THE CHINA SUSTAINABLE ENERGY PROGRAM

CSEP

可持续能源

Meeting China's Development Challenges
Through Energy Efficiency and Renewable Energy

The David and Lucile Packard Foundation,
The William and Flora Hewlett Foundation,
in partnership with The Energy Foundation

CONTENTS

MISSION

The David and Lucile Packard Foundation and The Energy Foundation launched the China Sustainable Energy Program (CSEP) in March 1999, after a series of meetings and consultations in China, the U.S., and internationally with scientists, policy-makers, business leaders, and policy analysts. The William and Flora Hewlett Foundation joined as a funding partner in 2002. The Packard and Hewlett Foundations provide funding, while the Energy Foundation manages the program.

THE PROGRAM'S MISSION IS:

To assist in China's transition to a sustainable energy future by promoting energy efficiency and renewable energy.

Energy is the world's most polluting industry, causing nearly all the world's acid rain, urban smog, global warming emissions, and much of the airborne toxins. These pollutants undermine public health and environmentally sustainable development. CSEP supports public policy development that encourages use of cost-effective, energy-efficient technologies—technologies that replace fossil fuels, and improve public health and environmental quality.

Cover Photo: Keren Su/Getty Images
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INTRODUCTION

The China Sustainable Energy Program (CSEP) is a grants initiative that strives to help the Chinese help themselves by furthering energy efficiency and renewable energy development, with the ultimate goal of improving China's public health and the environment. Our approach includes:

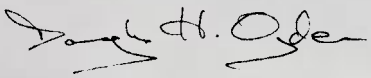
1. A focus on policy development. Our six program areas—buildings, transportation, industry, electric utilities, renewable energy, and low-carbon development paths (energy planning)—all support creation of market-oriented policy incentives that steer capital investment toward modern energy efficiency and renewable energy technologies;

2. A marriage of "top-down" and "bottom-up." Two high-level Chinese advisory groups provide guidance and strategic direction to CSEP programs—our Senior Policy Advisory Council (minister level) and Dialogue Partners (ministry directors general). National-level policy initiatives (top-down) are typically spear-headed by ministry-affiliated research institutes. These initiatives are then piloted at the provincial and local levels (bottom-up). The pilots test policy implementation, and aim to quantify new investment in energy efficiency and renewable energy, displaced fossil fuel emissions, and resultant health and environmental quality improvements;

3. A bridge between China and international policy experience. China actively seeks input and advice from the world community about clean energy development. At the request of Chinese grantees, we bring international policy practitioners to China for discussions and development of best policy practices, including the tailoring of policy approaches to local conditions; and

4. A Beijing office. Our Chinese staff of energy policy experts helps translate the advice of senior officials into grants projects, and engages government, academia, and business stakeholders in policy development and implementation.

CSEP awards $7 million in grants each year. The following describes some of the grantee initiatives and successes over the last five years. Our aim in this report is to give credit where credit is due; we find the grantee organizations listed in the following pages to be visionary champions of change. These are the groups, individuals, and initiatives that are pioneering China's sustainable energy future.



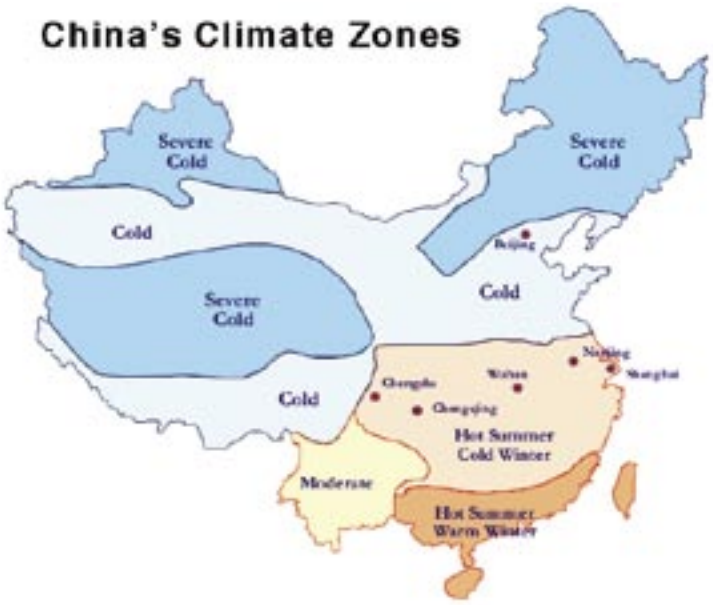
Douglas Ogden
Director
The China Sustainable Energy Program

BUILDINGS

BUILDING CODES

Codes require buildings to use modern materials, insulation, and advanced windows to reduce energy leakage. Codes also catalyze economic development—new industries emerge to produce advanced, energy efficient products that meet code requirements.

