

**TAB 4: DEPARTMENT OF ENERGY**

**Note: Copies of signed Department of Energy agreements can be found at the website, [https://ostiweb.osti.gov/iaem/country-frame\\_bi.html](https://ostiweb.osti.gov/iaem/country-frame_bi.html) .**

## **High Energy Physics Cooperation with China 2002-2003**

### **BACKGROUND**

The Implementing Accord between the Department of Energy (DOE) of the United States of America (USA) and the State Scientific and Technological Commission of the People's Republic of China (PRC) on Cooperation in the Field of High Energy Physics was signed in Washington, DC on January 31, 1979, along with the Agreement Between the Government of the United States of America and the Government of the People's Republic of China for a five-year period.

The S&T Agreement was last renewed on April 25, 2001 for five years, through April, 2006.

### **OBJECTIVE**

The objective of the High Energy Physics Implementing Accord is to further the research programs of each country by establishing a framework for cooperation in the field of high energy physics, including theoretical and experimental research, accelerator design and construction techniques, and related technology.

The cooperation between the U.S. and the PRC in high energy physics research conducted under this Accord has included the development of facilities for such research and their use in seeking a better understanding of the fundamental constituents of matter and the interactions between them.

### **DESCRIPTION**

During the period under consideration, cooperation under this Accord has involved exchange of information on scientific and technical developments, exchange of personnel for collaboration on scientific experiments, and visits of technical teams for exchange of information about and training in the application of technological developments.

All of the work carried out under this Program unclassified and unrestricted. Results from this work are published in the open literature and discussed at open national and international conferences. The U.S./PRC Program for Cooperation in the Field of High Energy Physics deals only with areas of science and technology that do not involve sensitive technology or are of potential military applicability.

The Program of Cooperation in High Energy Physics is a modest part of the U.S. high energy physics research program, but it is beneficial to both participants and to the scientific field of High Energy Physics.

### **STATUS & ACCOMPLISHMENTS**

The U.S. and the PRC formed a Joint Committee to oversee the work done under this Program. The Committee meets annually to review progress on the specific Items for Cooperation carried out under the program, and to formulate a detailed Program of Work for the upcoming year. There are reports on the status of each item given by both the U.S. and PRC sides. This method of guiding and monitoring the Program seems to work very satisfactorily from the perspectives of each side.

The Chinese government recently decided to underwrite a major upgrade of the Beijing Electron-Positron Collider (BEPC) and its dedicated detector (BES). These upgrade projects, which are now under way, are currently the principal foci of the Cooperative Program. Probably the most significant development during the period under discussion was a multi-day meeting of the "International Machine Advisory Committee" at SLAC. The membership of this Committee includes scientists from U.S., German, and Japanese laboratories, as well as from Chinese laboratories. Its purpose is to review the plans and progress for the BEPC upgrade, both from a technical and a managerial point of view, to insure that the project succeeds in reaching its ambitious scientific goals.

### **ISSUES/CONSTRAINTS**

Each year, a detailed plan of exchanges and visits for scientific cooperation is formulated. During the past year, nineteen of the twenty-eight agreed exchanges did not in fact occur. This is unprecedented in the history of the PRC/U.S. Cooperative Program. While one of the items was deferred because of concerns about SARS, by far the most significant problem was the difficulty that Chinese scientists have experienced in obtaining visas to enter the U.S. in a timely manner, and the negative environment that the current visa practices have engendered.

### **PLANNED FOLLOW-ON ACTIVITIES**

It is planned to continue this program in its current mode.

### **NAMES, TITLES, AND CONTACT INFORMATION FOR RESPONSIBLE DOE OFFICES AND/OR LABS:**

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Department of Energy:	Jeff Mandula, Office of High Energy Physics
Argonne National Laboratory:	Larry Price, Director, High Energy Physics
Brookhaven National Laboratory:	Tom Kirk, Associate Laboratory Director
Fermi National Accelerator Lab:	Mike Witherell, Laboratory Director
Lawrence Berkeley National Lab:	Pier Oddone, Deputy Laboratory Director

Stanford Linear Accelerator Center: Jonathan Dorfan, Laboratory Director

**NAME, TITLE, CONTACT INFORMATION FOR ALL CHINESE COUNTERPARTS:**

Institute of High Energy Physics (IHEP):                   Chen Hesheng, Director  
Shanghai Synchrotron Radiation Center (SSRC):    Xu Hongjie, Director

The above institutions are laboratories of the Chinese Academy of Sciences (CAS).  
Lu Yongxiang is the President of the CAS and Jin Duo is the Director General of the  
CAS Bureau of Basic Sciences and heads the Chinese delegation to the annual meeting of  
the oversight committee.

**CHINESE VISITORS TO THE U.S.**

Lu Yongxiang is the President of the CAS and Jin Duo is the Director General of the  
CAS Bureau of Basic Sciences and heads the Chinese delegation to the annual meeting of  
the oversight committee.

**BUDGET**

We estimate the DOE costs associated with our collaboration to be in the range of \$200 -  
400 K. We have no estimate of the Chinese costs.

**PROJECTED ACTIVITIES BETWEEN 2004-2010:**

We anticipate that activities under this S&T agreement will continue in the current mode  
during the upcoming decade.

## **U.S.-PRC FUSION COOPERATION PROGRAM (2002-2003)**

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### **PROTOCOL**

#### **(2002-2003)**

Protocol Between the Department of Energy of the United States of America and the State Science and Technology Commission of the People's Republic of China on Cooperation in the Fields of Nuclear Physics and Controlled Magnetic Fusion Research

**[Note: This report pertains to the Fusion Protocol.]**

### **AGENCY**

U.S. Department of Energy (DOE)

### **FOCUS**

The objective of the Fusion Protocol is to cooperate in promoting controlled magnetic fusion science and technology. To date, cooperation that has taken place is under the Protocol in the general form of scientist-to-scientist collaborations, exchanges of data and open literature, and visits to each other's facilities for information exchange. The U.S.-PRC Fusion Program of Cooperation, though modest in scale, is mutually beneficial to both sides of the cooperation.

### **DESCRIPTION**

The Protocol between the Department of Energy (DOE) of the United States of America (USA) and the State Science and Technology Commission (SSTC) of the People's Republic of China (PRC) on Cooperation in the Fields of Nuclear Physics and Controlled Magnetic Fusion Research was signed May 11, 1983 for a five-year period. While the two programs (nuclear physics and magnetic fusion) are combined in a single protocol at the insistence of the PRC, this protocol only covers work on magnetic fusion.

Annex I to the Protocol, covering Intellectual Property Rights, was signed on March 13, 1986. The Protocol is subordinate to the Agreement between the Government of the U.S.A. and the Government of the People's Republic of China on Cooperation in Science and Technology (S&T) which was signed in Washington, DC on January 31, 1979.

The Protocol was extended to April 30, 1991, for another five years to be coterminous with the overall S&T Agreement which was extended and amended to include a new Annex, Annex I, for the protection of intellectual property. The S&T Agreement was extended again effective April 30, 1996 for another five years through April 30, 2001. The S&T Agreement and the Fusion Protocol were extended again on April 25, 2001 for another five years through April 25, 2006.

## **AGENCY OFFICE**

Office of Fusion Energy Sciences (SC-50)  
Office of Science

## **AGENCY CONTACT**

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## **FUNDING SOURCE**

Office of Fusion Energy Sciences

## **BUDGET**

Aside from hardware procurement noted above, we estimate annual expenditures to be \$150K to \$200K and an equivalent of less than 1 person-year.

We understand that China invests more than the equivalent of \$125,000 annually in support of its participation in the fusion program of cooperation.

## **STATUS**

The U.S. and PRC Coordinators agreed to appoint Executive Secretaries to plan and oversee the ongoing work of the bilateral cooperation. The Executive Secretaries have the responsibility to identify Key Persons for each exchange item on the program and to ensure effective preparation for and execution of each item. Two types of specific activities were accepted by both Parties - particular research tasks and exploratory discussions.

