Annex X

To the Agreement Between the Department of Energy of the United States of America and the Ministry of Energy and Infrastructure of Israel in Energy Research and Development Simulation and Analysis of High Temperature Receivers and Thermochemical Processes for Central Receivers

WHEREAS, the Department of Energy of the United States of America (hereinafter referred to as "DOE") and the Ministry of Energy and Infrastructure of Israel (hereinafter referred to as "MOEI") have entered into an Agreement in Energy Research and Development signed in Jerusalem, on June 3, 1984;

WHEREAS, DOE and MOEI (hereinafter referred to as the "Parties") recognize that it would be beneficial to both countries to work on a project in Simulation and Analysis of High Temperature Receivers and Thermochemical Processes for Central Receivers; (hereinafter referred to as "the Project");

WHEREAS, the Parties further recognize that the Project is of mutual interest to both countries;

Therefore, the Parties agree as follows:

ARTICLE 1

Scope

The goal of this project is to establish cooperation between U.S. and Israeli institutions, to advance the understanding and use of ceramic receivers and thermochemical conversion of hydrocarbons for distributed and central receivers. Principal objectives are:

- 1. Conduct tests at the Weizmann Institute's Central Receiver facility on solar heated thermochemical reactors, specifically, the reaction of hydrocarbons and carbon dioxide, and possibly hydrocarbons and steam.
- Conduct solar tests at the Weizmann Institute's Central Receiver facility on a Black and Veatch ceramic receiver.
- 3. Perform system analyses, data evaluation and assessments of the experimental results.
- 4. Produce a report on the state of the art of high temperature ceramic receiver and hydrocarbon thermochemical conversion technology in Israel, to be added to similar information on the work in the U.S. and other countries.

The activities of this Annex shall be carried out under the following tasks:

Task 1 -- DOE shall design and fabricate a 20 kW carbon dioxide reformer for testing in the solar furnace at Israel's Weizmann Institute of Science (WIS). The design effort, which will include the entire loop, will be performed by a team consisting of staff from the United States' Sandia Laboratories. WIS will have the primary responsibility for the design of the loop, other than the reformer, with support from the U. S. Fabrication and assembly of the reformer will take place at Sandia.

Task 2 -- MOEI shall test the 20 kW reformer at WIS. At least one member of the technical staff at Sandia will participate in this testing. This task is scheduled to take place during 1987-1988; an evaluation shall be published at its conclusion.

Task 3 -- DOE shall design, construct, and test the Closed Loop Operations Experiment (CLOE) Phase I at Sandia. At least one member of the staff at WIS will participate in the testing. (CLOE is designed to test application of thermochemical energy transport to a distributed collector solar plant.) Construction is scheduled to be completed by September, 1988, and testing is scheduled to begin in November, 1988.

Task 4 -- The U. S. shall design, construct, and test CLOE Phase II at Sandia. At least one member of the staff at WIS will participate in this phase as well. This task is scheduled to begin in January, 1989.

Task 5 -- a) MOEI shall test at WIS an existing one-megawatt (thermal) ceramic tube cavity central receiver designed by Black and Veatch and constructed in the U.S. The tests in Israel shall include "cold" testing, "hot" testing by electrical heating and "solar" testing at the Solar Tower Facility. The DOE, through the U.S. Solar Energy Research Institute (SERI) shall observe the "solar" testing for an appropriate duration to get an understanding of the behavior of the ceramic receiver in solar flux. SERI shall assist WIS with data analysis of the test data and in the interpretation of the thermal performance at the WIS. A test report will be published jointly in 1988.

b) Computer codes for thermal performance developed in the U. S. Central Receiver Program by Sandia Laboratories have been made available to WIS, which has modified them for the specific case of this receiver. A visiting professional from WIS will conduct a test case evaluation using WIS and Sandia computer codes, at Sandia and with Sandia assistance for two weeks, to assess the validity of the modifications made by WIS.

