



Sino-U.S. Joint Group Workshop On Beijing Olympic Cooperation

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Chinese Participants

Beijing Municipal Science & Technology Commission
BOCOG
Tsinghua University
Chinese Academy of Sciences
Beijing Polytechnic University
Beijing Heating Group
Beijing Energy-Net DE Ltd

U.S. Participants

Department of Energy
Department of Agriculture
Department of Commerce
Environmental Protection Agency
National Renewable Energy Laboratory
Argonne National Laboratory
Lawrence Livermore National Laboratory
Lawrence Berkeley National Laboratory
Intl Center for Sustainable Development

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Future Works for 2008 Olympic Games

- To intensify control of air & waste pollution
- To continue rail transport construction
- To protect historical & cultural relics
- To implement “Digital Olympic” project
- To complete land preparation for Olympic Green & Wukesong Sports & Culture Center
- To start individual venue design
- To Start plans of other related construction projects

Introduction of Beijing High-Tech Olympic Games

≡ Meaning and Ethics

High-tech Olympic games is to embody modern science & technology achievements in Olympic games via multi-dimensions and multi-channels. Wide application of cutting edge high-tech achievements will let sprit of science, methodologies and achievements penetrate into every aspect of Olympic games and will make the Olympic games a high-tech equipped sporting gala.

≡ Major Content

A. Transportation

Objective: Key technologies in ITS, clean vehicle and railway transportation will be developed and demonstration project will be implemented to provide a swift, secure and clean transportation service system.

Three Areas included:

- a. Intelligent Transportation System: based on 3S technology

Brief: Adopt the 3S (GPS, GIS, GRS) based core technology and build a high effective intelligent traffic network system

Key projects:

- Beijing ITS plan and key technology development
 - Traffic emergency handling system development
 - Olympic village’ intelligent traffic management and dispatch system, etc.
- b. Clean vehicles: clean energy vehicle demonstration and promotion

Brief: Before 2008, automation emission will meet European emission 3rd standard in Beijing

Key Project:

Electrical Vehicles
Clean fuel vehicles

c. City transportation network: subway viaduct technology

Brief: To develop subway and light-weighted track transportation. Promote the structural adjustment of Beijing road system and passenger traffic lines and reduce bus traffic pressure.

Key Project: Develop underground subway and viaduct technologies. Based on 3 meters viaduct machine to develop 6 meters viaduct machine according to city's constructional characters.

B. Clean Energy

Objective: To adopt high efficiency technology to promote Beijing structure adjustment, reduce environmental pollution brought by energy consumption as well as energy burden along with economic development. In 2008, new clean, efficient and low cost energy structure will be formed.

Three Areas included:

a. Coal Clean Burning

Brief: * Clean coal technology demonstration and promotion: water coal mixture and type coal.
* Clean coal burning technology demonstration and promotion recycle sulphur bed and sulphur and nitre elimination.
* Coal Burning emission control technology demonstration and promotion: furnace smoke cleaning.

b. Natural Gas High Efficient Utilization

Brief: Natural gas cooling-heating-electricity co-generation technology

c. Renewable energy Utilization

Brief: * Solar Energy: Around the Olympic Game's sports ground and gym or stadium 80 to 90 percent road lamps can use solar energy photovoltaic generating technology, and 90 percent bathing thermal water in the Olympic Village, can be supplied by use of solar energy heat concentrating technology
* Other renewable Energy: wind power, geothermal heating and biomass energy

C. Environmental Protection

Objective: Up to 2008, Beijing air quality will meet national and WHO's standard. Civilian water quality will meet WHO's standard

Three Areas included:

a. Sand storm prevention and control

Key Project

- Layout and planning and control mode of ecological construction of sand protection and control
- Optimized plantation of indeciduous forest and grass and selection and breeding of indeciduous plant for sand protection and control and drought resistance and its facility and technology
- Airborne dust control technology on urban bare land
- Application and demonstration of sand protection and control technology etc.