There have been eight U.S.-PRC Fusion Program Coordinators' Meetings on Cooperation in the Field of Controlled Magnetic Fusion Research and the annual programs have been fulfilled satisfactorily. The U.S. benefits significantly from the science learned in these joint and collaborative experiments. The existing and potential new physics experiments and the potential to perform tests of materials and blanket behavior in Chinese test facilities make bilateral activities of continuing interest. For the 2002-2003 bilateral program, there were a total of 26 exchanges and 65% of these exchanges were completed

by December 2003. Both sides are preparing preliminary proposals for 2004-2005 coordinated tasks which will include plasma physics, fusion technology, power plant studies, and materials research at a modest level of activity of about 20-30 exchanges. Also included will be cooperation associated with the new HT-7U project, a large superconducting tokamak to be located at the Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP) in Hefei. (The HT-7U has now been renamed as the EAST tokamak.) In February 1999, a Memorandum of Understanding (MOU) between General Atomics (GA) in San Diego, CA, and ASIPP was signed to advance collaboration on GA's DIII-D tokamak and China's HT-7U tokamak. This collaboration drew on the DIII-D physics and operating experience to provide technical support for the HT-7U design. The Chinese plan to finish the construction of the device by the end of 2004.

Recently, GA and ASIPP have proposed another Memorandum of Understanding (MOU) on an expanded collaboration between the DIII-D Program at GA and the EAST Tokamak Program at ASIPP. The collaboration, which is in planning and approval stages, includes joint work on design and fabrication of tokamak components and plasma control system that would benefit both programs. The collaboration would also include scientific participation in the DIII-D and EAST experiments. The scope and pace of this collaboration will be determined by the resource requirements.

Under the framework of the U.S.-PRC fusion protocol, the Fusion Research Center (FRC) at the University of Texas at Austin entered into an agreement to subcontract with ASIPP for engineering, design and fabrication of the new DOE HELIMAK project at the FRC. The ASIPP has a unique history of collaboration with the FRC, having participated for many years, and most importantly, having designed and fabricated the vacuum vessel for TEXT-U at the FRC. The HELIMAK project used the resources from the TEXT and TEXT-U projects. The subcontract to ASIPP was for \$205,000 for approximately 18 months. This cost mainly consisted of materials and consumables, instrumentation, and personnel supplements. ASIPP contributed to the cost of fabrication and appointed six key scientists and senior engineers to take overall responsibility for completing the joint work. It was anticipated that a total of 132 man-months would be necessary on the part of the Chinese for completing the work. The HELIMAK device met all design requirements and was installed in 2002 at the FRC. The device continues to operate successfully as a research experiment to further enhance our bilateral collaboration.

## **RESULTS**

On the bilateral program, we believe the program is progressing well in a technical sense. We are pleased to note that, in contrast with earlier years, this current program is nicely balanced in various ways, e.g., 1) theory, experimental and design are all included, and 2) on our side, includes laboratories, universities and industry. With regard to the technical coordination, the Chinese were particularly pleased with our assistance with their HT-7U design team to provide a wide range of knowledgeable and detailed views for an effective technical evaluation for improving and refining the HT-7U design.

## **TECHNOLOGY TRANSFERS**

All of the U.S. work involved in this program is unclassified and unrestricted. Results of the work are discussed and exchanged freely at international conferences and published in the open literature. The U.S. Fusion Energy Sciences Program in its collaboration activities with China is focused on areas that do not involve sensitive technology or equipment. We are aware of the concerns about potential technology transfer to China for military applications and continue to consult, as appropriate, with responsible DOE offices to prevent any such transfers.

## **CHINESE VISITORS TO THE U.S**

The participating Chinese laboratories/institutes under the State Science and Technology Commission (SSTC) include:

- the Chinese National Nuclear Corporation supports the fusion program through its Southwest Institute of Physics (SWIP), which is its prime fusion laboratory,
- the Southwest Institute of Nuclear Physics and Chemistry (SWINPC), and
- the China Institute of Atomic Energy (CIAE);
- the Chinese Academy of Science supports the Institute of Plasma Physics (ASIPP) in Hefei as its primary laboratory although activities exist in Beijing and other universities.
- the University of Science and Technology of China
- Dalian University

The Chinese Coordinator for the U.S.-China fusion program, Professor Deng Xiwen, is the Deputy Director of SWIP.

## **U.S. VISITORS TO CHINA**

The participating U.S. fusion laboratories/contractors under the policy guidance and funding support of the U.S. Department of Energy (DOE), parallel to China's SSTC, include:

- General Atomics (GA) in San Diego, CA
- Princeton Plasma Physics Laboratory (PPPL)
- Fusion Research Center (FRC) at the University of Texas
- Lawrence Livermore National Laboratory (LLNL)
- Massachusetts Institute of Technology (MIT)

## **UPCOMING EVENTS**

### **BILATERAL**

A group of U.S. scientists will visit ASIPP for one week in March 2004 to develop a detailed plan to implement, through a proposed Memorandum of Understanding (MOU), the DIII-D/ASIPP collaboration on the DIII-D tokamak at GA and on the EAST tokamak (the new name for China's HT-7U, a large superconducting tokamak) at ASIPP. This group consisting of five scientists and engineers from GA headed by Dr. Vincent Chan will conduct further study of EAST control system requirements and to begin work for its

use for the start of EAST operations in 2005. Several Chinese scientists and engineers will participate in GA's DIII-D experimental operation this year.

The bilateral program is progressing satisfactorily. Both sides are planning a technical workshop (probably in China hosted by SWIP) towards the end of June 2004 with the objective of developing the list of collaborative activities for the 2004-2005 U.S.-PRC Program of Cooperation. We anticipate that work similar to that which has been underway will continue as there are many areas of mutually beneficial cooperation and exchange, particularly bilateral research work relevant to the high-priority multilateral ITER activity.

### **MULTILATERAL**

We are pleased that the Chinese scientists are active participants in an International Energy Agency (IEA) fusion agreement on materials research strengthening the Chinese role in multilateral collaborative fusion activities. In addition, we are also pleased that China joined the ITER negotiations in mid-February 2003 in parallel with the U.S. The Chinese government then announced that they would be able to make a significant in-kind contribution toward ITER construction.

### **ISSUES/CONSTRAINTS**

The work under this Agreement addresses two DOE objectives: advancement of science and knowledge base for fusion as an energy source. China's long-term objective is to develop and utilize fusion as an energy source. The Chinese have completed new physics experiments, and are planning additional experiments over the next few years. These activities are of interest since the U.S. program, while focused on fusion science, still retains developing fusion energy as a long-term energy goal.

It is still a major problem for the Chinese scientists to receive U.S. visas in a timely manner to fulfill bilateral activities. Currently it can take about six months for the Chinese to receive their visa. This delay in the arrival of Chinese scientists to participate in bilateral activities conducted under the auspices of the U.S.-PRC Fusion Protocol has a profound effect on the operations of joint experiments. The intensifying collaboration between GA and ASIPP, for example, might require personnel exchanges on a short notice. We continue to assist whenever possible through consultations with the State Department.

# **U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization**

## **Annex 1 – Rural Energy Development**

**2002-2003**

### **BACKGROUND**

Rural Energy Development, signed by DOE and Ministry of Agriculture in June 1995 - focuses on the use of village scale renewable energy technologies to provide energy or electricity to rural areas in China. Scope of cooperation outlined in Annex includes biomass, solar, small wind, and small hydropower technology testing and demonstration.

### **OBJECTIVE**

The objectives of this Annex are to promote sustainable development in rural areas by accelerating the deployment of renewable energy with support of US industry, and to demonstrate the technical and economic feasibility of renewable energy technologies for rural populations in China.

### **STATUS & ACCOMPLISHMENTS**

- Assistance for Chinese Sustainable Village – NREL organized a workshop on a sustainable village biogas energy system with the International Center for Sustainable Development (ICSD), and the Biogas Research and Training Center (BRTC) in Chengdu, Sichuan, August 29 – 30, 2002. The goal is development of a biogas system to meet the needs of a planned 100-household village in Guanghan, Sichuan. The project discussions established the capabilities of BRTC to design and execute the project, and provided initial cost estimates and a project plan for a joint USDOE/ICSD/NREL activity with BRTC and Guanghan.
- Village Power Development – NREL co-authored a hybrid systems project development training manual for the Chinese context with UNDP.
- Micro-enterprise Development – The first phase of the Greenstar micro-enterprise project to help generate income and improve quality of life in Pang Do Village in Tibet is complete. 1.6kW of PV is installed and plans are underway to use 400 watts for educational and battery charging applications. The micro-enterprise phase where solar-powered internet communications will help villagers increase local incomes through export of digital art and music, will begin after the Spring thaw in Tibet.