Grantees have developed energy efficient building codes for both Central and South China that could reduce carbon emissions by 250 million tons by 2020, and thus displace the need for 50 large (500-megawatt) coal-fired power plants.



Grantees have developed energy efficient building codes for the central "Hot-Summer Cold-Winter" and the southern "Hot-Summer Warm-Winter" climate zones, where most of China's population resides.

MAJOR GRANTEES

China Buildings Energy Efficiency Association
Shanghai Tongji University
Lawrence Berkeley National Laboratory
Natural Resources Defense Council

China's construction boom is the largest and fastest in human history. China's buildings consume 23 percent of the nation's total energy, a percentage that's rising rapidly. Through advanced building energy codes and appliance and equipment efficiency standards, China could launch an energy efficient products industry while cutting energy use.

APPLIANCE STANDARDS

China now makes more consumer appliances—refrigerators, air conditioners, light bulbs, and the like—than any other country. Just the expected increase in new air conditioners in China over the next five years will absorb the entire electricity output of the massive Three Gorges Dam.

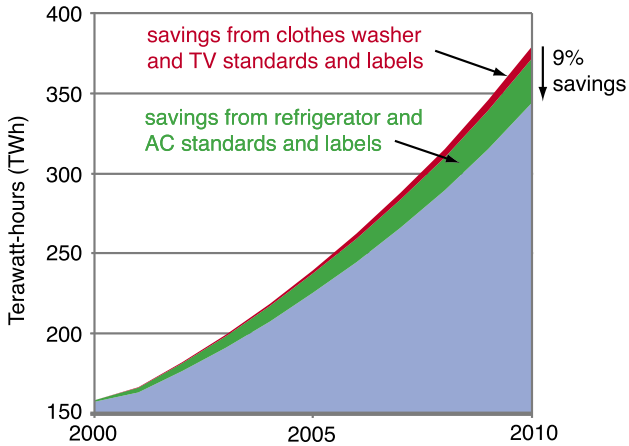
Requiring appliances to be more energy efficient is one of the most effective means for cutting electricity growth and the emissions from coal-fired electricity plants. Advanced standards also improve economic development by spurring the most advanced manufacturing approaches.

Grantees created efficiency standards for refrigerators, air conditioners, televisions, fluorescent lamps, clothes washers, and gas appliances that will displace the need for 51 large (500-megawatt) coal-fired power plants by 2020.

Preliminary design for China's first appliance energy efficiency label.

Residential Savings of 9% in 2010

Efficiency standards and labels for refrigerators, air conditioners, clothes washers, and TVs will save 9% of all residential electricity in 2010.



Source: Lawrence Berkeley National Laboratory

MAJOR GRANTEES

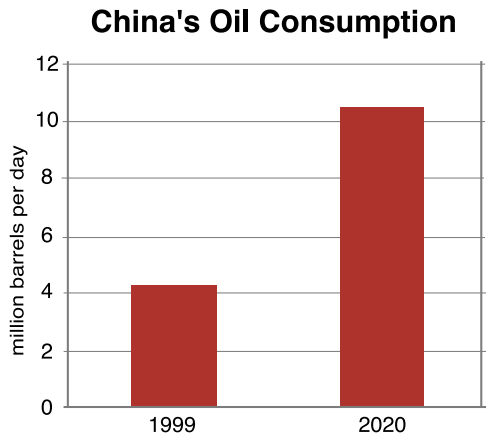
China National Institute of Standardization
China Certification Center for Energy Conservation Products
American Council for an Energy-Efficient Economy
Lawrence Berkeley National Laboratory

TRANSPORTATION

FUEL EFFICIENCY STANDARDS

Fuel efficiency can slash dependence on foreign oil. Stringent fuel efficiency standards catalyze huge fuel savings, and also cut tailpipe emissions, improving air quality and public health.

CSEP has supported the development of China's first fuel efficiency standards. China's Standards Administration adopted fuel efficiency standards for cars that will update China's engine technologies and save 23 million tons of carbon in 2020, **displacing 212 million barrels of oil—equivalent to removing 25 million cars from the road.** And if the standard were to be expanded to include not only cars but also trucks and motorcycles, oil savings could be twice as much by 2020.



ADVANCED VEHICLES

A revolution is underway globally in developing efficient, low and zero-emission vehicles. For example, California will have 430,000 hybrid-electric vehicles on its roads by 2010. Because New York and Massachusetts also have hybrid vehicle requirements, nationally there will be about 850,000 hybrids plying America's roads.