b. Air pollution control

Key Project

- Beijing air pollution forecast and application study
- Mechanism and its control approach and Halon substitution technology of consuming the substance of the ozoneosphere
- Fine particle airborne dust control technology and its application
- Beijing hot island effect control technology and its application

c. Water Resource Protection and Sustainable Utilization

Key Project

- Water resource: study of technology of controlling the pollution in the zone of Guanting reservoir and in the lower reaches and its application, the protection of water resource of Miyun reservoir, re-design and planning for Beijing water system
- Water conservation: water conservation technology study and application in industrial, agriculture and civilian areas, and water cleaning technology application.
- Water pollution: Water pollution control and management mode study. Waste water treatment and recycle technology and preliminary treated water recycle technology

d. Solid waste treatment

Key Project

- Harmlessness treatment and recycle technology study and application for industrial, medical and civilian solid waste.
- Large sized waste burning furnace equipment design and application

D. Olympic Stadium and Sport Center

Objective: Syndicate cutting edge technologies in Olympic village, stadium and sport center construction-and embody green, high-tech and humanity ethics in the demonstrative construction projects.

Key Projects:

- Intelligent building technology and demonstration
- Frequency control and energy saving technologies and demonstration application
- Construction materials development and application
- Solar energy photo-electricity and photo-thermal technology development and application

E. Information and Communication

Objective: To meet the technical requirement of communication, data processing and TV broadcasting for Olympic and to provide advanced, safe and stable information and communication service

Key Projects:

- Digital news information system at the Olympic press center
- High definition digital television demonstrative city project
- Software and intelligent competition management system development
- Information Safety
- Mini-satellite design and application

F. Olympic Safety

Objective: To establish security system for Olympic games, form effective safety mechanism to provide security guarantee system for Olympic games

G. Science and Technology for Sports

Objective: Adopt modern S&T idea, means and integrate advanced scientific methods of training, and completely raise the level of scientific training of sportsman or sportswoman and sport competition. Meet requirement of anti-doping-agency standard.

Key Projects:

- Equipment for scientific training and sporting
- Doping Agency Detection study and application

H. Opening and Closing Ceremony

Objective: By use of China's original and advanced International technical achievements in close combination with the idea of the humane Olympics we shall create the complete new opening and closing ceremonies of the Olympic Games by high-tech means.

I. Zhongguancun Science Park

Objective: Taking Olympic games as a great opportunity to build world first class science park in Beijing which can help people to acknowledge Beijing, China and high-tech.

Introduction of 10 Main high-tech Projects for the Beijing 2008 Olympic Games

≡ Projects Background

- The “High-Tech” Action Plan for the Beijing 2008 Olympic Games” are coordinated by the most and Beijing Municipal Government, with 11 central government departments participating in.
- 60 projects have been started as phase 1 of the “plan”. 10 main projects of which are selected to be presented here.
- The implementation plans for these 10 main projects have been drafted.

≡ The 10 Main Projects

A. The plan and Implementation Study for Intelligent Transportation System (ITS) of Beijing

Major Content:

- Beijing ITS Overall Planning
- Beijing Road Network Optimizing Technique
- R&D for information platform and service system
- Control system study and demonstration for city road ITS
- Advanced public transportation management system study
- Strategic study for Beijing ETC integrated application
- Study for Beijing ITS social supporting system
- Key technology study and device development for vehicle navigation system.