Task 6 -- Israel shall design, construct, and test a closed-loop reforming/methanation system with heat provided by the ceramic receiver described in Task 5. At least one member of the technical staff at Sandia will participate in the testing.

Schedule, Milestone and Reporting Requirements

- 1. Within three months of the effective date of this Annex, a set of checkpoints shall be developed that shall allow for periodic assessment of Project progress and direction, and facilitate mutually agreed written modification, expansion, contraction, or termination of the Project.
- 2. Each Party shall provide to the other Party brief quarterly reports that shall note the status of the Project with respect to schedules, milestones and budgets. The fourth quarter report shall be a full scale annual report including a specific work plan for the following year; this report shall be delivered at least thirty days before the end of the fourth quarter. The two Project leaders appointed pursuant to Article 4.2 shall jointly prepare an annual report describing the work done, results achieved, funds expended and milestones completed. An assessment of progress made in light of the adopted set of checkpoints will be included.

ARTICLE 4

Administration

- 1. Overall responsibility for annual approval of the Project's technical content and budget shall rest with the Parties.
- Each Party shall appoint a Project Leader for the detailed management of the Project. The Project Leaders shall be responsible to their respective Project Coordinators (appointed pursuant to Article 3.3 of the Agreement dated June 3, 1984) for the working contacts between the Parties.

ARTICLE 5

Funding

1. Each party shall bear the costs it incurs in the implementation of this annex.

ARTICLE 6

Exchange of Personnel

1. Whenever an assignment of personnel is contemplated under this Annex, each Party shall ensure that qualified staff are selected for the assignment.

- 2. Each such assignment of personnel shall be the subject of a separate assignment arrangement between the Parties or between their contractors, subject in each case to the approval of DOE and MOEI.
- 3. Each Party shall be responsible for the salaries, insurance, travel, living expenses and other allowances to be paid to its assigned personnel, unless otherwise agreed in the separate assignment agreement.
- 4. The receiving Party shall assist in arranging for accommodations for assigned personnel and their families.
- 5. The receiving Party shall assist assigned personnel and their families as regards administrative formalities.
- 6. The assigned personnel shall conform to the general rules of work and safety regulations in force at the laboratory to which assigned, or as agreed in the separate assignment agreements.
- 7. Assigned personnel shall be given necessary assistance by the Receiving Party for the execution of their research and other activities under this Annex.

Loan of Equipment

Each party agrees that in the event equipment is to be exchanged or supplied by one party to the other party, the following provisions shall apply covering the shipment and use of the equipment.

- 1. The sending party shall supply as soon as possible a detailed list of the equipment to be provided together with the associated specifications and technical and informational documentation.
- 2. The equipment, spare parts, and documentation supplied by the sending party shall remain the property of the sending party and shall be returned to the sending party upon completion of the mutually agreed-upon activity unless otherwise agreed.
- 3. The receiving party shall provide the necessary premises and shelter for the equipment, and shall provide for electric power, water, gas, etc., in accordance with technical requirements which shall be as mutually agreed upon.
- 4. Responsibility for expenses, safekeeping and insurance during the transport of the equipment from the original location in the country of the sending party to the place of entry in the country of the receiving party shall rest with the sending party. If the

sending party elects to have the equipment returned, it shall be responsible for expenses, safekeeping and insurance en route from the place of entry in the country of the sending party to the final destination in the country of the sending party.

- 5. Responsibility for expenses, safekeeping and insurance during the transport of the equipment from the place of entry in the country of the receiving party to the final destination in the country of the receiving party shall rest with the receiving party. If the sending party elects to have the equipment returned, the receiving party shall be responsible for expenses, safekeeping and insurances en route from the place of departure in the country of the receiving party.
- 6. The equipment provided by the sending party for carrying out mutually agreed-upon activities shall be considered to be scientific, not having a commercial character.