China could leapfrog to hybrid-electric vehicles by adopting policies that provide incentives for clean vehicles while penalizing inefficient, polluting cars and trucks. Jumping to hybrid vehicles could also become a profitable export strategy.

Grantees helped China's Ministry of Science and Technology develop and adopt a five-year $100 million R&D program to develop advanced hybrid-electric and fuel cell vehicles.

MAJOR GRANTEES

China Automotive Technology and Research Center
Northern Jiaotong University
Tsinghua University
Feng An, Consultant
Michael Walsh, Consultant
Michael Wang, Consultant

The torrid growth of China's transportation sector is leaving the bicycle behind as China shifts to automobiles as a "pillar industry." To accommodate cars, China has gone from being an oil exporter in 1993 to importing one-third of its needs today. Car purchases now dominate economic activity; new car sales in major cities jumped 38 percent in 2003.

Beijing's preliminary Bus Rapid Transit System design.

CLEAN FUELS

Tailpipe emissions cause the majority of air pollution in China's major cities. Clean fuels are a prerequisite to hybrid-drive vehicles as well as reduced tailpipe emissions.

If China is to clean up its fuels and achieve parity with Japan by 2010, gasoline and diesel sulfur levels must be reduced to a maximum of 50 ppm by that time.

Comparison of 2010 Fuel Sulfur Content

parts per million (ppm)

	China	USA	Europe	Japan
Gasoline	800	15	10	<50
Diesel	2000	15	10	<50

Grantees are now promoting tighter fuel standards. A national gas tax of under 4 cents per gallon (9.9 fen per liter) could retrofit all China's refineries by 2010 to produce low-sulfur fuels for advanced, clean vehicles.

BUS RAPID TRANSIT

Traffic congestion suffocates urban development, causing serious declines in worker productivity. Less affluent Chinese are being left behind as cars take over the roadways and bicycles become less safe.

China's dense cities cannot physically absorb unfettered vehicle use. Congestion is already severe; new roads only fill up, choking economic growth and productivity.

CSEP is working to help China develop cost-effective multi-modal transit systems. Ultra-modern, dedicated-lane buses, moving station-to-station, can move people with subway efficiency at **5 percent of subway costs.**

Grantees have helped Beijing commit to building a 15-kilometer Bus Rapid Transit (BRT) corridor in 2004. Kunming is building a comprehensive 39.5-kilometer system. These BRT systems serve as models for national, and international, replication.

MAJOR GRANTEES

SINOPEC Economic and Development Research Institute
Beijing Transportation Development Research Center
Kunming Transportation Planning Institute
Lawrence Berkeley National Laboratory
Taiwan University
Xu Kangming, Consultant

INDUSTRY

INDUSTRIAL EQUIPMENT STANDARDS

Industrial equipment standards—for electric motors, compressors, fans, etc.—promise to deliver enormous energy savings. Electric motors consume the majority of China's electricity. CSEP is supporting new motor standards that could **save 240 million tons of carbon by 2020 and cut the need for 37 large (500-megawatt) coal-fired power plants.**

MAJOR GRANTEES

China National Institute of Standardization
American Council for an Energy-Efficient Economy

China's industrial sector, dominated by large, state-owned enterprises, consumes two-thirds of the country's primary energy and emits the bulk of China's carbon dioxide.

ENERGY EFFICIENCY

CSEP has supported development of market-oriented policies— particularly energy efficiency sector targets—that help industrial enterprises cut energy use and prepare for competition under WTO. Sector targets have been successful in Europe; the Dutch government established targets with its principal industrial enterprises and succeeded in improving overall industrial energy efficiency 20 percent between 1990-2000.

CSEP supported pilot implementation of sector targets with Shandong Province's two largest steel enterprises, an approach that serves as a national model for implementing China's Energy Conservation Law and Clean Production Law. These targets will **save 275,000 tons of carbon over three years.**

