles and vehicle use. The Institute of Environmental Science and Engineering (IESE) at Tsinghua University will collaborate with CATARC and other research institutes to develop the modeling tool. Efforts will include (1)

developing a new vehicle classification system, into which existing vehicle data will be incorporated; (2) generating a database to indicate trends in fuel consumption of road transportation vehicles; and (3) projecting future fuel consumption levels under various policy scenarios.

Recommendations: China should:

- Strictly enforce its fuel economy standards for passenger vehicle standards, which are the single most effective tool for reducing vehicle fuel consumption and vehicle emissions;
- Establish a high-capacity enforcement body and implementation mechanism to supervise the implementation of fuel efficiency standards;
- Immediately begin consideration for Phase III and IV passenger vehicle fuel economy standards;
- Adopt fuel economy standards for heavy-duty vehicles as soon as possible;
- Adopt tax and fiscal policies, including a fuel tax, to promote the manufacture and purchase of fuel efficient vehicles.

2. Reducing Vehicle Emissions and Improving Fuel Quality

Developing a Vehicle Emissions Model Based on Chinese Data

Accurate vehicle emissions models are necessary to maximize the effectiveness of emissions control policies. Government officials have expressed concern over the lack of domestic emissions models and the resulting inability to make accurate projections of emissions' impact on public health. The International Sustainable Systems Research Center (ISSRC), CATARC, Tsinghua University's IESE, Beijing Jiaotong University, and the Vehicle Emissions Control Center (VECC) are creating an International Vehicle Emissions (IVE) model for China. These groups will: (1) develop an emissions database; (2) establish driving cycles (data combining vehicle speed, acceleration, and other factors influencing emissions); (3) create an emissions model; and (4) work with the State Environmental Protection Administration (SEPA) to develop an annual vehicle emissions control report.

Improving Chinese Capability in Testing, Modeling, and Controlling Vehicle Emissions

To address the capacity inefficiencies that hold back emissions controls, we are continuing to support ISSRC to (1) bring Process Environment Monitoring Systems (PEMS) to China to test heavy-duty diesel vehicles emissions; (2) compare data, analysis methodology, and equipment with Tsinghua University, the Vehicle Emissions Control Center (VECC, under the State Environmental Protection Administration), CATARC, Beijing Jiaotong University, and other Chinese counterparts; (3) hold training seminars to build local grantees' capacity for data collection, analysis, and model development and simulation; and (4) assist Chinese organizations to establish a vehicle emissions database and develop a vehicle emissions model (modeling emissions against car types, temperature, driving behaviors, and other factors) based on Chinese data.

Developing the Euro IV Gasoline Standard and Euro III Vehicle Diesel Standard

Vehicle exhaust is becoming the dominant source air pollution in urban China, as cities undergo vehicle population growth and relocation of industry. As a control measure, China is strengthening emissions standards. However, implementation is hindered by the lack of corresponding fuel standards. For instance, the State Environmental Protection Administration (SEPA) adopted the Euro IV emissions standards in 2005 and set 2010 as the implementation deadline, but no Euro IV gasoline fuel standards are currently available. This project supports the Research Institute of Petroleum Processing to (1) analyze the emissions impact of various fuel specifications; (2) exchange experiences with domestic and international experts; (3) draft the Euro IV gasoline and mandatory Euro III diesel fuel standards; (4) organize meetings to evaluate and obtain technical approval for the standards; and (5) submit the standards to the Standardization Administration of China (SAC) for adoption.

Developing a National Vehicle Emission Control Annual Report

SEPA is taking action to combat China's mounting transportation-related air pollution, brought about by rapid motorization, poor fuel quality, and poor automotive technology (due to low market-entry thresholds). In recent years, the government has begun to implement fuel economy standards and emissions requirements; however, the precondition for targeted policymaking and effective implementation is the availability of accurate and timely data. This project supports grantees to assist SEPA's efforts to (1) establish a national vehicle emissions control mechanism with local Environmental Protection Bureaus (EPBs); (2) collect vehicle fleet and emissions data, on which national and local emissions levels will be calculated; and (3) prepare China's annual vehicle emissions control report.

Developing Policies to Encourage the Retrofit of Old Diesel Vehicles

With strict emissions and fuel quality standards for new vehicles in place, Beijing is now turning to emissions controls for in-use vehicles and the retrofitting of "dirty" diesel vehicles. Last year, with our support, Beijing Automobile Research Institute (BARI) tested various after-treatment technologies on buses, post office diesel cargo vehicles, and garbage trucks. This year, BARI will (1) carry out a larger diesel retrofit demonstration project with about 100 vehicles using different retrofit technologies and products; (2) identify the best retrofit technologies and products for Beijing's diesel fleet, maintaining supervision over the durability of these devices; (3) assist Beijing's EPB with developing a plan to retrofit as many as 5,000 diesel vehicles based on research results; and (4) submit policy recommendations and management regulations to encourage the retrofit of out-dated, dirty diesel vehicles and the I/M system.

Developing Policies to Reduce Shenzhen's Vehicle Emissions

In recent years, air quality in Shenzhen has steadily worsened. Between 2003 and 2005, the number of annual "haze" days averaged over 130, compared to 9.2 in the1980s and 82.4 in the 1990s. Research indicates that the transportation sector, especially freight trucks, is a major contributor. Reducing smog has become a priority of the Shenzhen municipal government; this political climate provides an opportunity to demonstrate the link between air pollution and vehicles—especially diesel emissions—and to bring international best practices in sustainable urban transport policies to China. This project supports a group of Shenzhen researchers, including the Shenzhen Vehicle Emission Control Center (SVECC) and Beijing

University at Shenzhen, to (1) develop traffic demand management (TDM) policies, such as congestion pricing and higher parking fees in downtown areas; (2) carry out hybrid vehicle pilot projects, such as hybridization of government car, taxi, and bus fleets; (3) launch a diesel vehicle retrofit program, especially for Shenzhen-Hong Kong trans-boundary freight trucks; and (4) organize an international workshop on haze control to discuss sources of pollution and control measures.