### **ISSES/CONSTRAINTS**

No follow-on activities at this time, due to budget constraints.

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**LIST ALL CHINESE SCIENTISTS AND OFFICIALS WHO VISITED/STUDIED AT/WORKED AT USG OFFICES OR LABORATORIES, OR US ACADEMIC OR BUSINESS INSTITUTIONS UNDER THE US-CHINA S&T AGREEMENT:**

Mr. Xu Shiwen, Section Chief, Foreign Affairs Office, Qinghai Province

**TECHNOLOGY TRANSFER**

**BUDGET**

\$60k US DOE; \$20k China

**PROJECTED ACTIVITIES BETWEEN 2004-2005:**

No follow-on activities at this time, due to budget constraints.

# **U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization**

## **Annex 2 – Wind Energy Development**

**2002-2003**

### **BACKGROUND**

Wind Energy Development, signed by DOE and former Ministry of Electric Power (now State Power Corporation of China) in Oct 1996 - focuses on accelerating sustainable large-scale development of wind power in both grid-connected and off-grid village power applications in China. Scope of cooperation outlined in Annex includes resource assessment, utility wind power plant analysis, a finance workshop, wind/hybrid mini-grid analysis, project development and personnel exchanges in training programs. *Note: The Annex was renewed in 2002. However, last year the State Power Corporation was dismantled. The wind power development tasks thereafter have been continued under Annex 7.*

### **OBJECTIVE**

The objectives of this Annex are to demonstrate the technical and economic feasibility of advanced wind energy technology and to enhance its commercialization potential for the benefit of both countries.

### **STATUS & ACCOMPLISHMENTS:**

- Wind Resource Assessment and Mapping – DOE, NREL and EPA completed a southeast China wind resource assessment and mapping in 1998. The most attractive wind resource is found along the coastal area and on the offshore islands, particularly along the coast of Fujian where several excellent sites were identified by the mapping process. CD-ROMs of these wind maps plus additional recent measurement data were completed in 2003.
- Xiao Qing Dao Village Power Project – DOE/NREL and the State Power Corporation of China developed a pilot project using a wind/diesel/battery system to electrify 120 households on Xiao Qing Dao island in the Yellow Sea off Shandong Province. Power usage is estimated to have increased by 40% from 2001. State Power, the US Embassy, and NREL participated in a ribbon-cutting ceremony in August 2002. Performance and operational data is being collected by NREL and Rudong Electric Company, and preliminary analyses are underway.
- Support for Stable Power Purchase Terms – An analysis was completed on the correlation between long-term power purchase agreements and the price of wind. Worldwide data was collected and six countries were highlighted as case studies. A primary barrier to widespread grid-connected wind power development in

China had long been the lack of long-term power purchase agreements. This study demonstrated the economic and market development benefits of more stable and long-term power purchase terms. In September 2003 developers were selected for the first time through competitive bidding for two 100MW concessions projects (one locates in Jiangsu Province and another Guangdong) that offered 20-year power purchase terms. \$53 million worth of GE Wind turbines were originally specified on the winning Jiangsu wind concessions bid. Last month, we heard from the GE Wind sales manager in China that Suzlon is now in contract negotiations to provide the turbines. The other wind concessions site, in Guangdong, is supplied by Goldwind turbines. The blades for these Goldwind turbines are supplied by a US-China joint venture company, Baoding.

- Training – Each year, NREL trains two Chinese engineers in a 2-3 month training program on various topics including: wind resource assessment, hybrid systems modeling, and wind utility interconnection modeling. In 2002, Hao Xiangzhong of the Electric Power Research Institute and Qin Haiyan of China Classification Society trained in wind turbine certification testing.
- Follow-on activities include monitoring and evaluation of the Xiao Qing Dao Village Power Project.

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<b>Name</b>	<b>Position</b>	<b>Organization</b>
Yu Wuming	Deputy Director	Goldwind
Li Li		Goldwind
Wang Minghao	Director	Hydropower Planning General Institute
Shi Pengfei	Director	New Energy Division, Hydropower Planning General Institute
Zhou Chunlin	Director	Rudong County Wind Power Project Office
Liang Zhipeng		State Development Planning Commission

**ESTIMATED COSTS (INCLUDING COSTED-OUT FTES) FOR S&T ACTIVITIES CONDUCTED DURING 2002-2003 (IF ESTIMATED CHINESE CONTRIBUTIONS ARE AVAILABLE, PLEASE PROVIDE):**

\$120k USDOE; \$40k China

**PROJECTED ACTIVITIES BETWEEN 2004-2005:**

Projected activities under this Annex are expected to continue through 2005.

# **U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization**

## **Annex 3 – Energy Efficiency**

**2002-2003**

No activities to report at this period, except Beijing Energy Efficient Demonstration Project.

### **BACKGROUND**

The U.S. and China agreed to study the potential for an energy efficient building demonstration project under a Statement of Work (SOW) signed by Ambassador Sassor in 1998. The SOW was amended in early 2001 to acknowledge the successful completion of this feasibility study and to identify relative contributions to the building and a demonstration center to be included in the building. The Department of Energy supported the analysis of efficient building designs and techniques as its contribution to this project. This analysis was undertaken by LBNL and NREL and funded through the Office of Policy and International Affairs and the Office of Energy Efficiency and Renewable Energy. The U.S. private sector provided the core of the US contributions, including additional analysis and design support, coordination of the involvement of U.S. companies, and in-kind or discounted contributions of efficient products for the building. The groundbreaking for the building occurred in 2002 and building was completed in January 2004. Secretary Abraham joined by Minister Xu Guanhua participated in a ribbon-cutting ceremony on January 12, 2004.

### **OBJECTIVES OF COOPERATION**

Promote the use of energy efficient and renewable energy technologies in commercial buildings.

### **ACCOMPLISHMENTS**

Chinese government signed an agreement with US Department of Energy to build an energy efficient building. Natural Resource Defense Council (NRDC) manages the project and US companies participate in this project, including American Standard and Falcon Waterfree Technologies for plumbing fixtures, Calmac Manufacturing for ice storage; Carrier Corporation for air conditioning, D-Light and Luminoptics for lighting, Johnson Controls for the building automation system, Sureblock for insulated walls and Traco for energy-saving windows. The goal of energy savings compared with a regular building built in China is about 35%.

### **AGENCY CONTACT**

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**BUDGET**

\$150 k DOE; China's contribution to this building in the past 5 years is more than \$7.5 million.

# **U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization**

## **Annex 4 – Renewable Energy Business Development**

**2002-2003**

### **BACKGROUND:**

Renewable Energy Business Development, signed by DOE and State Economic and Trade Commission (SETC) in Oct 1996. This Annex is anticipated to assist China in meeting its energy demand and promoting and accelerating commercialization of renewable energy in China. DOE/NREL workshops and outreach activities have been successful in helping U.S. companies facilitate business partnerships and develop markets for renewable energy technologies in China. *Note: This Annex was renewed in 2002. Due to government restructuring in 2003, renewable energy responsibilities of SETC were absorbed into the National Development and Reform Commission (NDRC). NDRC now leads this Annex.*

### **OBJECTIVE:**

The objectives of this Annex are to establish the framework for specific collaboration in order to promote renewable energy business development between the U.S. and China and to increase use of renewable energy. Activities conducted under this Annex will help create market opportunities for suppliers of renewable energy products and services in both countries and will encourage investment and other participation in renewable energy projects.