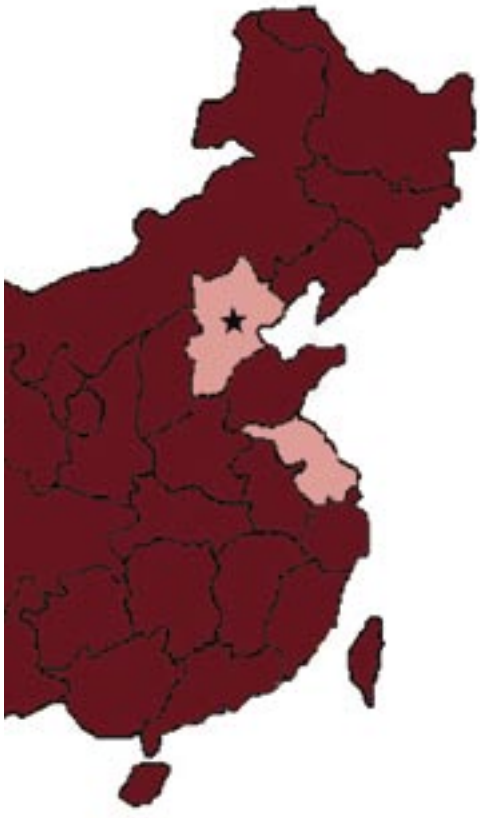
MAJOR GRANTEES

China Energy Conservation Association
Lawrence Berkeley National Laboratory
Netherlands Organization for Energy and the Environment

ELECTRIC UTILITIES

STATE ELECTRICITY

Establishing regulatory structures to insure least-cost electricity development—including energy efficiency when it is cheaper than new supply—has been a priority of grantees. CSEP supported a dozen research institutes affiliated with central government ministries to design a regulatory body to oversee the electricity sector, which helped establish China's new State Electricity Regulatory Commission (SERC). International grantees are providing training to SERC's new commissioners and staff in best international practices to assure successful reforms, including regulatory incentives for energy efficiency and renewable energy.



DEMAND-SIDE MANAGEMENT

Demand-Side Management (DSM) programs help cut energy use, making China's economy more competitive, and reduce the environmental and health impacts of fossil fuels. Grantees have launched several pilot projects in East China.

• **Beijing's** municipal government issued a preferential off-peak power tariff and other policies to promote the efficient use of electricity.

• **Hebei Province** adopted a small electricity "wires charge" that raises $10 million each year for energy efficiency projects.

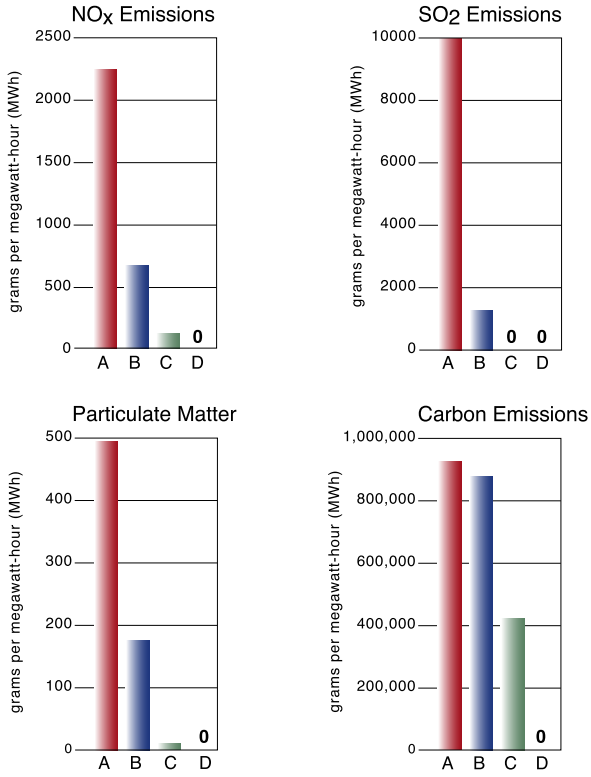
• In 2002, **Jiangsu Province** allocated $5 million to leverage over $70 million in DSM investment by 70 industrial and commercial enterprises.

China's electricity sector—its most polluting industrial sector due to the dominance of coal-fired power plants—is undergoing phenomenal growth.

GENERATION PERFORMANCE STANDARDS

In China's emerging, competitive electricity market, regulators must ensure that increasingly diverse generation resources, including energy efficiency and renewable energy, face a level competitive playing field. Generation Performance Standards (GPS) cap emissions on a kilowatt-hour production basis, thereby requiring older, dirtier power plants to internalize the costs of their pollution. This helps shift investment to natural gas, energy efficiency, and renewable energy. Grantees developed a draft national GPS rule and launched GPS implementation pilots in Zhejiang, Jiangsu, Shandong, and Shanxi provinces.