Time of Implementation

2002-2004

Investment

RMB 48.7 million

B. The R&D and industrialization of Electric Motor Vehicles**Major Content:**

- Electrical vehicle demonstration operation for “Green Olympic Transportation”
- R&D and industrialization of electrical vehicle key technologies
- Vehicle fuel cell development
- Develop independent intellectual property vehicle fuel cell technology and product to achieve industrialization capacity.
- Electrical vehicle development

Time of Implementation

2002-2004

Investment

RMB 111.946 million

C. The Demo-Project for Clean Energy**Major Content:**

- Beijing Energy Requirement Analysis
- Beijing Energy Environmental Analysis
- Beijing Industry High Efficiency Clean Energy Research
- Implementing R&D and Demonstration of Regional Natural Gas CCHP System
- Action Plan of Clean Energy Experiment Demonstration City
- Beijing New Energy and Renewable Energy Development Research
- The Sustainable Development Mechanism Research of Beijing High Efficiency Clean Energy

Time of Implementation

2002 – 2004

Investment

RMB 81.5 million

D. Key Technology Research and Demo-project for sandstorm Prevention**Major Content:**

- The research of Beijing Regional land desert inspection, evaluation and pre-alert technology
- The research of integrating utilization of natural resources and ecological security protection system
- The Research of the construction technology of the sand protection and control system
- The research of Beijing forest ecological system management and the germ plasma resources protection technology
- The research of bare land fast fixation and vegetation resume technology
- Construction of different types of sand protection and control demonstration area

Time of Implementation

2002 – 2008

Investment

RMB 780 million

E. Technology and Application Research for High Performance Micro Earth Observation Satellite

Major Content:

- High performance mini-satellite platform system for earth observation.
- High definition all color remote sensor development
- Surface test and control and data collection and processing system.
- On track testing and targeting determination technology
- Integrating appliance demonstration
- Set up space information service system towards Olympics

Time of Implementation

2002 - 2005

Investment

RMB 160 million

F. Intelligent Multi-language Information Service Network System

Major Content:

- System resources construction and key technology assessing of Olympic multi-lingual information service network system
- R&D of Inter-lingual translation manufacture towards the Olympics
- R&D of multi-lingual integrating manufacture towards the Olympics

- Multi-lingual information service network system towards the Olympic Organizing Commission
- Multi-lingual information service network system towards Beijing digital information booth

Time of Implementation

2002 - 2005

Investment

RMB 78 million

G. Key Technology for Food Safety

Major Content:

- The research of food security inspection technology
- Food security inspection and analysis and evaluation
- Strengthen the control technology research of food security Technology standard system of food security
- Integrating demonstration

Time of Implementation

2002 - 2007

Investment

RMB 212 million

H. Key technology for the information Safety of the Olympic Games and the System Stimulation Testing

Major Content:

- Physics facility security
- Identity attestation system
- Data backup and catastrophe resume
- Security Management Organism
- Wireless network security
- Software simulation testing plat

Time of Implementation

2002 - 2005

Investment

RMB 210 million

I. The Technology Standards Research and Demonstration for the Green Buildings

Major Content:

- Research of green construction standard
- Research of Green construction evaluation system
- The break through of key technology in environmental protection, such as sewage and solid waste.
- The break through of key technology in construction conservation and indoor environment.
- The break through of key technology in green construction material

Time of Implementation:

2002-2005

Investment:

RMB 162 million

J. Doping Control Technology and Detecting Facilities Research

Major Content

- Study on peptide doping agency testing method.
- Biochip for doping agency testing.
- Upgrading doping agency method.
- Horse doping agency testing lab.
- Study on doping agency test method in food.

Time of Implementation:

2002-2005

Investment:

RMB 70 million

U.S. Sustainable Assistance for Olympic Challenge

Components of Community Sustainable Development Planning (CSDP)

Objective:

To assist Beijing in developing and implementing this integrated approach with coordinated assistance of US Government Agencies, NGOs and the US private sectors. To develop an integrated sustainable-development approach to Beijing's Olympic Park design and Beijing's overall future economic development.

Areas included:

- Integrated Urban Energy Planning
- Sustainable Transport Planning
- Green Buildings and Sustainable Architecture
- Cleaner Production in Industry and Manufacturing
- Sustainable Infrastructure Development
- Sustainable Electric Supply and Distributed Generation
- Sustainable Water and Sewerage Treatment
- Sustainable Agriculture and Forestry
- Community Sustainable Development Plan

Proposed Cooperation Projects

≡ Tsinghua University / Architecture Science & Technology Dept.