### **STATUS & ACCOMPLISHMENTS:**

- Direct Business Support – NREL provided one-on-one assistance to US companies interested in the China market. The Chinese Renewable Energy Industries Association served as an in-country liaison for US companies to receive specialized business support such as customized market research, excellent contacts, introductions to key industry and government representatives, and facilitation of business deals. More than a dozen US companies and organizations benefited from this program.
- Outreach – NREL updated and expanded a website at [www.nrel.gov/china](http://www.nrel.gov/china) that provides information on the Protocol as well as business and policy information for U.S. companies.
- Renewable Energy Opportunity Fact Sheets – Information for US companies on promising Chinese and multi-lateral opportunities as well as policy and market facts were assembled in 7 fact sheets. They are:

- World Bank/GEF Renewable Energy Development Project
  - Grid Connected Wind Farms in China
  - China's Township Electrification Program
  - Renewable Energy Policy in China
  - China's Plan for Renewable Energy
  - The New Brightness Program
  - Renewable Energy Business Partnerships in China
- Renewable Energy Business Directory – A guide of US renewable energy manufacturers, system integrators, and component suppliers was undated in 2002.
  - Follow-on activities include facilitation of U.S./China business partnerships with linkages to Chinese government and program officials as well as companies and financiers. A business development workshop and a study tour with linkages to the Beijing Olympic Games are planned for 2004.

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Men Xiangyong	Senior Engineer	PetroChina
Chris Raczkowski	Director	Azure International

Juanli Han	Director of Marketing, PR and Strategic Development	Azure International
Zheng Fangneng	Director	Energy Division of the Department of High-Technology Research, Development and Industrialization, Ministry of Science and Technology
Xu Shisen	Director	Gasification Division, Thermal Power Research Institute
Huang Weiguang	Director	Institute of Engineering Thermophysics of China Academy of Sciences
Li Wenhua	Deputy Director	Beijing Research Institute of Coal Chemistry, Ministry of Science and Technology
Du Minghua	Director	Beijing Research Institute of Coal Chemistry
Luo Yunfei	Scientist	Beijing Research Institute of Coal Chemistry
Xiao Yunhan	Deputy Director	Institute of Engineering Thermophysics of China Academy of Sciences
Wang Bangzhong	Division Director	Chinese Meteorological Administration
Teng Shulong	Director	Sustainable Development Center, Beijing Municipal Science and Technology Commission
He Hong	Director	International Cooperation Division, Beijing Municipal Science and Technology Commission
Zhang Lingzhi	Deputy Director	Shijiazhuang Environmental Monitoring Center
Zhan Wanli		South North Institute for Sustainable Development
Yin Chuntao	Program Officer	South North Institute for Sustainable Development
Chen Chuanhong	Deputy Director General	Chinese Ministry of Science and Technology
Liu Bin		Energy Environment Economic Research Institute, Tsinghua University
Yan Changrong		Chinese Academy of Agricultural Sciences

**ESTIMATED COSTS (INCLUDING COSTED-OUT FTES) FOR S&T ACTIVITIES CONDUCTED DURING 2002-2003 (IF ESTIMATED CHINESE CONTRIBUTIONS ARE AVAILABLE, PLEASE PROVIDE):**

\$140k USDOE; \$50k China

**PROJECTED ACTIVITIES BETWEEN 2004-2005:**

Activities under this Annex are expected to continue through 2005, including facilitation of U.S./China business partnerships with linkages to Chinese government and program officials as well as companies and financiers. A business development workshop and a study tour with linkages to the Beijing Olympic Games are planned for 2004.

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**U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and  
Renewable Energy Technology Development and Utilization**

**Annex 5 – Electric & Hybrid Electric Vehicles**

**2002-2003**

(No activities between 2002-2003, but this Annex has been replaced by a new Annex entitled “DEVELOPMENT OF ELECTRIC-DRIVE AND FUEL CELL VEHICLE TECHNOLOGIES” signed on October 29, 2003.)

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**U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and  
Renewable Energy Technology Development and Utilization**

**Annex 6 – Geothermal Production and Use**

**2002-2003**

(This Annex is inactive.)

# **U.S./China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization**

## **Annex 7 – Renewable Energy Policy and Planning**

**2002-2003**

### **BACKGROUND**

Renewable Energy Policy and Planning, signed by DOE and State Development Planning Commission (SDPC) in May 2000. This newest Annex to the Protocol focuses on renewable energy policy and plans as well as support of the Brightness Rural Electrification Program. *Note: During government restructuring SDPC was renamed the National Development Reform Commission (NDRC).*

### **OBJECTIVE**

The objectives of this Annex are to establish the framework for specific collaboration in order to promote renewable energy policies and assist in renewable energy planning. Activities conducted under this Annex will help develop a framework to assist China in developing national policies and planning for sustainable future renewable energy development. It is anticipated that implementation of this Annex will assist China to meet its energy demand in the near future and to promote and accelerate the commercialization of renewable energy in China.

### **STATUS & ACCOMPLISHMENTS:**

- Brightness Program Training Certification – NREL and the Institute for Sustainable Power (ISP) worked with the Jikedian Renewable Energy Center to establish a training certification program for the solar home systems used in the Brightness Program. An initial evaluation of the Brightness program and training levels was conducted by NREL and ISP, and was followed by training and certification of Master Trainers in the US in 2002.
- Sustainability Training – DOE/NREL and NDRC held a Village Power Sustainability Workshop in Beijing to support the \$240 million RE-based Township Electrification Program, the largest rural electrification program of its kind in the world. Attendees included a dozen foreign experts and 70 Chinese government, service company and systems integrator company representatives. Discussions included load management, use of hybrid systems, the energy service company approach, rational tariffs, productive uses, and other factors that support sustainability.

- Training Regulation – Due to the efforts of DOE/NREL, the Chinese government has approved a new regulation stipulating mandatory levels of technician certification. The regulation outlines requirements for local master trainers (general knowledge of PV hybrids and PV/wind hybrids), rural electric workers (basic knowledge), and village operators (specific systems).
- Village Power Training Infrastructure – The Beijing Jikedian training center was accredited to international standards by ISP for RE-based village power systems. Accreditation for village power system training is critical because the 800 RE systems that were installed for rural electrification during 2002-2003 are all village scale systems. Accredited training centers will train a quality workforce of trainers and village operators. A second training center in Yunnan, in the southwest of China, is pursuing accreditation. Chinese auditors have been trained to replicate the process for future training centers.
- Village Power Manual – NREL and Jikedian completed a training and information manual for technicians responsible for operating and maintaining renewable village power systems under the Township Electrification Program. Thousands of technicians will be trained this year, helping to develop the infrastructure for RE technologies. The Chinese version of the manual is in use. The English version is being edited and revised.
- Renewable Energy Planning – NREL and the Tellus Institute trained provincial representatives and the staff of the Center for Renewable Energy Development on the LEAP model. Based on results from LEAP modeling analysis, the provincial Development and Reform Commissions of Hunan and Xinjiang are developing renewable energy plans. This exercise has identified deficiencies in the availability of quality renewable energy data. As a result, the methodology for developing renewable energy plans will be incorporated into the 11<sup>th</sup> Five-Year Plan.
- Energy Policy – NREL is supporting the development of biomass and wind guidelines for the new Chinese renewable energy law. In August 2003 the Environment and Resource Protection Committee of the National People’s Congress in China requested a “Renewable Energy Development and Utilization Promotion Law.” In partnership with the Center for Renewable Energy Development NREL is assessing available biomass resources, identifying appropriate technology, and outlining sound policies. NREL is also developing wind-related policy initiatives for the law and helping to organize a study tour to the US for policymakers.
- HOMER/VIPOR Training – NREL and Jikedian held a training for 20 systems integrators on renewable energy design and rural electrification optimization software packages in Beijing during July 2002.

- Rigorous HOMER Training – Two Chinese experts participated in HOMER training in the US during July 2003. The experts brought real data from the Township Electrification Program installations and ran scenarios to determine the benefits and disadvantages of a PV system versus a PV/diesel hybrid system. They reported the results to government policymakers upon return to China. In addition, the intense instruction gave them the knowledge and experience to be in-country HOMER experts.
- System Monitoring – NREL and Jikedian identified two villages in China to be monitored with data acquisition systems in order to make system design improvements for future systems.
- Follow-on activities include assistance to National Development Reform Commission and provincial level commissions in analyzing China's energy situation and developing plans and policies to promote use of renewable energy and assistance to China's largest renewable energy rural electrification program for villages. Specifically, NREL will support the biomass and wind sections of the new renewable energy law, and will organize a productive uses of renewable energy workshop that was postponed last year because of SARS.