Air Emissions from Chinese Fossil Fuel Power Plants



A) Average Chinese Coal Boiler
B) Average New Coal Boiler
C) Gas Combined-Cycle Turbine
D) Wind Turbine

Key assumptions for the graph include the following:
- Chinese Coal Boiler: 225g NOx/MMBtu, 540g SO2/MMBtu (low sulphur coal), heat rate = 10,000 Btu/kWh
- New Coal Boiler: 71.1g NOx/MMBtu, 135 SO2/MMBtu (scrubber), heat rate = 9,504 Btu/kWh
- Combined-Cycle: 9ppm Nox, heat rate = 7,500 Btu/kWh
- Emissions based on 300 MW power plants

Sources: Ralph Cavanagh, "Congress and Electric-Industry Restructuring: Environmental Imperatives," Electricity Journal 12(6): 21-31; Pacific Northwest National Laboratory.

MAJOR GRANTEES

Institute of Economic System and Management of the State Council Office for Restructuring the Economic System
State Power Economic Research Center
China Research Academy of Environmental Sciences
Regulatory Assistance Project
Natural Resources Defense Council

RENEWABLE ENERGY

MANDATORY MARKET SHARE

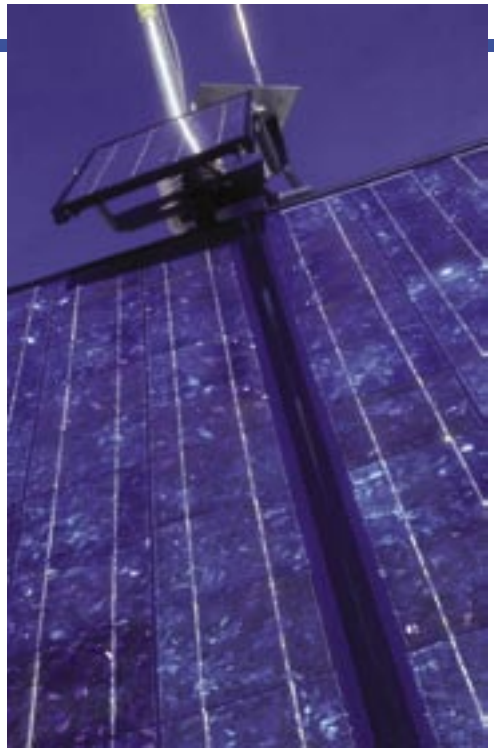
With CSEP support, China is beginning to tap its renewable energy potential.

Mandatory Market Share (MMS) requires a certain percentage of all electricity to come from renewable energy. Grantees in Fujian and Sichuan provinces have helped launch MMS pilots; **Fujian announced it will build 200 megawatts of new wind facilities—an investment of over $200 million**—in order to implement its MMS program.

MAJOR GRANTEES

Center for Renewable Energy Development
of the Energy Research Institute
Tsinghua University
Center for Resource Solutions

China could easily become the world's number one wind energy producer. If China develops even half its conservatively estimated wind resources, it could generate about 275 billion kilowatt-hours of power each year—about one-fifth of the country's current demand—displacing the need for 125 million tons of coal, two million tons of sulfur dioxide emissions, and 65 million tons of carbon emissions.



WIND CONCESSIONS

In Guangdong and Jiangsu provinces, grantees helped design and implement wind concession programs that auctioned wind development rights to private developers, leading to another $200 million in new wind installations to be built over the next couple of years. All in, **China has announced over 700 megawatts of new wind facilities, a possible investment of over $700 million.** These pilots are proving that cost reductions in wind energy will be quickly achieved.

Heilongjiang Province:
113 megawatts

Hebei Province:
200 megawatts

Jiangsu Province:
100 megawatts

Fujian Province:
200 megawatts

Guangdong Province:
100 megawatts

LOW-CARBON DEVELOPMENT PATHS

NATIONAL ENERGY PLAN

China's people, competitiveness, and environment will be best served if economic growth is fueled by increased energy efficiency and the cleanest technologies. China has committed to quadrupling its GDP by 2020.
If this quadrupling is achieved using coal, the public health and environmental consequences, already severe, could become dire. For the health of its people and the balance of its environment, China simply must engineer a new, low-carbon energy development path—and quickly.

Beginning in 2002, CSEP supported eleven central government ministries and research institutes to develop a National Energy Plan for 2004-2020. The Plan is built upon a five-year energy scenarios analysis effort by grantees that assesses China's economic sectors and analyzes China's overall energy efficiency potential.