A. Integrated Evaluation and planning of The Olympic Park energy system

Background:

Green Olympics and Hi-tech Olympics demand that the energy system of Olympic Park and the urban energy system are advanced, high efficient and clean. The discussion draft of Olympic urban energy system planning has already published. But the draft still needs to be modified.

Primary planning of the Olympic park energy system

Electricity

- 20%wind power
- 80% utility grid

Space heating

- District heating with natural gas cc CHP plant as heat resource
- 0.4Mm² with geothermal heat pump

Sanitary hot water

- Solar Energy

Air-conditioning

- district heating system to drive absorption chiller

Research Content

- Energy loads of the Olympic park (including electricity, heating and cooling)
- Considering high-efficiency, cleanness and economic, select the best energy system
 - * Natural gas
 - * Renewable energy
- Make sure the scale of the applied energy systems and their operational modes
- Get the reasonable energy system planning and its evaluation

Cooperation content with U.S.

- Evaluation and analysis for urban energy system
- Other

B. Study on natural gas co-generation energy system

Background

According to the Beijing Air Pollution Environment, nature gas comes. Nature gas is so expensive, so need to develop energy-efficiency.

Research Content

- How to increase economic benefit of the natural gas cogeneration
 - * Develop the reasonable energy system structure
 - * Operational optimization
 - * Capacity optimization
- Demonstration engineering
 - * Large co-generation plant for district heating, e.g. Taiyanggong heating plant, Tsinghua University, Electric City, Caoqiao Gas Turbine Heat & Power Plant
 - * Small co-generation system (BCHP)
- R&D on equipment for co-generation
 - * New air-conditioning units
 - * Energy storage
- Build demonstration platform of building combined heating (cooling) and power system
 - * Fuel cell
 - * Microturbine
 - * Gas engine

C. Eco Building for Demonstration

Background:

- Purpose
 - * Pre-study for Olympic Office building
 - * Demonstration Eco techniques
 - * Study & training center
- Location: Tsinghua Campus
- Size: 2800 M²

Techniques used in energy system of Eco building

- SOFC produces electricity and heat with Natural gas
- Liquid desiccant AHU for dehumidification powered by heat generated from SOFC
- Solar power & solar AHU for outdoor air
- Only water and CO₂ exhausted
- CO₂ can then be feed to plant at the green roof

Technique used in envelope of Eco building

- Adjustable external shading
- High performance windows
- Solar chimney for ventilation
- Green roof provided with CO₂ supplied by SOFC

Technique used in environment control system of Eco building

- Humidity independent control
- Cool ceiling for sensitive heat
- Displacement ventilation to supply outdoor air
- Passive solar heating during winter

Technique used for sustainability

- Flexibility
 - * Plug and play
- Life circle analysis for material selection
 - * Steel structure with glassing
 - * Concrete take of less 20% of the total materials

Project schedule

- End of 2002: Conceptual designing
- End of March 2003: Detailed design
- April – November 2003: Construction and installation
- Dec.2003 – May 2004: Commissioning

Possible cooperation with US

- Supplying equipment
 - * SOFC
 - * High performance glassing
 - * etc.
- Supplying technologies
- Join the working team in design and commissioning

Possible partners in USA

- School of Architecture, Carnegie Mellon Univ.,
- Westinghouse Electric co., Pittsburgh

D. Green Building Evaluation for Olympic Campus & Buildings

General Goal: Green Olympic

- Saving natural resources
 - * Energy, water, unrennewable materials
- Protect environment
- Provide health & comfort environment

Approach: Evaluation & Guidance

- Develop a green building evaluation procedure & rating system
- The evaluation procedure will be carried on during the construction processes
 - * Campus planning
 - * Concept design
 - * Detailed design
 - * Constructing & installation
 - * Commissioning & management

What do we need?