**NAME, TITLES, AND CONTACT INFORMATION FOR RESPONSIBLE DOE OFFICES AND/OR LABS:**

Harvey Major, DOE HQ, (202) (202) 586-3054, [harvey.major@ee.doe.gov](mailto:harvey.major@ee.doe.gov)  
 Jean Ku, Project Leader, NREL, (303) 384-7554 or (510) 847-0867, [jean\\_ku@nrel.gov](mailto:jean_ku@nrel.gov)  
 Debra Lew, Group Manager, NREL, (303) 384-7522, [debra\\_lew@nrel.gov](mailto:debra_lew@nrel.gov)  
 Paul Gilman, Project Leader, NREL (303) 384-6920, [paul\\_gilman@nrel.gov](mailto:paul_gilman@nrel.gov)  
 Ian Baring-Gould, Sr. Engineer, NREL, 303-384-7021, [ian\\_baring\\_gould@nrel.gov](mailto:ian_baring_gould@nrel.gov)  
 Ralph Overend, Staff Scientist, NREL (303) 275-4450, [Ralph\\_overend@nrel.gov](mailto:Ralph_overend@nrel.gov)

**NAME, TITLE, AND CONTACT INFORMATION FOR ALL CHINESE COUNTERPARTS:**

Shi Lishan, Director, Renewable Energy and Rural Power Division, Energy Bureau, National Development and Reform Commission, +86 (10) 6850-1262  
 Liang Zhipeng, Center for Renewable Energy Development and National Development and Reform Commission, +8610 6850 1445, [gjjw0132@mx.cei.gov.cn](mailto:gjjw0132@mx.cei.gov.cn)  
 Zhuang Xing, Center for Renewable Energy Development, +8610 6390 8467, [zhuangxing@cenpok.net](mailto:zhuangxing@cenpok.net)  
 Ma Shenghong, Vice-Dir of Jikedian Renewable Energy Center, +8610 6262 0054, [msh@mail.iee.ac.cn](mailto:msh@mail.iee.ac.cn)

**LIST ALL CHINESE SCIENTISTS AND OFFICIALS WHO VISITED/STUDIED AT/WORKED AT USG OFFICES OR LABORATORIES, OR U.S. ACADEMIC OR BUSINESS INSTITUTIONS UNDER THE US-CHINA S&T AGREEMENT:**

<b>Name</b>	<b>Position</b>	<b>Organization</b>
Ma Shenghong	Vice Director	Jikedian Renewable Energy Center
Chen Zhenbin	Professor	Jikedian Renewable Energy Center
Lu Huyu	Senior Engineer	Institute of Electrical Engineering
Sun Xiao	Senior Engineer	Institute of Electrical Engineering
Wang Zhongying	Director	Center for Renewable Energy Development
Lv Fang	Economist	Jikedian Renewable Energy Center
Liu Haitao	Engineer	Institute of Electrical Engineering

**ESTIMATED COSTS (INCLUDING COSTED-OUT FTES) FOR S&T ACTIVITIES CONDUCTED DURING 2002-2003 (IF ESTIMATED CHINESE CONTRIBUTIONS ARE AVAILABLE, PLEASE PROVIDE):**

\$200k USDOE; \$250k China (China's cost-share is significant for the Township Electrification Program – they spent \$240 million.)

**PROJECTED ACTIVITIES BETWEEN 2004-2005:**

Activities under this Annex are expected to continue through 2005, including assistance to the National Development Reform Commission and provincial level commissions in analyzing China's energy situation and developing plans and policies to promote use of renewable energy and assistance to China's largest renewable energy rural electrification program for villages.

**PROTOCOL FOR THE COOPERATION IN THE FIELD OF FOSSIL  
ENERGY TECHNOLOGY DEVELOPMENT AND UTILIZATION  
BETWEEN  
THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA  
AND  
THE MINISTRY OF SCIENCE AND TECHNOLOGY  
OF THE PEOPLES REPUBLIC OF CHINA**

**2002-2003**

Annex I: Cooperation in the Area of Power Systems  
Annex II: Cooperation in the Area of Clean Fuels  
Annex III: Cooperation in the Areas of Oil and Gas  
Annex IV: Cooperation in the Area of Energy and Environmental Technologies  
Annex V: Cooperation in the Area of Climate Science

**BACKGROUND**

The Fossil Energy Protocol was signed April 20, 2000.

**OBJECTIVE**

The objective of the Protocol and its Annexes is to promote scientific and technological cooperation in various areas related to fossil energy, particularly areas related to research, development, and technology transfer.

**STATUS & ACCOMPLISHMENTS**

Results of activities under the Protocol have included the following:

- Training of 175 Chinese utility personnel in U.S. technologies and practices for flue gas desulfurization (FGD). The Chinese FGD market is estimated at \$13 billion over the next 6 years.
- Natural gas training and certification for Chinese personnel.
- Study of the use of ammonia as a reagent for the capture of CO<sub>2</sub> from power plant gas streams. This could be a key technology in the commercialization of the carbon sequestration process.
- Training of Chinese personnel in U.S. coal bed methane technologies.
- The activities under the protocol are described further below.

**COPY OF AGREEMENT**

- Copy of Protocol is attached, and the Annexes appear at the end of this document.

**NAME, TITLES, AND CONTACT INFORMATION FOR RESPONSIBLE DOE OFFICE AND /OR LABS**

- FE Protocol: Barbara McKee, Office of Coal and Power Import Export, 301-903-3820
- Annex I: Dr. Victor Der, DOE/Fossil Energy, 301-903-2700
- Annex II: Dr. Lowell Miller, DOE/Fossil Energy, 301-903-9451
- Annex III: Guido DeHoratiis DOE/Fossil Energy, 202-586-7296
- Annex IV: Dr. James Ekmann, National Energy Technology Laboratory, 412-386-5716
- Annex V: Michael Riches, DOE Office of Science and Technology, 301-903-3264

**NAME, TITLE, AND CONTACT INFORMATION FOR ALL CHINESE COUNTERPARTS**

- FE Protocol: Xu Jing, Ministry of Science and Technology
- Annex I: Zhang Xiaolu, China Power Investment Corporation
- Annex II: Xu Yong Sheng, National Development and Reform Commission
- Annex III: Pan Dehren, Petroleum and Chemical Industries Association
- Annex IV: Xu Jin, Ministry of Science and Technology
- Annex V: Feng Renguo, Chinese Academy of Sciences  
Wang Huijun, Chinese Academy of Sciences

**List all Chinese scientists and officials who visited/studied at/worked at USG offices or laboratories, or US academic institutions under the US-China S&T agreement:**

- Shi Dinguang, Ministry of Science and Technology

**ESTIMATED COSTS (INCLUDING COSTED OUT FTES) FOR S&T ACTIVITIES CONDUCTED DURING 2002-2003 (IF ESTIMATED CHINESE CONTRIBUTIONS ARE AVAILABLE, PLEASE PROVIDE)**

- Annex I: Cooperation in the Area of Power Systems
  - Electricity Grid Modeling for Planning Future Growth-- This activity included the briefing of engineers from State Power Corporation on the use of Power World software. DOE cost: \$30k.
  - IGCC Technology Briefings-- Under this project, Chinese engineers were briefed on U.S. Integrated Gasification Combined Cycle power technologies, at the Polk Station (a DOE Clean Coal Project), as well as the Southern Company's pilot plant in Wilsonville, Alabama. DOE cost: \$26k
  - Flue Gas Desulfurization Technology Briefings-- This project was a two-week training course for 180 Chinese utility personnel on the design and operation

of U.S. Flue Gas Desulfurization Technologies. The training program was implemented in China by U.S. industry. DOE cost: \$250k

#### Annex II: Cooperation in the Area of Clean Fuels

- No projects were conducted under this Annex in 2002-2003.