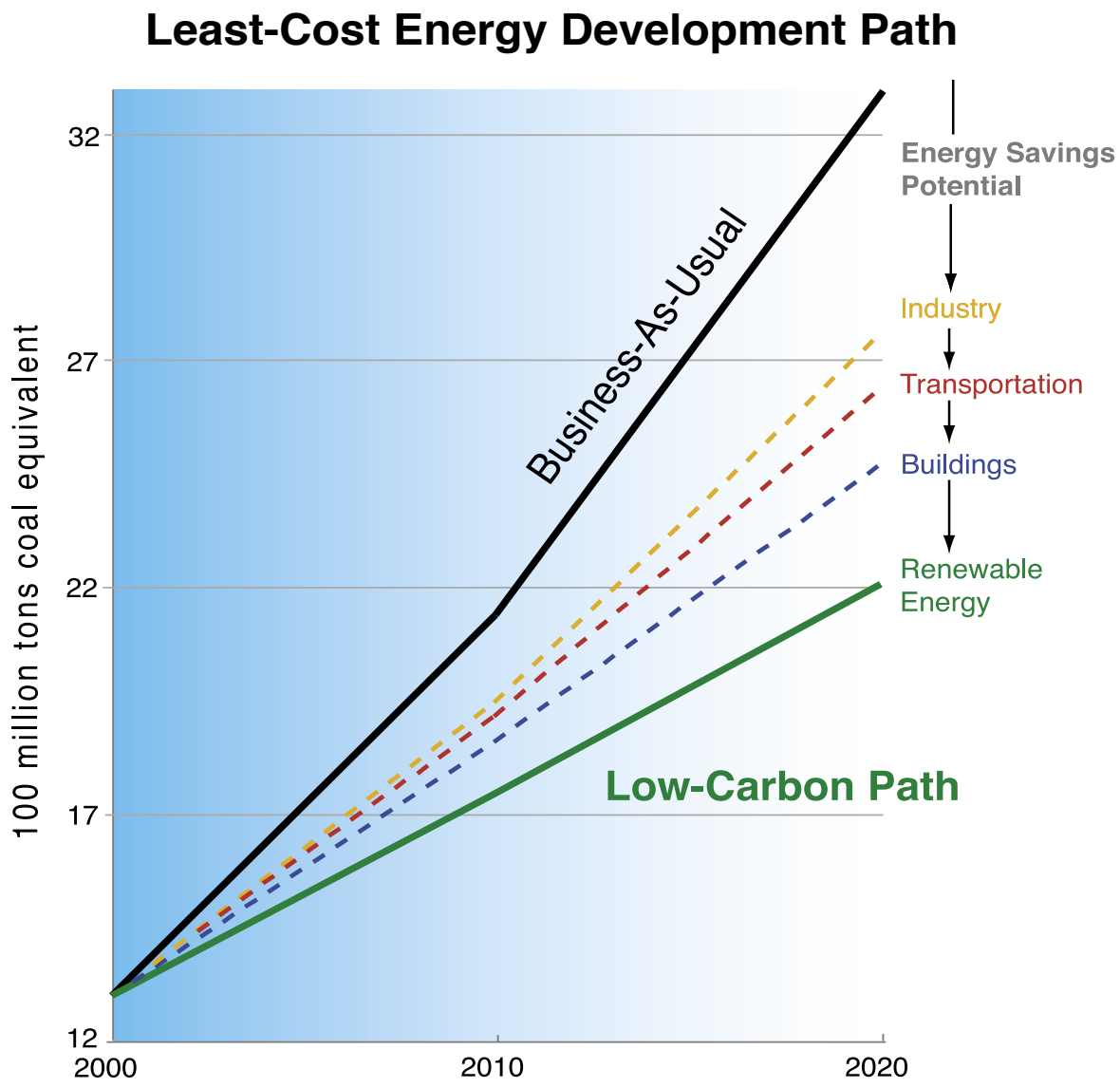
The scenarios show that, with aggressive energy efficiency and renewable energy policies adopted today, **China could cut one billion tons of coal by 2020** while growing its fossil energy use at a far slower pace than economic growth. Although fossil consumption will likely increase 90 percent above today's levels, this is a much smaller fraction of what could otherwise be expected in a quadrupling of China's national economy.

Carbon emissions could drop over 40 percent such that, by 2020, China's per capita carbon emissions will be less than one ton, about 33 percent of the OECD countries' and 93 percent of the world's average.

MAJOR GRANTEES

State Council Development Research Center
Beijing Energy Efficiency Center
Lawrence Berkeley National Laboratory

China aims to quadruple its GDP by 2020, and is growing consistently with that goal. This means there will be three more economies the size of present China in under two decades—an immense energy and environmental challenge.



These optimistic scenarios, however, will not happen without aggressive government action today. The institutional challenges of accomplishing the many CSEP-supported energy efficiency and renewable energy policy initiatives are substantial. Yet by pushing forward with these policies now, China's leaders are putting the nation's environmentally sustainable development on track to succeed.