Recommendations:

- China should take the following measures to reduce vehicle emissions and improve vehicle fuel quality: Implement clean, low-sulfur gasoline and diesel fuels as rapidly as possible. Vehicle emissions cannot be reduced without clean fuels;
- Establish fiscal policies to speed oil companies' improvement of fuel quality;
- Develop systems to monitor and enforce emissions standards compliance;
- Establish a strong I/M system and accelerate the phasing-out of outdated vehicles;
- Establish and enforce a schedule for the adoption of more stringent vehicle emissions and fuel quality standards; and
- Develop tax and fiscal policies promoting the production and purchase of clean vehicles.

3. Promoting the Use of Alternative Fuels

Developing Policies to Promote IGCC + CCS in Coal-to-Liquid Projects

High crude oil prices and energy security concerns have made coal-based alternative vehicle fuels a key area of development in China's transportation sector, backed by the highest levels of government: the National Development and Reform Commission (NDRC) is intent upon developing a national strategy to develop coal-based alternative fuels, following a joint letter to Premier Wen Jiabao from over 10 leading Chinese scientists. However, resource-constraints and environmental concerns—such as carbon emissions—are often left out of plant development plans. CSEP recognizes that research on the application of state-of-the-art technologies internationally, such as the combination of the Integrated Gasification with Combined Cycle and carbon sequestration (IGCC+CCS), can reduce carbon emissions and overall coal-based fuel efficiency in China. This project will support leading coal-based fuel experts to develop a report on the benefits of IGCC + CCS, and promote the application of this technology in China's alternative fuel industry through a series of policy recommendations. Recommendations will be based on assessments of (1) current alternative fuel developments in China, (2) environmental and resource-availability concerns for alternative fuel development, and (3) technological solutions, especially IGCC + CCS technologies.

Developing Policies to Promote Biofuels

Transportation consumes nearly one-third of the oil in China. Over the past few years, China has become the world's second largest consumer of oil, and is heavily dependent on imports, bringing in 134 million tons of crude oil between January and November 2006 (a 16 percent increase from the same period in 2005). Thus, biofuels are receiving increased attention as a

way to diversify vehicle fuels, and for their renewable, carbon-neutral, and economically beneficial properties. This project supports the Center for Renewable Energy Development (CRED) under NDRC to (1) review international fiscal policies to promote the development of biofuels; (2) analyze conditions in China to identify the best technologies and resource options; (3) finalize the guidance manual and management rules for China's biofuel development; and (4) develop incentive policies to promote the commercialization of biofuel technologies.

Developing a Bio-Diesel Pilot

China adopted the Renewable Energy Law in 2005; two years later, it approved the Medium- and Long-Term Development Plan for Renewable Energy, which includes provisions for biofuel development as a way to diversity China's energy mix. The Department of Chemical Engineering at Tsinghua University is carrying out a bio-diesel pilot project. The project team will: (1) identify challenges with raw material collection (e.g. waste oil, fruit, plant seeds); (2) develop policy recommendations for the utilization of deserted or temporarily-unused land, and for the establishment of local Waste Oil Recycling Management Regulations; (3) analyze the cost-effectiveness of various bio-diesel production technologies and propose incentive and investment policies; (4) assist the Ministry of Science and Technology (MOST) with initiating a national bio-diesel demonstration program; and (5) support the development of a bio-diesel standard for vehicles.

4. Developing Fiscal Policies To Encourage Clean, Efficient Vehicles

Developing a Fuel Tax for China

The environmental effects of vehicle emissions are accumulating rapidly in China, exacerbated by the speed of economic development, the growth of the auto industry, and low domestic fuel prices. Facilitated by grantees, China's Ministry of Finance (MOF) has taken note of the effectiveness of fuel taxes abroad as a way to limit vehicle usage, reduce fuel demand, and improve air quality, and has voiced acceptance of a fuel tax scheme. CATARC and other fiscal policy research institutes are developing and assessing the impact of detailed implementation regulations, based on international experiences with fuel taxes and their effect on energy, the economy, the environment, and society as a whole. In addition, CATARC will submit a proposal for periodic tax rate adjustments.

Developing a Preferential Vehicle Purchase Tax for China

The central government seeks to promote fuel efficient vehicles in China. For example, the Ministry of Finance (MOF) is considering an adjustment to the current vehicle purchase tax (a 10 percent flat rate) to encourage market penetration of fuel efficient and less polluting vehicles. CATARC is assisting MOF with creating a purchase tax system that differentiates tax rates for vehicle categories based on fuel efficiency (i.e. the better fuel efficiency, the lower the tax rate), which will create incentives to use fuel-efficient vehicles. Specifically, CATARC is: (1) developing various vehicle purchase tax schemes that link the tax rate with vehicle fuel efficiency and emissions levels; (2) developing vehicle purchase tax schemes that promote hybrid vehicle technologies; (3) analyzing the energy savings, environmental benefits, and social costs of adopting each scheme; and (4) recommending the optimal tax scheme to MOF, based on consultation with stakeholders.