#### Annex III: Cooperation in the Areas of Oil and Gas

- Capacity Building Natural Gas Training and Certification-- This activity was a natural gas training workshop that took place in Beijing during August of 2002. It led to outside funding to expand the training program. DOE cost: \$50k
- Coal Bed Methane Training Program-- This project was a coal bed methane training workshop, which was held in Wuxi in November, 2003. DOE cost: \$48k

#### Annex IV: Cooperation in the Area of Energy and Environmental Technologies

- NO<sub>x</sub> and SO<sub>2</sub> Control Workshops-- These workshops were held in Shenyang during November, 2003. Major Chinese power producers were represented, as well as 9 U.S. vendors of emissions control equipment. A total of 105 Chinese were present. DOE cost: \$60k.

#### Annex V: Cooperation in the Area of Climate Science

- Analysis of General Circulation Models- This activity draws on 500 years of Chinese data on the climate of East Asia, and the ability of original climate models to reproduce that data set. DOE cost: \$42k
- Climate Data Preparation and Analysis-- This project consists of the reconstruction of 200 years of climate data over China. DOE cost: \$42k
- Measurement of Atmospheric Greenhouse Gas Emissions other than CO<sub>2</sub>-- This project also draws on the long term data set available in China. Recent activities have been focused on methane emissions from rice paddy fields, including the effect of the change of soil management practices on emissions of methane and nitrous oxide. DOE cost: 42k
- Effect and Impact of Climate Change on Human and Natural Systems-- This project is focused on the interplay between climate and human activity, notably agriculture. DOE cost: \$42k

#### **Projected activities between 2004-2012.**

The following tasks are planned:

- Annex I: Cooperation in the Area of Power Systems
  - Power Plant Optimization Software Briefing-- This project is to familiarize Chinese personnel with one of the commercially available U.S. plant optimization software packages, Pegasus. This project includes a one-week technology briefing at a Chinese power plant that has the Pegasus package installed. This will be followed by suitability assessments of other plants. Projected DOE cost: \$73k
  - Advanced Distributed Generation Technologies and Applications Colloquium-- This is a fuel cell technology briefing that would be a one week event to be conducted at the Fuel cell center at the University of California Irvine. It would be held during the spring of 2004, and may include a site visit to the Wabash Clean Coal technology project. Projected DOE cost: \$106k

#### Annex II: Cooperation in the Area of Clean Fuels

- Co-Production (Polygeneration) Study-- This activity will be conducted in conjunction with the Yanzhou Coal Company's development of its liquid fuels from coal (co-production) project. Projected DOE cost: TBD.
- Study of the Impacts of a Major Coal Liquefaction Plant on Regional Environment and Economy-- This project will study the regional environmental and economic impact of a major direct coal liquefaction plant. The site studied will be that of the proposed Shenhua Coal Liquefaction project. West Virginia University has been working with the Shenhua Group in this area, and will be involved in the work. Projected DOE cost: TBD.

#### Annex III: Cooperation in the Areas of Oil and Gas

- Overview and Use of DOE Oil and Gas Software-- This project will consist of technology briefings for reservoir simulation software that has been developed by DOE. Projected DOE cost: \$50k.

#### Annex IV: Cooperation in the Area of Energy and Environmental Technologies

- Study of CO<sub>2</sub> Sequestration with Ammonium Carbonate-- This project features joint work on the use of ammonium scrubbing of flue gas to capture CO<sub>2</sub>, with the product being ammonium carbonate that can be used as an intermediate storage system for sequestration options. Included in this work are studies by both sides on the use of ammonia for carbon dioxide capture along with other pollutants. Projected DOE cost: \$10k.

- Mercury Emissions Inventory-- This project would assist in the development of a mercury emissions inventory in China. Projected DOE cost: \$80k.

#### Annex V: Cooperation in the Area of Climate Science

- Analysis of General Circulation Models-- This activity draws on 500 years of Chinese data on the climate of East Asia, and the ability of original climate models to reproduce that data set. Projected DOE cost: \$22k.
- Climate Data Preparation and Analysis-- This project consists of the reconstruction of 200 years of climate data over China. Projected DOE cost: \$22k.
- Measurement of Atmospheric Greenhouse Gas Emissions other than CO<sub>2</sub>-- This project also draws on the long term data set available in China. Recent activities have been focused on methane emissions from rice paddy fields, including the effect of the change of soil management practices on emissions of methane and nitrous oxide. Projected DOE cost: \$22k.
- Effect and Impact of Climate Change on Human and Natural Systems-- This project is focused on the interplay between climate and human activity, notably agriculture. DOE cost: Projected \$22k.

**U.S.-China Peaceful Uses of Nuclear Technologies Agreement  
Cooperative Activities  
(2002-2003)**

**BACKGROUND:**

In June 1998, DOE and China's State Development Planning Commission (SDPC, since renamed the National Development and Reform Commission--NDRC) signed the five-year PUNT Agreement, however little activity was initiated under the Agreement. (Note: SDPC is the signatory agency, however, China's overall nuclear programs mainly reside in the China Atomic Energy Authority, CAEA). In June 2001, Secretary Abraham received a letter from Minister Zeng Peiyang, Chairman of the SDPC, inviting him to visit China and resume dialogue on peaceful uses of nuclear technologies. The Secretary accepted the invitation and agreed to the first meeting of the Joint Coordinating Committee (JCC) under the PUNT.

**OBJECTIVE:**

The U.S. and PRC are parties to the Treaty on the Non-Proliferation of Nuclear Weapons. The PUNT Agreement is to reaffirm the Agreement for Cooperation between the Government of the United States of America and the Government of the People's Republic of China Concerning Peaceful Uses of Nuclear Energy signed on July 23, 1985. The specific objective is to advance a non-proliferation agenda with China that includes control of exports of nuclear materials, equipment and technologies; nuclear material control and accounting; physical protection of nuclear materials and nuclear facilities; nuclear reactor power plant safety; and nuclear safeguards technology development.

**STATUS & ACCOMPLISHMENTS**

More than 90 U.S. and Chinese government officials, scientists, and researchers participated in the first JCC Meeting and its technical workshop from July 31 to August 2, 2002, in Beijing, China. David Pumphrey, Deputy Assistant Secretary of Energy for International Energy Cooperation, co-chaired the JCC with China's Ma Xin, Deputy Director General for Foreign Affairs of the SDPC. The Workshop was divided into three parts:

1. Nuclear Technology: Both sides agreed to pursue information exchange and collaborative visits in the areas of nuclear plant aging management and life extension, severe accident phenomenology and mitigation, advanced reactor development, and export controls of nuclear materials, equipment, and technology.
  
2. Nuclear Safety: Both sides agreed to pursue cooperation in nuclear safety by holding workshops. However, after the meeting in 2002, Congress directed the International Nuclear Safety and Cooperation program to work exclusively with former Soviet Union countries. DOE will continue cooperation with China in emergency planning and

preparedness and this Group was renamed “Nuclear Security, Emergency Management and Safety.” Future activities will include collaboration in plume modeling, emergency exercises, and training and possible workshops on Nuclear Nonproliferation and Export Control and Material Accounting and Control.

3. High Level Waste Management: Both sides agreed on a preliminary set of potential areas of cooperation such as high-level waste disposal, spent nuclear fuel management, and environmental management.

In September 2003, Secretary Abraham and Chairman Zhang Huazhu of CAEA signed a “Statement of Intent” reaffirming U.S.-China joint commitment to the nonproliferation topics covered in Peaceful Uses of Nuclear Technologies (PUNT) Agreement, including the exchange of nonproliferation assurances required for transfer of nuclear technology. The recent understandings removed the impediments that had prevented most U.S. firms from obtaining and using authorizations under DOE regulations (10 Code of Federal Regulations Part 810) to provide technology and services to the Chinese nuclear power program.

Secretary Abraham signed another “Statement of Intent Concerning Cooperation in the Fields of Peaceful Use of Nuclear Energy and Nuclear Nonproliferation and Counter-Terrorism” with CAEA during his visit to China in January 2004.

### **ISSUES/CONSTRAINTS**

All planned activities in FY 2003 were stalled because of the SARS outbreak and visa issues.