General Application Information

- The Energy Foundation makes grants to non-governmental non-profit charitable organizations (equivalent to public charities as classified under U.S. law).
- The foundation evaluates grant requests primarily on their ability to: (1) deliver real commitments to energy efficiency and renewable energy in China; and (2) build capacity in organizations within China and thereby further sustainable energy policy progress.
- The foundation has limited resources and is unable to provide funding for all grant requests. Grants are allocated on a competitive basis, and are awarded based on their ability to build durable and enforceable energy efficiency and renewable energy policies and practices. Preference will be given to those proposals that are able to attract significant co-funding from other sources, particularly in China.
- So as to minimize confusion, please bear in mind the foundation is not able to provide funding for:

1) Efforts aimed at influencing central government, provincial, or municipal legislatures;
2) Local community projects, unless they have been consciously designed for further replication or have broad provincial, regional, or national implications;
3) Technology demonstrations (e.g., model solar installations or model energy-efficient buildings) or the research and development of technology (e.g., funds to develop hybrid automobiles or commercialization of an invention);
4) Fossil fuel supply technology policies, including coal, clean coal, or natural gas, although the program will consider supporting advanced clean coal, natural gas, and carbon sequestration policy initiatives that are likely to substantially increase energy efficiency and carbon emissions abatement;
5) The acquisition of land, capital construction, or the planning, renovation, maintenance, retrofit, or purchase of buildings, even if the intent is to save energy;
6) "Overhead," such as rent, leases, equipment costs, depreciation, or other indirect charges beyond those directly incurred by the project. Grants are made for funding actual program costs only;
7) The purchase of equipment (e.g., copiers or computers);
8) The "pre-proposal" stage for those seeking to submit proposals for consideration.

How to Apply for a Grant

Because the Energy Foundation's funding priorities are specialized, we recommend that all applicants carefully review these guidelines. For those who are fairly sure your project fits the guidelines, we encourage you to write a brief letter of inquiry in English describing the project, its purpose, and the amount you are requesting. We will notify you if a full proposal is warranted. All inquiries should be submitted directly to the Energy Foundation's Beijing office via mail, fax, or email.

For those organizations forwarding a full proposal, please send us the application form (see details below) filled out in English, one copy of your proposal (translated into English), and the supporting documents listed below, to the Energy Foundation's Beijing office. The foundation will send a notice confirming receipt of the proposal and will review the proposal and send a formal response to the applicant within six weeks. Outstanding proposals will then be submitted to the Energy Foundation Board of Directors, which in turn retains final authority over whether to fund any particular grant.

The Energy Foundation will review projects based upon their direct relevance to priority policy issues identified through dialog with Chinese agencies, non-governmental organizations, and advisors. Proposals will be judged upon the following criteria:

- Ability to promote priority policy objectives;
- The feasibility of the project;
- Design of how project progress will be monitored and evaluated against goals;
- The ability to deliver enforceable policy change;
- External peer review of project design.

The foundation seeks to maximize the impact of its funding by:

- Seeking co-funding for projects whenever possible;
- Seeking the support of Chinese non-governmental organizations via in-kind provision of staff time, meeting venues, etc.

The Proposal

Proposals to the foundation should follow a format that best conveys the strengths of your project. In general, a complete proposal includes the following, presented in English:

- The attached application form as a cover sheet;
- A clear statement of the problem(s) to be addressed;
- A statement of the policies that can remedy the problem(s);
- A discussion of the decision-maker(s) who can implement the policies;
- A background description of what has been done to date, and who has been involved in related projects undertaken by the applicant or other organizations;
- A description of the project strategy, setting forth how you will go about implementing the project;
- An analysis of how the project will be enforced, so that it will lead to sustained, durable change;
- A discussion of the results you expect from your project, including specific timelines and a work plan for achieving those results by specific dates;
- A detailed project budget set forth in a financial statement format, including a brief explanation of the budget, a list of other sources of actual and potential funding for the project, and a description of plans to secure additional funding and/or in-kind commitments (a sample budget can be downloaded at http://www.efchina.org);
- A discussion of how you will determine whether your project is successful, including how these results can be measured objectively;
- A history of your organization, including mission, goals, and most successful projects.

Supporting Documents

To consider a proposal for funding, we also need the following documents:

- Organization budget;
- Most recent financial statements, if available (and audited, if possible);
- A current annual report, if available;
- List of board of directors and officers;
- Curricula Vitae of key personnel involved in project.