Goal #2: Help introduce advanced-technology, hybrid-electric drive vehicles into China's fleet in significant, and increasing, volumes.

Supporting Shenzhen's Hybrid Demonstration Project

After testing two Prius models for taxis in Shenzhen (supported by CSEP in 2005), which resulted in better fuel economy and lower emissions, Shenzhen's municipal government is now looking to use hybrid cars in the governmental vehicle fleet. We now support Shenzhen to (1) develop policies promoting the use of hybrid cars in the government vehicle and taxi fleet; (2) establish a bidding and incentive system for hybrid bus demonstration; (3) identify and promote hybrid technologies and products through independent testing; and (4) assist the Ministry of Science and Technology (MOST) to establish a hybrid technology and product demonstration project.

Supporting Beijing for a Hybrid Demonstration Project

In recent years, many manufacturers have claimed improvements in fuel economy and emissions from their hybrid vehicle products; however, there is currently no independent test for verification or comparison of various models. Thus, the Beijing Environmental Protection Bureau (EPB) is carrying out a demonstration project for 10 hybrid bus models. Beijing EPB is (1) working with CATARC, bus companies, manufacturers, and other stakeholders to develop the demonstration plan (including bus operation and route design, emissions and fuel economy test methods, and inspection and maintenance); (2) conducting independent tests of hybrid buses for such elements as emissions, fuel economy, comfort, durability, and cost effectiveness; (3) summarizing test results, recommending the optimal technologies and products, and proposing plans for high-volume hybridization; and (4) examining financial incentive policies as a way to promote hybrid products.

Recommendations: China should:

- Require procurement of hybrid vehicles for government fleets (e.g. taxis, ministry vehicles), which will reduce hybrid costs and stimulate market development through volume purchases;
- Conduct local hybrid technology demonstration projects with preference policies and clear targets for hybrid introduction, following the example of such places as California, where the hybrid-electric vehicle market was stimulated by requiring manufacturers to sell 10 percent "zero-emission vehicles" within the state.

Goal #3: Promote and support China's development of sustainable transportation systems, especially bus rapid transit (BRT).

Formulating the National Public Transit Systems Development White Paper and BRT Development Technical Manual

To transform government statements of public transit support into concrete actions, we are looking to help the Ministry of Construction (MOC) develop specific guides and policies for urban transportation system development. The first phase of this multi-year program is focused on deepening our understanding of the field and working with MOC to develop a BRT technical guide and annual National Public Transit Systems Development White Paper. The Chinese Academy of Urban Planning and Design (CAUPD) and international consultants

are leading a group of influential Chinese experts to prepare the white paper and formulate the technical manual; in addition, the project team has assisted local cities with Public Transit Week and Car-Free Day events, and will establish a website on which MOC will publish the technical guidance and other public transport-related information.

Promoting Public Transportation

National-level political support for limiting motorization and promoting public transport has increased rapidly in recent years. However, increasing public awareness and support is also essential for successful transportation system reform. To do so, MOC has launched "Public Transportation Week" and "Car Free Day" activities, accompanied by media and public awareness campaigns. This year, 108 cities participated in the campaign, which was coordinated by Global Village Beijing (GVB) and CAUPD. The project team (1) assisted with the coverage of campaign-related media events, including television advertisements, radio announcements, billboards, and brochures; (2) coordinated the production of a television program and DVD film about the benefits of public transportation; and (3) provided assistance on related projects, as needed.

Continuing Support to the China Sustainable Transportation Center (CSTC)

With the central government's prioritization of public transit, cities are increasingly interested in BRT implementation. CSTC was established in 2005 to meet the need for greater local technical capacity. In the past year, CSTC served as the technical assistance center to cities in the process of BRT planning and construction, particularly Beijing, Jinan, Xi'an, Chengdu, and Shenzhen; translated and introduced documents on international best practices; built an information exchange platform for international and domestic experts; and assisted with technology transfer and capacity improvement in each of these cities. CSTC also trained its own staff, and now is able to operate independently to provide technical assistance, seek funding, and support the development of BRT systems in such cities as Xi'an, Hefei, Shenzhen, and Chengdu.

Developing Public Transportation Reform Plans and Related Policies in Beijing

Beijing has taken aggressive action to improve and increase sustainability of its public transit system, with plans for comprehensive system reform and an increase of public transit trip share to 40 percent by 2010. Having lowered bus fares, Beijing is now working to integrate different transportation modes and existing bus routes, and to increase designated bus lanes. The Beijing Transportation Research Center (BTRC), in collaboration with the Beijing University of Technology, is assisting government agencies and bus operation companies with the following: (1) optimization of bus routes and integration of transportation modes through a detailed transportation survey and demand analysis; (2) development of the plan and design for bus terminals and transfer hubs; (3) improvement of the bus lane priority system for public transportation and construction of an additional 285 km of exclusive bus lanes; and (4) ticket price adjustments.

Developing BRT in Beijing

After its successful BRT demonstration, Beijing now plans to construct at least three additional BRT corridors by 2010, including Chaoyang Road, Anli Road, and Fushi Road. Proper planning will optimize efficiency and integration with other transport modes—especially the metro system—and promises to dramatically improve the overall public transit

system. With continued support from CSEP, Beijing Changdatong Bus Ltd. and the China BRT Association are improving the current BRT systems and developing future plans through the following: (1) increasing BRT Line 1 efficiency, especially in operations and integration with other traffic modes; (2) assisting with the design and construction of the Chaoyang and Anli Road corridors; (3) conducting preliminary planning for BRT development along the third ring road and Baiyi road, two of the main public transit corridors in Beijing; (4) analyzing the effects of further BRT expansion; and (5) disseminating Beijing's BRT experiences to further the adoption of BRT policies.