### **FOLLOW-ON ACTIVITIES**

DOE hosted the 2<sup>nd</sup> JCC and Workshops (Export Control, Physical Protection, Nuclear Energy, Nuclear Emergency Management and Safety, and High-Level Waste Management) at the Sandia National Laboratory, in February 2004. The U.S. delegation was led by David Pumphrey, Deputy Assistant Secretary for International Energy Cooperation, US DOE and US Principal Coordinator for PUNT. The Chinese delegation was led by Mr. Wang Jun, Deputy Director-General, Energy Bureau of NDRC, and Chinese Principal Coordinator for PUNT. Mr. Paul Longworth, Deputy Administrator for Defense Nuclear Nonproliferation, National Nuclear Security Administration, US DOE, and Mr. Zhang Jing, Director-General of Department of International Cooperation, CAEA, and Deputy Coordinator for PUNT, also attended the JCC. They discussed the Statement of Intent signed by Secretary of Energy Spencer Abraham and CAEA Chairman Zhang Huazhu in January 2004.

Both sides recommended the following for further cooperation:

Nuclear Energy Technology:

- Advanced reactor technology information exchange;

- Training in advanced safety analysis methods;
- Technical exchange on nuclear plant aging and life cycle management programs;

Nuclear Security, Emergency Management and Safety:

- Atmospheric plume modeling inter-comparison for emergency response countermeasures;
- Emergency management training course for preparedness for nuclear emergencies;
- Security and safety of radioactive sources collaboration; and
- Workshops on “Nuclear Material Accounting and Control for Facilities” and “Nonproliferation Policy and Export Control”;

Environment and Waste Management:

- Regulatory framework and applications;
- Repository science and technology activities;
- Technical cooperation projects to enhance the long-term management of radioactive waste in China.

**U.S. AGENCY CONTACT**

US Principal Coordinator:

David Pumphrey, Deputy Assistant Secretary for International Energy Cooperation

**CHINESE AGENCY CONTACT**

Chinese Principal Coordinator:

Ma Xin, Director-General, Office of International Affairs, NDRC

Chinese Deputy Principal Coordinator

Zhang Jing, Director-General, Office of International Affairs, CAEA

**CHINESE VISITORS TO THE U.S.**

In June 2002, at the invitation of Westinghouse, Chairman Zhang Huazhu of CAEA led a delegation that visited the Westinghouse research facility in Pittsburgh. Chairman Zhang also met with Secretary Abraham in DOE on June 20, 2002 to discuss potential cooperation under the auspices of PUNT.

**CHINESE VISITING FELLOWS TO THE MONTEREY INSTITUTE'S CENTER FOR  
NONPROLIFERATION STUDIES, OCT 2001 – SEPT 2003**

**Fall 2001**

Mr. Li Yang  
Deputy Director  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

Mr. Bi Haibo  
Attaché  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

**Spring 2002**

Mr. Li Genxin  
Division Director, Fourth Division  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

Mr. Zhang Shen  
Third Secretary, Third Division  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

**Summer 2002**

Col. Nie Songlai  
Academy of Military Science  
Xianghongqi Haidian District  
Beijing 100091 CHINA

**Fall 2002**

Fan Jishe  
Research Associate  
Center for Arms Control and Nonproliferation Studies  
Institute of American Studies  
Chinese Academy of Social Sciences

Mr. Wang Ni  
Deputy Director  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs  
Mr. Yang Zhaohui  
Secondary Secretary  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

**Summer 2003**

Major Xu Bin  
Foreign Affairs Office  
PLA National Defense University

**Fall 2003**

Mr. Haigang Yin  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

Zhang Ze  
Attaché  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

**CHINESE PARTICIPANTS TO 4<sup>TH</sup> US-CHINA ARMS CONTROL  
CONFERENCE**

Brookings Institution,  
1775 Massachusetts Avenue, NW, Washington, D.C.  
March 4-5, 2002

Li Daozhong  
Associate Research Fellow  
China Institute for  
International Strategic Studies

Liu Chao  
Defense Attaché Office  
Embassy of the People's Republic of China  
Washington, D.C.

Liu Jieyi  
Director General

Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

Pan Zhenqiang  
Professor  
National Defense University  
Ren Fumao  
General Armament Department  
People's Liberation Army

Ruan Zongze  
Director, International Politics  
China Institute of International Studies

Shen Dingli  
Professor  
Center for American Studies  
Fudan University

Wang Xiaolin  
Deputy Division Director  
Department of Arms Control and Disarmament  
Ministry of Foreign Affairs

Wu Haitao  
First Secretary  
Permanent Mission of the People's Republic of China to the United Nations, New York

Xia Hailin  
Foreign Affairs Office  
Ministry of National Defense

Yang Chengxu  
President  
China Institute of International Studies

Yang Xiyu  
Counselor  
Permanent Mission of the People's Republic of China to the United Nations, New York

Yao Yunzhu  
Division Director  
Department of Foreign Military Studies  
Academy of Military Sciences

Ye Ru'an

Vice President and Secretary General  
China Arms Control and Disarmament Association

You Weijun  
First Secretary  
Embassy of the People's Republic of China, Washington, D.C.

Zhai Dequan  
Deputy Secretary General  
China Arms Control and Disarmament Association

Zhu Feng  
Professor  
School of International Relations  
Beijing University

**OTHER VISITORS TO THE U.S.**

Mr. Liu Daming (CIAE) was a guest lecturer at an IAEA International Training Course, September 2003, in Albuquerque NM.

Ms. Li Rong-rong (China Institute of International Studies) was at Sandia working on ideas for possible U.S.-Chinese counter-terrorism cooperation from April 2002 to November 2002.

**BUDGETS (CENTER FOR NONPROLIFERATION STUDIES AND ARMS CONTROL PROGRAMS):**

FY 2002 \$116,200  
FY2003 \$358,600

**TECHNOLOGY TRANSFERS**

Materials presented at the first JCC and Workshops have been reviewed by the Department of State, DOE/Export Control Office, and DOE Labs Export Control experts. No transfer of any technology or equipment to China as part of programs.

## U.S./China Energy and Environmental Technology Center

2002-2003

### I. Detailed inventory of all S&T cooperation:

#### - Type of cooperation:

Transfer of Clean Fossil Energy technology to meet China's environmental needs and generate export business for American firms. Included in 2002-2003 activities has been support of the U.S./China Fossil Energy Protocol.

#### - Objectives of cooperation

1. Establishment and maintenance of a U.S.-funded physical presence in Beijing to enhance the competitiveness and adoption of U.S. energy and environmental technologies in China.
2. Minimization of adverse global environmental impacts associated with China's growth by facilitating exchanges between the U.S. and China.
3. Promotion of U.S. energy technologies in the sustainable development of China's energy sector.

#### - Results obtained

1. Sale of Hydrocarbon Technology Inc. (HTI) coal liquefaction technology to the Shenhua Group for \$750,000.
2. Two American firms are on the four firm short list to supply technology for an integrated gasification combined cycle (IGCC) project, valued at \$300 - \$400 million, being developed by the Shandong Power Company
3. Two industrial partners' workshops were held, one in 2002 and one in 2003. These workshops were attended by over 40 U.S. firms, and were focused on opportunities in the Chinese market for U.S. firms with offerings related to coal-fired power generation. Substantial networking between U.S. and Chinese firms has taken place, and this has led to privately funded market development activities.
4. Activities were initiated for the introduction of U.S. combustion optimization and NOx control technologies to the China marketplace.
5. Ongoing dialogue with the City of Beijing has resulted in a project, using both U.S. and Chinese expertise, to develop a plan to manage coal quality in Beijing under the city's new Olympic Energy Sub-plan. This project is aimed at heating plants, notably those using stoker boilers.

#### - Any follow-on activities planned

1. Continued work the City of Beijing on development of the city's coal quality management plan.
2. Implementaion of a U.S. combustion optimization software project to demonstrate the technology for the Chinese utility sector.