Deadlines

All grants awarded by the China Sustainable Energy Program must be approved by the Board of Directors of the Energy Foundation. The Board of Directors meets three times a year (the first week of March, the last week of June, and the first week of November). We accept proposals on a rolling basis. There are no specific deadlines. However, in order for the foundation to consider a proposal for inclusion in a specific docket, we need to receive the initial inquiry letter approximately four months in advance of the next board meeting (e.g., by November 1 for the March board meeting, by February 15 for the June board meeting, and by July 1 for the November board meeting); proposals need to be submitted approximately three months in advance of the next board meeting (i.e., by December 1 for the March board meeting, by March 15 for the June board meeting, and by August 1 for the November board meeting). Please keep in mind that it takes approximately six weeks to review inquiries and proposals and to contact you with a response.

Step 1:

Please carefully review the guidelines.

Step 2:

If you think your project fits the guidelines, please submit a two or three-page letter of inquiry—in English—that briefly describes your project, its purpose, and the amount you are requesting. All written inquiries should be mailed, faxed, or e-mailed to the Energy Foundation's Beijing office. We will notify you if a full proposal is warranted.

Step 3:

If you are submitting a full proposal, please include the information requested on the application form, and provide answers to the questions on that form using separate pieces of paper. Proposals should fully describe all aspects of the project in detail, should be in English, and typically would average six-to-ten pages in length. If you need more space to fully describe your project, feel free to add more pages.You can download a full-length application form from our website at www.efchina.org. Our website also offers a downloadable model proposal and a model budget template for your reference, which are intended as examples only. We accept proposals in any format.

Step 4:

Please send inquiries and proposals to the Energy Foundation's Beijing office:

The China Sustainable Energy Program
The Energy Foundation—Beijing Office
CITIC Building, Room 2403
No. 19, Jianguomenwai Dajie
Beijing, 100004 P.R. China
Tel: 86-10-8526-2422
Fax: 86-10-6525-3764
Email: china@ef.org
Website: www.efchina.org

For more information, you may also contact the Energy Foundation's San Francisco office:

The China Sustainable Energy Program
The Energy Foundation
1012 Torney Avenue #1
San Francisco, CA 94129 U.S.A.
Tel: 415-561-6700
Fax: 415-561-6709
Email: china@ef.org
Website: www.efchina.org

I. Organizational Background

Name of Organization:			Date of Application:
Mailing Address:			
City/County:	Province/State:	Country:	Postal Code:
Telephone:		Fax:	
Email Address:		Website:	
Primary Contact Person:		Primary Contact's Title:	
Primary Contact's Direct Telephone:		Primary Contact's Direct Fax:	
Primary Contact's Direct Email:		Date organization was founded (month/year):	
Tax Status: (Please check one) __Government Institution __School __U.S. 501(c)3 Non-Profit organization __Affidavit of Public Charity __Other			
(1) Main purpose(s) of organization		(2) History of organization (including goals and previous projects)	

II. Sector (please identify which program category best describes your project): __Buildings __Industry __Electric Utilities __Renewable Energy __Transportation __Low-Carbon Development Paths

III. Project Background

(1) Please describe the main problem(s) that this project will address.

(2) Please describe the main public policies that can remedy these problems and how your project will further these policies.

(3) Please discuss (name) the decision-makers and venues that can implement these policies.

(4) Project Description
- (a) What has been done to date?
- (b) Who have been the main parties involved?
- (c) Who have been the principal funders of the project to date?
- (d) Please describe the project strategy and your work plan for securing decision-maker implementation of the project.
- (e) Please describe a plan for how the policy goals for the project will be enforced.
- (f) How will you measure the success of your project?

IV. Budget

(1) Total organizational budget;

(2) Total project budget;

(3) Amount requested from the Energy Foundation;

(4) For what duration;

(5) Other sources of funding for the project (please include a description of past, present, and future funding from all Chinese and international sources, including plans for securing additional funding and in-kind contributions, particularly from sources in China);

(6) Other proposals pending and with whom;

(7) Please provide a detailed project budget in a financial statement format (a budget template in MS Excel format is available on our website at www.efchina.org).

V. Supporting Documents (Please include these materials with your proposal)

- List of board of directors and officers;
- Resumes of key personnel involved in project;
- Most recent (audited) financial statements;
- A current annual report.

* The China Sustainable Energy Program supports non-governmental non-profit institutions that are "equivalent to" public charities in the U.S. If you have an affidavit of public charity equivalence, please submit a copy of it with this form.

THE CHINA SUSTAINABLE ENERGY PROGRAM

The David & Lucile Packard Foundation, The William & Flora Hewlett Foundation,
in partnerhip with The Energy Foundation

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XIANG Mei, Program Associate

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