Upgrading Kunming's Bus-Priority System

Kunming is a public transportation pioneer and was the first Chinese city to have a centralized dedicated-bus-lane system. In past years, CSEP supported the Kunming Urban Transportation Planning Institute (KUTPI) to upgrade Kunming's dedicated-bus-lane into a world class BRT system. Last year, the project team created conceptual designs and plans to establish several new BRT corridors, one of which (5 km) opened in 2006. This corridor integrates most BRT features, such as exclusive bus lanes and level boarding, and will serve as a model for comprehensive BRT development throughout Kunming. The team also created plans to optimize routing and operational management, improve bus-lane infrastructure, and create a new ticketing system. KUTPI is now working to continue sustainable transit development, with a focus on the integration of urban planning with BRT development. KUTPI will (1) assist the municipal government to refine the design of the existing dedicated bus lanes; (2) expand the system and integrate additional BRT characteristics; (3) work with the municipal government and bus companies to establish a ticketing system more integrated with the bus system; and (4) promote the concept of Transit Orientated Development (TOD) along BRT corridors, pushing for high density mixed-use construction and areas conducive to walking and biking.

Developing BRT in Ji'nan

As a relatively small city, Jinan, with a population of 1.5-2 million, faces the constraints that make BRT a promising strategy for meeting its urban transportation pressures, including congestion and diminishing air quality. The construction of Jinan's BRT system is already underway: begun in March, 2006, two corridors are now running, with a total length of 25 km. To ensure that the system continues to develop efficiently, we are supporting (1) further study of vehicular and passenger volume; (2) development of a plan to integrate BRT with existing bus service routes to optimize convenience and efficiency; and (3) development of management regulations to identify the roles of each partner and of profit-sharing methods.

Developing BRT in Xi'an

Xi'an recently received approval of a $240 million World Bank loan to strengthen its transportation infrastructure. Grantees, having convinced Xi'an over the past several years to incorporate BRT into the city's master urban plan, are now working to promote BRT as a centerpiece of the World Bank project and to provide analysis for the World Bank's investment. Logit Group of Brazil is assisting the Xi'an Urban Planning Institute and Chang'an University to (1) conduct a survey and complete a model for urban transportation; (2) identify the most appropriate passenger corridors for BRT development based upon demand analysis; (3) complete plans for infrastructure design, bus route integration, ticketing systems, and BRT operations and management; (4) identify candidate vehicles and ITS

technology; and (5) recommend financial and institutional structures for long-term BRT development and implementation.

Developing BRT in Chongqing

After years of debate, Chongqing has finally committed to ground public transit reform, and in July 2007, the Chongqing government publicly announced that it would begin BRT development. CSEP is assisting Chongqing BRT Corporation to set up a BRT-dedicated team, which will work to convince the government to commit to a whole-system rather than a segmented approach to BRT development. The team will work under the direction of international consultants to: (1) survey public transit demand and construct a model to project temporal and spatial ridership for BRT development; (2) develop a conceptual BRT network plan and implementation phase plan; (3) analyze the economic and traffic effects of various development scenarios for the BRT system; and (4) promote the integration of various public transit modes.

Developing BRT in Chengdu

Chengdu and Chongqing constitute China's fourth special economic zone (SEZ). In order to harmonize the development of urban and rural districts, promote equity, and encourage environment-friendly growth, Chengdu is developing a public transit system, using BRT to link the city center with new satellite cities. Southwestern Jiaotong University is now promoting BRT and transit-oriented development (TOD) in Chengdu's developing areas, by assisting the municipal government with the following: (1) survey of public transit demand and construction of a model to project temporal and spatial ridership for BRT development; (2) development of plans for the BRT network and phased implementation; (3) analysis of economic and urban development in various satellite cities to develop TOD pilots in one or two satellite cities; and (4) analysis of development trends in downtown areas and satellite cities, to encourage the implementation of mixed-use development and integration with public transit.

Developing BRT in Guangxi

With intensive training and technical support, a BRT pilot project in Nanning, Guangxi's capital, has great potential to influence public transit development in over 20 cities throughout the province. The Association of Mayors of Guangxi will continue to provide technical support and coordination of the following tasks: (1) cooperating with the Nanning municipal government to organize a local team to develop BRT network planning and corridor design; (2) organizing technical teams from other cities to study Nanning's methodologies and development experiences; and (3) providing intensive technical training for public transit development planning.

Developing BRT in Jiangsu

Jiangsu is one of China's wealthiest provinces, but is suffering from declining urban air quality, eutrophication of nearly all its major lakes, and other environmental problems. Realizing the role of public transit in reducing energy consumption and emissions, the Jiangsu Provincial Construction Bureau is now accepting CSEP support to organize an expert team for the following: (1) development of a provincial policy framework to encourage local cities to develop plans for sustainable public transit systems; (2) provision of training courses to enhance the capacity of local technical groups; and (3) provision of technical support for

two to three cities with public transit priority pilot projects (e.g. BRT, traffic mode integration).

Recommendations:

- The central government should designate BRT as the centerpiece of sustainable urban transportation in China, providing financial support and encouraging BRT development in all major cities.
- China should develop BRT systems in several cities to serve as domestic and international models for replication.
- China should develop incentive policies and provide technical guidance to promote BRT development across the country.

China Sustainable Energy Program
Low-Carbon Development Paths Program Strategy

Overarching goal: Forward the development and implementation of sustainable energy policies in all energy-consuming sectors by supporting initiatives spanning the boundaries of our other program areas.