## **II. A copy of the Agreement**

The EETC is maintained outside the U.S.-China S&T Agreement. It is maintained through a DOE FE Cooperative Agreement with Tulane University. Tulane University maintains EETC offices in both New Orleans and at Tsinghua University in Beijing. Tulane maintains a subcontract with Tsinghua University. The Chinese side cost shares the EETC through funding of Tsinghua University for this activity by the Ministry of Science and Technology of China.

## **III. Name, titles, and contact information for responsible DOE offices and/or Labs:**

Dr. Peter L. Rozelle, Office of Coal and Power Import Export  
301/903-2338

## **IV. Name, title, and contact information for all Chinese counterparts:**

- 1.1.1.1.1.1 Shi Dinghuan, Ministry of Science and Technology, Deputy Director General
- Xu Jin, Ministry of Science and Technology, Executive Deputy Director
- Professor Wu Zongxin, Tsinghua University, Executive Director of EETC in China
- Professor Zhang Aling, Tsinghua University, Associate Director
- Professor Gu Shuhua, Tsinghua University, Associate Director
- Professor Wang Yanjia, Tsinghua University, Assistant Director

## **V. List all Chinese scientists and officials who visited/studied at/worked at USG offices or laboratories, or US academic or business institutions**

Dong Xu Yu, Shanghai Electric Corporation (Visited Penn State University)  
Liu Minjiu, Shandong Dongming Petrochemical Corporation (Visited Penn State University)  
Wan Liangdi, Shanghai Electric Corporation (Visited Penn State University)  
Li Xing Ping, Shandong Dongming Petrochemical Corporation (Visited Penn State University)  
Yu Zhufeng, China Coal Research Institute (Visited Lehigh University)  
Li Yianjiang, China Coal Research Institute (Visited Lehigh University)  
Yue Xiuping, China Coal Research Institute (Visited Lehigh University)  
Xu Zuyong, China State Power Corporation (Visited Lehigh University)  
Luo Weihing, Zhejiang Coal Development Corporation (Visited Lehigh University)  
Zhou Xiaohang, Zhejiang Electric Power Development Corporation (Visited Lehigh University)  
Hu Jiangchao, Zhejiang Energy Group Corporation (Visited Lehigh University)

Fan Xiaoning, Zhejiang Energy Group Corporation (Visited Lehigh University)  
 Hu Genfa, Zhejiang Energy Group Corporation (Visited Lehigh University)  
 Wang Chenmin, Zhejiang Energy Group Corporation (Visited Lehigh University)  
 Qiu Xuilu, Zhejiang Natural Gas Development Corporation (Visited Lehigh University)

**VI. Estimated costs (including costed-out FTEs) for S&T activities conducted during 2002-2003 (If estimated Chinese contributions are available, please provide):**

Year	Contracts	FTE Salary	FTE Travel	Total
2002	\$500,000	\$60,000	\$10,000	\$570,000
2003	\$500,000	\$60,000	\$10,000	\$570,000
Total	\$1,000,000	\$120,000	\$20,000	\$1,140,000

**VII. Projected activities between 2002-2010:**

The EETC will continue to work to facilitate the introduction American clean energy technology to China's growing energy marketplace. Through these activities, workshops and study tours will be hosted by the EETC. These activities will include participation by Chinese and American firms engaged in production of energy products from fossil fuel sources.

Specific projected activities will include the following:

1. Development of a coal quality management plan for the City of Beijing. Under the plan to improve Beijing's air quality prior to the 2008 Olympics, 15 million tons per year of coal will still be used in Beijing. It will be essential to manage the quality of this coal in order to meet the air quality goals. The EETC is working to introduce U.S. experiences in coal quality management, as well as U.S. vendors to the Beijing market. This project is anticipated to run through 2005.
2. Introduction of U.S. combustion optimization practices to the Chinese market, for the purpose of gaining low-cost reductions in emissions of sulfur dioxide, carbon dioxide, and nitrogen oxides from Chinese power plants.

# **Green Olympic Protocol for the 2008 Olympic Games in Beijing**

**2002-2003**

## **AGENCY**

U.S. Department of Energy (DOE)

## **FOCUS**

The objective of cooperation under this Protocol is to promote the use of clean energy technologies as well as to provide technical assistance to China's Ministry of Science and Technology (MOST) and Beijing Municipal People's Government (BMPG) in energy and environmental policy and planning for the 2008 Summer Olympic Games.

## **DESCRIPTION**

China will host the 2008 Summer Olympic Games in Beijing and that in preparation, both the national and municipal governments, BMPG in particular, of China intend to use clean energy technologies to improve Beijing's environmental quality to an acceptable level by 2008 and to present the event as a magnificent "high-tech" sports meet.

For that reason, a Statement of Intent between DOE and the BMPG was signed on September 10, 2002, with a focus on assisting BMPG to develop clean energy technologies and energy and environmental policies in preparation for the 2008 Summer Olympic Games. Also, noting that China's lead national agency, MOST, and the Beijing Municipal Science and Technology Commission (BMSTC), a component of BMPG, intend to cooperate with DOE on this event, a three-signatory Protocol was signed during Secretary Abraham's trip to China in January 2004.

## **AGENCY OFFICE**

Office of Policy and International Affairs

## **AGENCY CONTACT**

Ms. Lee Gebert  
China Desk Officer  
Office of Policy and International Affairs  
(202) 586-2132  
(202) 586-1180 FAX

## **FUNDING SOURCE**

For DOE Activities:  
Office of Energy Efficiency and Renewable Energy

## **STATUS AND ACCOMPLISHMENTS**

The US government is collaborating with the City of Beijing on this effort. Under the leadership of the US Department of Energy, other US government agencies are providing support to the Olympic Challenge including:

- Department of State
- Environmental Protection Agency
- Department of Agriculture
- Department of Transportation
- Department of Commerce (including Export-Import Bank, Trade and Development Agency, National Oceanic Atmospheric Administration)

In September 10, 2002, Vice Mayor Lin, Chairman of the 2008 Beijing Olympic Science and Technology Committee (BOSTC), and Assistant Secretary Bailey signed a Statement of Intent to cooperate on clean energy technology deployment for the 2008 Olympics. The US-China Joint Working Group (JWG) has been established to further develop cooperative activities. The first JWG Meeting took place on December 5-6, 2002 with representatives from US government agencies and the counterpart Chinese agencies to identify areas for cooperation that are of mutual interest. 11 areas of cooperation were identified by the JWG at the meeting,

- Efficient use of natural gas
- Fuel cell, hydrogen, and electric vehicles
- Green building rating system
- Energy and resources planning for the Olympic Green
- Urban Traffic and Transportation
- Energy efficient demonstration building
- Air quality (monitoring, management, and integrated environmental strategies)
- Weather (monitoring and forecasting)
- Water (water quality monitoring, animal waste treatment, wastewater reuse, and water efficiency and conservation).
- Clean Coal Technologies
- Beijing-Chicago "Friendship Cities Initiatives"

Energy Secretary Spencer Abraham joined China's Science and Technology Minister Xu and Beijing's Vice Mayor Fan on January 12<sup>th</sup>, 2004 to sign the Green Olympic Protocol for the 2008 Olympic Games in Beijing. Two joint working group meetings were successfully held in Beijing in 2002 and 2003, leading to new proposals for cooperation.

## **CHINESE VISITORS TO THE U.S.**

Former Beijing Vice Mayor Lin, Chairman of the 2008 Beijing Olympic Science and Technology Committee, visited USDOE in September 2002

Beijing Vice Mayor Fan Baoyuan visited USDOE on December 19, 2003.

## **ESTIMATED COSTS (INCLUDING COSTED-OUT FTES) FOR S&T ACTIVITIES CONDUCTED DURING 2002-2003 (IF ESTIMATED CHINESE CONTRIBUTIONS ARE AVAILABLE, PLEASE PROVIDE):**

\$400,000

## **PROJECTED ACTIVITIES BETWEEN 2004-2005:**

- DOE will begin to publicize the work of the JWG to U.S. industry and will work with the Foreign Commercial Service in Beijing to facilitate interactions between the teams, end-users, and suppliers of technologies;
- The third JWG will take place in the U.S. in Fall 2004
- Coordinate 6-agency activities associated with U.S./ China Protocol on Greening Beijing for the 2008 Olympics.