- Evaluation system & procedure
- Software tools for evaluation
- Energy modeling, Life-cycle analysis, etc.
- Guidance
- Technique References

Project Schedule

- End of 2002: Draft of evaluation procedure
- End of June, 2003: First version of product

- July – Dec. 2003: Validity through case study
- End of 2003: Complete

Possible cooperation with US

- Provide relative information
- Provide relative software tools
- Evaluate the evaluation procedure
- Direct join the develop team

Possible partners from USA

- LBNL
- USGBC

E. Other Proposed Cooperation Projects List

LNG in public transportation
Green building evaluation & construction
Low energy demonstration building
Underground water heat pumps
Renewable energy applications in buildings
Energy system integration analysis & evaluation
Combined cooling, heating & power generation system for Olympic campus
Building Combined Heating & Power (BCHP) demonstration system at Zhongguancun

- **Contact Information for the above projects**
- **Prof. Jiang Yi**
- **Department of architecture technology and science / Tsinghua University**
- **Tel: 8610-62786871**

≡ Chinese Academy of Sciences

A. Solar Energy

Area Interested

- Building Integrated Photovoltaics
BIPV system can be integrated into almost any type of building to supplement grid-supplied power, reduce energy costs, and provide emergency back-up power during utility power outages
 - * Solar Roof
 - * Solar Wall

- Concentrating Solar

Accomplishing

- Reducing of energy loss in CH₃OH combustion
- Upgrading availability of solar thermal energy
- Cutting down investment of solar concentrator
- Solar to electric efficiency: 33%

- **Contact: Dr. Zhifeng Wang / Chinese Academy of Sciences**
- **Zhifeng@vip.sina.com**

北京理工大学

A. Sustainable Energy Technologies in Building for Olympic Games 2008 / Enhanced Heat Transfer & Energy Conservation Key Lab of Education Ministry

Key Figures of the Lab

- Faculty Member: 15
- Ph D and Ms. Students: 60
- On-going research projects: RMB 16 million
- Financial supports from the government (2001~2005): RMB 15 million

Advanced Environmental Energy Technologies

- 12 technologies that are to be integrated into the new Lab Building of 5100 M²
 - * Ground-source heat pump systems
 - * Light pipes for lighting
 - * Heat recovery heat exchangers
 - * Thermal energy storage
 - * Catalytic combustion for natural gases
 - * Photo-catalytic technology for air cleaning
 - * Advanced anti-fouling technology
 - * Advanced thermal insulation for buildings
- Working together for cleaner and more efficient energy technologies

Main functions of the new Key Lab Building

- Prototype of low energy consumption buildings
- Localization of advanced environmental energy technologies in China
- Database of sustainable energy in buildings
- Platform for international exchange and cooperation

- **Contact: Prof. Ma Chongfang / Dean of College of Environmental & Energy Engineering of Beijing Polytechnic University**
- **Tel: 8610 6739 1917**

Conclusion

The following are the Areas of Common Interest for Sino – US collaboration on the Energy and Environmental Protection Industry respectively.

≡ Energy (9 aspects)

- Green Building Evaluation & Guidance
- Cooperation on Demonstration Building. Including designing, technology collaboration, equipment, and construction. The demonstration building is used for technology display, including clean energy technology, energy efficiency, renewable energy and energy storage.
- Integrated resources in clean energy
- Renewable of Transportation
- Fuel cell & Hydropower cooperation
- Exhausted heating application
- Cooperation in Transportation on ITS & electric vehicle
- Establish US-China Nature Gas Technology Cooperation
- Renewable Energy Application / Wind resource evaluation & Wind power application

≡ Environmental (3 aspects)

- Air Quality
 - * Air Quality Management
 - * Integrated Environmental Strategies
- Weather
 - * Air Quality Forecasting
 - * Nowcasting & very short time forecasting Typhoon and Severe Weather
 - * Dust storm forecasting and monitoring
- Water
 - * Water quality monitoring sensors
 - * Animal waste treatment
 - * Water efficiency & conservation