Goal #1: Help China develop scenario analysis tools anticipating the impact of today's energy policy decisions and use them to formulate sustainable energy development plans.

Means:

We can achieve this goal by helping China do the following.

1. Develop sustainable energy policy analysis tools and encourage long-term planning agencies at the central and provincial government levels to use them.
2. Develop scenarios for the 2006-2030 timeframe showing the impact of energy policies on carbon emissions. Implement policies effecting the greatest carbon emissions reductions.
3. Develop and implement national policies designed to achieve China's long-term national sustainable energy development goals—reducing GDP energy intensity by 20 percent over the 2005-2010 period and quadrupling GDP while only doubling energy use over the 2000-2020 period.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. The extent to which sustainable energy scenarios are credible, in circulation, and utilized by China's senior policy decision-makers.
2. The extent to which sustainable energy policy analysis tools and techniques are adopted by Chinese non- and quasi-governmental energy policy organizations.
3. The amount by which carbon emissions are reduced as a result of sustainable energy policies.

Goal #2: Help China develop and encourage China to adopt sustainable energy policies affecting all energy-consuming sectors, particularly "all-in costs" pricing of fossil fuels.

Means:

We can achieve this goal by helping China do the following.

1. Quantify and publicize the social and environmental costs of fossil fuel combustion.
2. Develop tax, fiscal, and/or economic policies that bring China closer to "all-in costs" energy pricing.
3. Establish a strong environmental legal system to serve as a foundation for sustainable energy policy implementation.

Evaluation Criteria (Key Performance Indicators):

We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.

1. The extent to which the social and environmental costs of fossil fuel combustion become internalized into the cost of energy.
2. The extent to which central and provincial government decision-makers utilize analytical tools weighing the true, "all-in" costs and benefits of fossil-fuel combustion, energy efficiency, and renewable energy.
3. Whether China establishes a strong environmental legal system.

Goal #3: Encourage China to reform its energy administration to facilitate the development and improve the implementation of sustainable energy policies.

Means:
We can achieve this goal by helping China do the following.
1. Establish a strong Ministry of Energy, with branch offices, to oversee China's energy issues, reducing the inefficiency and complexity of China's energy administration.
2. Reform the State Environmental Protection Agency (SEPA) to bolster sustainable energy regulations.
3. Increase Ministry of Finance budgets for implementing sustainable energy policies.
4. Increase the number of full-time personnel working at government agencies and research institutions on sustainable energy policy development and implementation.
5. Add environmental measures to government officials' performance evaluation criteria.

Evaluation Criteria (Key Performance Indicators):
We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.
1. Whether the Ministry of Energy is formed and becomes a strong agency for catalyzing sustainable energy investments.
2. Whether SEPA implements reforms to strengthen sustainable energy policies.
3. Whether the number of full-time personnel working on sustainable energy policy development and implementation in China increases.
4. The extent to which the performance of government officials is evaluated on the basis of the environmental conditions of areas under their jurisdiction.

Goal #4: Encourage China's State Council (cabinet) to issue energy efficiency and renewable energy policy directives to central, provincial, and local governmental entities in order to expedite policy development and implementation in all program areas.

Means:
By monitoring State Council dockets, respond to energy-related issues under consideration by the State Council and urge the inclusion of energy efficiency and renewable energy policy recommendations in State Council discussion.

Evaluation Criteria (Key Performance Indicators):
We support and evaluate projects based on their ability to deliver measurable progress in the form of key performance indicators. We use the following metrics to monitor overall progress.
1. The extent to which the State Council acknowledges the importance of energy efficiency and renewable energy as solutions to critical social and environmental problems.

China Sustainable Energy Program
Low-Carbon Development Paths Program Ongoing Projects

China Academy of Environmental Planning

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $45,000

Description: To continue efforts to further environmental regulatory reforms' research and implementation approaches and conduct a local EPB pilot that demonstrates the effectiveness of environmental enforcement when proper authority and capacity is in place.

China Academy of Social Science

Grant Date: 6/1/2006 **Duration:** One year **Amount:** $60,000

Description: To analyze the impact of China's import/export mix on energy demands, and submit policy recommendations to optimize trade for clean energy development

China Energy Research Society

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $50,000

Description: To publish and distribute policy recommendations developed by CSEP grantees to senior policy decision-makers at the central and local government levels.

Development Research Center of the State Council

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $50,000

Description: To submit policy recommendations developed by grantees in all program areas to the State Council and other senior government ministries.

Grant Date: 2/1/2007 **Duration:** One year **Amount:** $60,000

Description: To develop polich recommendations on China's sustainable energy financing system and develop policy recommendations encouraging investment in energy efficiency and renewable energy.

Energy Research Institute

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $55,000

Description: To continue efforts to further environmental regulatory reforms' research and implementation approaches.

Grant Date: 6/1/2007 **Duration:** One year **Amount:** $50,000

Description: To develop recommendations for a national energy tax for China.

Global Village of Beijing

Grant Date: 12/1/2006 **Duration:** One year **Amount:** $60,000

Description: To continue to support media campaigns promoting key energy efficiency and renewable energy policy recommendations from each of the China Sustainable Energy Program's six program areas.

Lawrence Berkeley National Laboratory

Grant Date: 3/1/2007 **Duration:** One year **Amount:** $100,000

Description: To help China's leading energy policy research institutes develop plans to help China meet its 20 percent energy intensity reduction target.

Natural Resources Defense Council, Inc.