ARTICLE 8

Information and Intellectual Property

- 1. The publication, distribution, handling, protection and ownership of information, and intellectual property, and rules and procedures related thereto, not covered by this Annex, shall be determined by the Parties by unanimity.
- 2. Subject to restrictions applying to patents and copyrights, the Parties shall have the right to use and disseminate all information provided to or arising from the Project. It is intended that the results of this Project shall be published in the scientific literature.
- 3. A Party possessing information arising in the course of or under this Project ("arising information") regarding inventions on which patent protection is to be obtained shall notify the other Party and thereafter such information shall not be published or publicly disclosed until a patent application has been filed, provided, however, that this restriction on publication or disclosure shall not extend beyond six months from the date of notice to the other Party under this paragraph. Such information shall be appropriately marked to restrict publication or disclosure.
- 4. Reports containing arising information and information developed prior to or outside the Project necessary for and used in the Project shall be exchanged by the Parties and will cover the work performed by each Party under this Project.
- 5. With respect to any invention or discovery made or conceived in the course of or under this Annex by personnel of one Party(Assigning Party) or its contractors while assigned to

the other Party(Receiving Party) or its contractors, in connecton with exchanges of scientist, engineers and other specialists:

- (A) The Receiving Party shall acquire all right, title, and interest in and to any such invention or discovery in its own country and in third countries, subject to a non-exclusive, irrevocable, royalty-free license to the Assigning Party, its Government, and its nationals designated by it, in all such countries.
- (B) The Assigning Party shall acquire all right, title, and interest in and to any such invention or discovery in its own country, subject to a non-exclusive, irrevocable, royalty-free license to the Receiving Party, its Government, and its nationals designated by it, in such country.
- 6. Copyrights of either Party shall be accorded treatment consistent with internationally recognized standards of protection. Any material which may be the subject of copyright developed under the Project may be copyrighted. A Party securing a copyright or rights thereto shall grant a royalty-free, non-exclusive license to the other Party to reproduce, publish, distribute, duplicate and use the copyrighted material.
- 7. Each Party shall, without prejudice to any right of inventors or authors under its national laws, take all necessary steps to provide the cooperation of its authors and inventors required to carry out the provisions of this Article 8. Each Party shall assume the responsibility to pay awards or compensation required to be paid to his employees according to the laws of its country.
- 8. It is not anticipated nor shall it be required that any exchange of proprietary information will occur under the activities specified under this Annex. Should a circumstance arise in which it is necessary or desirable to exchange proprietary information, then additional agreements will be developed.

ARTICLE 9

Other Agreements

The provisions of this Annex shall not affect the rights or duties of the Parties under other agreements or arrangements. This Annex also in no way precludes commercial firms or other legally constituted enterprises in each of the two countries from engaging in commercial dealings in accordance with the applicable laws of each country; nor does it preclude the Parties from engaging in activities with other governments or persons.

Laws and Regulations

Activities under this Annex shall be in accordance with laws and regulations of the countries of the Parties. All questions related to this Annex shall be settled by the Parties by mutual agreement.

ARTICLE 11

Appropriated Funds

It is understood that the ability of the Parties to carry out their obligations under this Annex is subject to the availability of appropriated funds.

ARTICLE 12

Term

- 1. This Annex shall enter into force upon signature, shall continue in force for a two-year period, and may be amended or extended by mutual written agreement of the Parties.
- 2. In the event that, during the period of this Annex, the nature of either Party's energy programs should change substantially, either Party shall have the right to request revisions in the scope and/or terms of this Annex.
- 3. This Annex may be terminated at any time at the discretion of either Party, upon six months advance notification in writing by the Party seeking to terminate the Annex. Any such termination shall be without prejudice to the rights which have accrued under this Annex to either Party up to the date of such termination.

Done at <u>Jerusalem</u>	<u> </u>
this day of <u>November 17</u> ,	1987
AANallen	P. Cluckstern

For the Department of Energy of the United States of America For the Ministry of Energy and Infrastructure of Israel