

MEMORANDUM OF UNDERSTANDING

BETWEEN

**THE DEPARTMENT OF ENERGY
OF THE UNITED STATES OF AMERICA**

AND

THE CHINESE ACADEMY OF SCIENCES

ON COOPERATION IN NUCLEAR ENERGY SCIENCES AND TECHNOLOGIES

The Department of Energy (DOE) of the United States of America, and the Chinese Academy of Sciences (CAS) of the People's Republic of China, hereinafter referred to as the "Participants":

NOTING their desire to enhance communication and cooperation on nuclear energy-related matters of common interest and to foster collaboration among scientists, laboratories, research institutes and universities of the Participants' countries and to facilitate and promote cooperation in research and development in a broad range of nuclear energy sciences and technologies; and

NOTING 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 at Washington on July 23, 1985,

Have reached the following understanding:

Section 1 Objective

1. The objective of this Memorandum of Understanding (Memorandum) is to promote and facilitate cooperation on the scientific and technical aspects of nuclear energy technologies.
2. By their joint determination, the Participants may invite other entities to participate in the cooperative activities carried out in the framework of this Memorandum: governmental agencies, universities, science and research centers, institutes and institutions, private sector firms, and other entities of the Participants' respective governments. The costs of such participation are the responsibility of the entities that incur them.
3. The Participants' cooperation under this Memorandum is intended for peaceful purposes only.

Section 2 Forms of Cooperation

1. Forms of cooperation under this Memorandum may include: exchange of publicly available technical information, data and experience; exchange of technical and managerial personnel for visits and short-term assignments; exchange of equipment, materials and instrumentation; joint conferences, seminars or workshops; and such other forms of cooperation as the Participants may jointly decide in writing.
2. The terms of visits and assignments, and the exchange of equipment, materials, and instrumentation should be the subjects of appropriate written agreements between the sending and receiving entities.

Section 3 Areas of Cooperation

1. Priority areas of cooperation may include the following:

Nuclear Energy for Non-electric Applications

Nuclear power could be used to displace greenhouse gas emitting fuels in the industrial sector. Petroleum refining, for example, requires temperatures in the range of 250-500°C while steam reforming of natural gas requires process heat in the 500-900°C range. Achieving higher output temperatures requires switching to a new coolant technology such as molten salt. With advanced coolants, it is possible to achieve outlet temperatures ranging from 500°C to over 900°C.

Potential subjects of collaborative activities may include materials and chemistry of fluoride salt coolant systems.

Nuclear Fuel Resources

Nuclear energy can help alleviate the concern over greenhouse gases and global warming, energy supply security, and high and volatile fossil fuel prices. For nuclear energy to remain a viable and sustainable energy source, there must be assurance that economical sources of nuclear fuels are available. The focus of this cooperation is direct extraction of dissolved uranium from seawater. Although uranium is present in very low concentrations in seawater, 3.3 parts per billion, the oceans contain over 4500 million tonnes of uranium, which would provide essentially unlimited supply of nuclear fuel. Potential subjects of collaborative activities may include: (a) molecular-level understanding of the coordination modes, sorption mechanisms, and kinetics of uranium extraction; (b) new functional ligands; and (c) advanced sorbent materials.

2. The areas of cooperation may be expanded and revised by the written consent of the Participants.
3. The Participants intend to conduct research and development on mutually determined subjects under appropriate written agreements therefor. Such agreements should include, among other matters, provisions for the protection and allocation of intellectual property.

Section 4 Management

1. Execution of this Memorandum is to be guided by an Executive Committee (EC) consisting of one co-chair from each Participant: DOE Assistant Secretary for Nuclear Energy and Vice President of CAS.
2. The EC co-chairs should designate one technical coordinator from each Participant to organize technical activities under this Memorandum. The technical coordinators should jointly plan, identify, and coordinate cooperative activities. Specific working groups may be established to collaborate on mutually determined topics.
3. Working groups and/or EC meetings should take place on an annual basis or as otherwise mutually decided, alternately in the United States and in the People's Republic of China.
4. The host Participant should choose the meeting site and bear the costs for the arrangements associated with the meeting. Representatives from each Participant attending the meetings are to be responsible for their own travel and lodging expenses.

5. The technical coordinators should jointly prepare written reports of the meetings. Each Participant may disseminate the written meeting report without prior notification to the other Participant, after the record has been approved by EC. The report should document the progress of activities and the next year's plans for continuation of cooperation.
6. The technical coordinators may invite representatives of other organizations within their countries to attend joint working groups and/or EC meetings.

Section 5 General Considerations

1. This Memorandum does not constitute a legally binding agreement.
2. Each Participant should implement this Memorandum in accordance with the laws, regulations and other requirements of its respective country and international agreements to which its government is party.
3. Any questions relating to this Memorandum arising during its term should be resolved by consultations between the Participants.
4. Each Participant is responsible for the costs of its participation in all cooperative activities carried out in the framework of this Memorandum, unless they determine otherwise in writing. Each Participant's participation in the cooperative activities is subject to the availability of funds, resources, and personnel.

Section 6 Commencement, Modification, and Discontinuation


1. The Participants' implementation of cooperative activities within the framework of this Memorandum may commence on the date of signature.
2. This Memorandum may be modified by mutual determination of the Participants in writing.
3. The Participants may discontinue this Memorandum at any time in writing. Alternatively, a Participant that wishes to discontinue its participation in the activities under this Memorandum should endeavor to provide at least six (6) months' written notice to the other Participant.

Signed, in duplicate, at Washington on the 21 day of *December*, 2011, and at Beijing on the 29 day of *December*, 2011, in the English and Chinese languages.

FOR THE DEPARTMENT OF ENERGY
OF THE UNITED STATES OF AMERICA:

A handwritten signature in black ink, appearing to read "Steven Bly". The signature is fluid and cursive, with the first name "Steven" written in a larger, more prominent script than the last name "Bly".

FOR THE CHINESE ACADEMY OF
SCIENCES:

A handwritten signature in black ink, appearing to read "Jinghua Li". The signature is written in a cursive style, with the first name "Jinghua" and the last name "Li" clearly distinguishable.