Grant Date: 7/1/2006 **Duration:** One year **Amount:** $65,000

Description: To catalyze comprehensive environmental regulatory reform through an assessment of China's State Environmental Protection Administration, provincial environmental protection bureaus, and international best practice recommendations.

North China Electric Power University

Grant Date: 4/1/2007 **Duration:** One year **Amount:** $100,000

Description: To develop local, regional, and sectoral action plans and an advanced energy technology development roadmap to direct China's economy toward a less energy-intensive development path**.**

Peking (Beijing) University

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $55,000

Description: To continue research on the impact of environmental degradation on public health and conduct case study in Shanxi on the health effects and social cost of coal production and consumption, as well as internalization of these externalities in energy prices and taxes

Policy Research Center of Environment and Economy (PRCEE) of the State Environmental Protection Administration (SEPA)

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $180,000

Description: To develop policy recommendations on capacity building of China's environmental protection watchdog. Organize the Workshop on Environmental Regulatory Institutions and an international study tour for senior decision-makers to assess European environmental ministries.

The School of Environment and Natural Resources (SENR), Renmin University of China (RUC)

Grant Date: 7/1/2007 **Duration:** One year **Amount:** $65,000

Description: To examine funding sources to facilitate China's 2010 10-Percent pollutant emission reduction target and develop economic policies and incentives to strengthen the implementation of environmental regulation and leverage environmental financing.

Low-Carbon Development Paths Program
Projects Update

Goal #1: **Assist China to develop scenario analysis tools that help government decision-makers anticipate the future impact of today's energy policy decisions, and apply the tools to formulate sustainable energy development plans.**

Helping China Reach its Energy Intensity Reduction Target

China intends to implement a 20-percent improvement in national energy intensity by 2010. In 2006, however, China failed to meet its annual 4-percent target. Leaders at the local level must take the initiative to implement annual energy intensity improvements. Leaders of provincial Development and Reform Commissions and Economic and Trade Commissions, who attended the Ninth Annual China Sustainable Energy Program (CSEP) Senior Policy Advisory Council (PAC) meeting, are now working to improve energy efficiency in their administrative areas. The LCDP Program is supporting the development of municipal, provincial, regional and sectoral energy efficiency targets, along with specific implementation plans.

Currently, the Shanghai municipal, Jiangsu provincial, and Shandong provincial governments are formulating local practices for reducing energy intensity, with assistance from CSEP grantees the State Council Development Research Center (DRC), the Beijing Energy Efficiency Center (BECon), Energy Research Institute (ERI), China Academy of Social Science (CASS), and Lawrence Berkeley National Laboratory (LBNL). The grantees are working with both domestic and international groups to develop provincial action plans and training programs, thus providing a roadmap for other local governments that incorporates such policy options as Demand-Side Management (DSM), renewable energy, voluntary energy efficiency agreements for industrial enterprises, public transportation, building codes, and energy efficiency standards for household appliances. Grantees are developing corresponding policies, with an emphasis on local tax and fiscal incentives. Local grantees are disaggregating the provincial targets into specific targets for sectors, sub-sectors, cities, and enterprises.

Recommendation:
In order to meet its energy intensity reduction target, China should:

- Hold local leaders accountable, through annual performance evaluations, for meeting the national energy intensity target and environmental improvement goals.
- Empower the National Development Reform Commission, Environmental Protection Bureaus, and other agencies to gradually raise coal and oil prices, thereby internalizing the costs of pollution and creating an incentive for enterprises to invest in energy efficiency.
- Use regulations and incentive policies to increase investment in energy efficiency and renewable energy;
- Implement policies to reduce the energy-intensity of China's economic structure; and

- Use regulations and incentive policies to support research and development for advanced energy efficiency and renewable energy technologies.

Local Capacity Building for Implementation of the 2010 20-Percent Energy Intensity Reduction Target

In order to ensure implementation of the national 20-percent energy intensity target at the local level, the central government has signed contracts with each province establishing province-specific energy intensity reduction targets for 2010. Grantees DRC and ERI are working with CSEP consultant Zhou Fengqi to do the following: (1) assist and train local government leaders in sustainable energy policy options for implementing the 2010 target; (2) provide capacity training for the new National Energy Conservation Center, and (3) provide capacity training for the newly-established provincial energy conservation centers. Their work covers provincial and local-level implementation of all CSEP-supported policy projects across all sectors, including buildings (appliance efficiency and building codes), industry (energy efficiency agreements), electric utilities (demand-side management), renewable energy (in electricity generation and in fuels), and transportation efficiency.

In addition, China Energy Conservation Association (CECA) and the South-North Institute of Sustainable Development (SNISD) are compiling success stories from amongst CSEP pilot projects, which provide a comprehensive account of the implementation process from design to evaluation. Studies include: (1) the Shandong Province Energy Efficiency Agreement (EEA) Pilot Program, where two successful steel EEAs informed China's national Top-1,000 Enterprises Energy Efficiency Program; (2) Jiangsu province's design and execution of China's first 150-MW Energy Efficiency Power Plant (EEP); and (3) case studies for appliance standards, equipment standards, and building codes implementation.

China Energy Vision 2050 and Climate Change Study

Given its global impact, China's approach to global warming is coming under increasing international scrutiny. Based on the International Energy Agency's (IEA) World Report 2006, China will exceed the US as the world's top greenhouse gas emitter in 2009, 16 years earlier than previous projections. To examine how China can cope with carbon emissions up to 2050, DRC, ERI, Tsinghua University, China Academy of Environmental Planning (CAEP) and China Academy of Agriculture Science are conducting a study on China's energy strategy under the scenario of global warming. Grantees will examine the effects of emissions caps, carbon taxes, and energy efficiency targets over varying time periods, accounting for environmental capacity, public health, pollutants, technical requirements (e.g. low-carbon technologies), and social and economic costs and benefits. The ultimate goal for this study is to prompt China to act progressively to limit carbon emissions and global warming.

Creating Key Performance Indicators (KPIs) for All CSEP Programs

All CSEP projects are evaluated on the basis of anticipated environmental improvements that result from project implementation, measured by reductions in air emissions including carbon dioxide. Progress is measured in quantified and standardized carbon reduction numbers, also known as Key Performance Indicators (KPIs). ERI is leading the State Power Economics

Research Institute (SPERI), Tsinghua University, Green Building Energy Efficiency Institute, and the China National Institute of Standardization (CNIS) to work with CSEP program sectors, refining quantification and analysis methodologies and developing KPI numbers for all main projects. The results will serve as one area of a funder-supported evaluation of CSEP, scheduled for 2008.

Goal #2: **Help China develop and implement "all-in costs" pricing of fossil fuels.**

Developing Policy Recommendations to Encourage Investment in Energy Efficiency and Renewable Energy

While China's investment in energy efficiency is growing, it is far exceeded by investment in fossil energy supply, and is too low for China to meet the 2010 energy intensity reduction target. To shift investment away from energy supply and toward demand-side efficiency, DRC is developing policies to improve financing of China's energy efficiency and renewable energy through banking system reform. DRC is now working to (1) identify barriers to increasing energy efficiency investment; (2) examine the applicability in China of international best practices in sustainable energy financing; (3) establish standards for self-sustaining energy efficiency financing including criteria such as sustainability and efficiency; (4) encourage the policy-oriented China Development Bank, domestic commercial banks, and financial institutions to invest in sustainable energy and urban development; and (5) help China's Stock Regulatory Commission to formulate a policy to stimulate energy efficiency and renewable energy investment.

Developing an Energy Tax

China is beginning to consider adopting a national energy tax. The Ministry of Finance (MOF) is supporting the adoption of a vehicle fuel tax, and is exploring the possibility of a broader, either revenue-neutral or revenue-generating, energy tax. ERI, which historically has helped to catalyze other energy pricing adjustments in China, is developing an energy tax plan to submit to the State Council, NDRC, MOF, and the State Administration of Taxation. ERI plans to (1) continue working with international partners to integrate U.S. and European experiences into China's tax design; (2) determine the optimal rates and incentives within the energy tax system; (3) further analyze a tax's impact on energy consumption, the environment, and the economy; and (4) advocate the implementation of an energy tax.

Developing a National Energy Statistics System

Currently, data from China's energy consumption statistics system is unreliable, due largely to inconsistencies in methodology among provinces. PAC member Xie Fuzhan, Commissioner of the National Bureau of Statistics of China (NBSC), has prioritized the development of a reliable and unified energy consumption data system. To this end, the Research Institute of Statistical Sciences (RISS) is working with the National Bureau of Statistics to (1) develop a national Energy Statistics System, integrating energy indexing, supervision, and evaluation mechanisms; and (2) support training for local statistics officials on the use of these statistical tools. This system will facilitate supervision of energy consumption and evaluation of officials based on energy-related performance. In addition, RISS's work will provide a statistical basis for analysis of China's carbon emissions.

Recommendation: In a market economy, tax and fiscal policies should be used to direct investment toward sustainable energy development.

Developing Comprehensive National Energy Policies

China lacks a comprehensive national energy policy to guide energy policy decisions. In its absence, national energy decisions are either left to energy supply companies or made in an ad hoc, nearsighted manner in which pressing energy demands are met by increasing supply through construction of new fossil fuel-fired power plants. To move towards a more sustainable and proactive approach, North China Electricity Power University (NCEPU) is working closely with the Office of the National Energy Leading Group (ONELG) to assess international market-oriented energy and environmental regulations, with the aim of helping to guide China's energy policy decisions and to coordinate sector-specific regulatory developments. NCEPU and the policy research team provided ONELG with information on comprehensive energy policies and energy regulations in over 20 countries, including the foremost policy options and regulatory experiences with energy efficiency and renewable energy development.

NCEPU and the policy research team are continuing to provide ONELG with recommendations on market-oriented energy policies, emphasizing energy efficiency and renewable energy. Research focuses on policies to (1) adjust China's energy mix, reducing coal usage; (2) prioritize energy efficiency and clean energy development; (3) incorporate all-in lifecycle costs in energy development; (4) shift public and private investment into energy efficiency and renewable energy; (5) reduce dependence on oil imports; and (6) address global warming.

Recommendation: China should consider adopting an Energy Law that achieves the following:

- Gives increased power to a single central administration, such as a Ministry of Energy, to coordinate and govern sectoral interests;
- Requires that new energy development options be assessed by comparing all-in lifecycle costs (i.e., the economic, social, and environmental costs incurred during the lifecycle of energy generation);
- Includes policies that shift public and private investment toward energy efficiency and renewable energy; and
- Encourages "win-win" approaches that allow China to meet the energy needs of a growing economy while reducing emissions and protecting the environment and public health.

Goal #3: **Encourage China's State Council (cabinet) to issue energy efficiency and renewable energy policy directives to central, provincial, and local governments in order to expedite policy development and implementation in all program areas.**

Facilitating the Submission of Key Energy Policy Recommendations

For a number of years, DRC and the State Council Research Office (SCRO) have cooperated to submit grantee energy efficiency and renewable energy policy recommendations to top national leaders and government ministries, covering such topics as tax and fiscal policies for clean energy development, the 2010 20-percent energy intensity reduction target, promotion of cleaner-burning vehicles and fuels, Bus Rapid Transit (BRT), development of efficient high-voltage transmission lines, and regulatory system reform. DRC has also advised senior decision-makers on the implementation of the Renewable Energy Law, energy efficiency building codes, household appliance standards and labeling, and vehicle fuel economy standards.

The continuing efforts of DRC and SCRO have improved grantee access to national leaders and built momentum for the adoption of several important grantee-developed policies. DRC and SCRO also advise senior decision-makers on policy implementation, and work with government officials, grantees, and other stakeholders to further develop previously-submitted policies.

Publishing Policy Recommendations in *Energy Policy Research*

Published by the China Energy Research Society (CERS), *Energy Policy Research* (*EPR*) is a high-level policy journal circulated to senior energy policymakers, including Premier Wen Jiabao and other ministerial-level officials. The journal serves as an important vehicle for disseminating grantee policy recommendations. We have submitted grantee policy recommendations to the journal since 2002, and are continuing to do so this year.

CSEP grantee reports and policy recommendations are published in the "Sustainable Development Forum" section of *EPR*. Policy recommendations published in 2007 focused on province-level implementation of the 2010 20-percent energy efficiency target, including (1) incentives and policies to encourage investment in energy efficiency and renewable energy development; (2) the necessity of a sustainable urban planning strategy combining public transportation and green buildings; (3) implementation of the Renewable Energy Law; and (4) policies to further clean coal development.

Educating the Media and the Public on Sustainable Energy Development

Global Village of Beijing (GVB), a non-governmental organization, aims to increase public awareness of sustainable development by coordinating workshops for Chinese journalists, producing television programs and other media publications, and hosting public forums. Over the past year, with our support, GVB organized six workshops and a media campaign on local experiences and challenges in reaching for China's 2010 20-percent energy efficiency improvement target, BRT development in China's major cities, the implementation of the more specific measures of the *Renewable Energy Law*, pilot projects for renewable energy utilization, and public transportation campaigns (e.g. "Public Transit Week" and "Car-Free Day."). Workshop attendees included journalists from the government-affiliated *People's Daily*, *Guangming Daily*, and *Xinhua News Agency*. GVB was instrumental in Beijing's decision to raise the standard temperature of air-conditioners in public buildings,

which was recently adopted by the State Council as a national standard for air-conditioning in all public buildings.

Initiating a Sustainable Lifestyle Campaign

A main driver of increases in China's energy consumption has been urbanization and the corresponding boom in residential buildings, private vehicles, and home electronics and appliances. As top-down measures have not adequately adjusted industrial structure or limited energy consumption, there is a need to examine how consumer preferences and perspectives on energy-efficient lifestyles could help China reach its sustainable development goals.

A group of grass-roots environmental non-profit organizations, including Global Village of Beijing (GVB), Friends of Nature (FON), and the Beijing Fuping Institute (Fuping), initiated a campaign to (1) encourage energy-saving behavior (e.g. use of public transportation, clean vehicles, energy efficient buildings and appliances, green electricity, reducing standby power, setting summer air conditioners at 26 degrees Celsius); (2) advocate enterprises and the public sector to meet the energy efficiency targets set by local governments; and (3) develop specific policy recommendations leveraging sustainable consumer behavior (e.g. through tax exemptions and subsidies for efficient products), public transit prioritization, and sustainable urban planning.

Recommendation: China should

- Inform the public of the importance of energy efficiency and renewable energy technology investment; and
- Issue incentives for consumers to shift towards more sustainable living practices.

Catalyzing Comprehensive Environmental Structural Reform

Regulatory structure and improved accountability of local officials are the keys to enabling robust enforcement of environmental laws and regulations, and thus to the success of clean energy technology market development in China. To catalyze comprehensive environmental regulatory reform, grantees submitted policy briefings to senior government decision-makers in 2006, including recommendations for a cabinet-level upgrade of SEPA, establishing a vertical system of authority for SEPA over local environmental protection bureaus (EPBs), strengthening law enforcement, implementing environmental performance criteria in the evaluation of personnel at all levels of government, and increasing public involvement.

This year, with guidance from Luo Jianhua (Director-General of the Administrative Office, Environmental Protection & Resources Conservation Committee of NPC) and consultant Zhang Hongjun, the Policy Research Center of Environment and Economy (PRCEE) of SEPA pursued the following: (1) a "Workshop on Environmental Regulatory Institutions," headed by Mao Rubai (Chairman of the National People's Congress Environmental and Resources Protection Committee) to examine SEPA's current regulatory capacity and international experiences, thereby producing an outline for institutional reforms; (2) a study tour for key Chinese decision-makers of European nations with strong national environmental regulatory systems; and (3) the drafting of policy recommendations to senior national leaders for improving SEPA's regulatory capacity, including reviews of previous and ongoing projects funded by CSEP and other donors. Experts from such institutions as the School of

Environment and Natural Resources (SENR), Renmin University of China (RUC) provided assistance on appendices on economic policies and environmental financing.

In addition, ERI, CAEP, and Peking University are developing policy recommendations to senior government agencies to (1) increase the Ministry of Finance's allocation of resources for environmental regulation; (2) ensure enforcement of more stringent pollution levies, including fuel and energy taxes; (3) internalize the social costs of fossil fuels; (4) develop market mechanisms to promote clean technology investment; (5) improve environmental enforcement through legislative adjustments; and (6) build capacity by piloting a vertical institutional structure within provincial EPBs.