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Second Program Plan for DOE's Participation in the IEA Working Party on Energy Conservation Research and Development

January 1979 Department of Energy Washington, D.C. 20545

INTERNATIONAL ENERGY AGENCY

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Foreword

I am pleased to present the 1979 Program Plan for DOE's participation in the International Energy Agency's (IEA) Working Party on Energy Conservation Research and Development. The plan documents the projects currently being conducted by the working party in which DOE is participating and the projects proposed by DOE for consideration by other IEA member nations.

The Program Plan is intended to inform interested parties about DOE's IEA activities. It is also hoped that the plan will serve as a model for other working party participants in their efforts to document their current activities and plan their future commitments to IEA projects.

Dr. Melvin H. Chiogioji
Chairman
Working Party on Energy Conservation
Research and Development

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Introduction

In response to the oil crisis of 1973, the United States urged the international community to develop a program of cooperative action for dealing with the changing world energy situation. As a result of the United States' initiative, the International Energy Agency (IEA) was established in November 1974, within the framework of the Organization for Economic Cooperation and Development (OECD). The original members were: Austria, Belgium, Canada, Denmark, Federal Republic of Germany, Ireland, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

IEA was organized into a Governing Board composed of one or more ministers or their delegates from each participating country; a Management Committee composed of one or more senior representatives of the government of each participating country; and a Secretariat, which is the IEA's administrative body. Four standing groups and a committee were then formed in 1974 and 1975, each with a specific objective (see Exhibit 1). The Standing Group on Emergency Questions was formed to take common, effective measures to meet oil-supply emergencies by encouraging self-sufficiency in oil supplies, restraining demand, and allocating supplies among member countries on an equitable basis. The Standing Group on the Oil Market was charged with promoting secure oil supplies on reasonable and equitable terms for member nations. The Standing Group on Relations with Producer and Other Countries was formed to promote cooperative relations with oil-producing countries. Finally, the Committee on Energy Research and Development (R&D) and the Standing Group on Long-Term Cooperation shared responsibility for reducing the dependence of member countries on imported oil by undertaking long-term cooperative efforts on conservation of energy, accelerated development of alternative sources of energy, and energy-related R&D.

The United States has been most actively involved in IEA activities conducted under the Committee on Energy R&D.

Under the committee, member nations interested in developing and conducting cooperative R&D projects establish working parties. Currently, 12 working parties have been established:

- Biomass Conversion
- Fusion
- Geothermal Energy
- Coal Technology
- Energy R&D Strategy
- Energy Conservation R&D
- Hydrogen Production from Water
- Ocean Energy Systems
- Radioactive Waste Management
- Small Solar Power Systems
- Solar Heating and Cooling
- Wind Power.

Various United States agencies are participating in all 12 working parties.

Introduction

The Working Party on Energy Conservation R&D was established in March 1977 by the Committee on Energy R&D to promote international cooperative R&D programs focusing on new energy conservation technologies. The working party has four objectives:

- To develop international mechanisms for performing energy conservation research, development, and demonstration (RD&D) with maximum benefits to participants, and to accelerate the realization of those benefits
- To identify areas of mutual interest that represent major opportunities for more efficient use or for conservation of energy
- To define and implement mechanisms to develop and exchange information and/or R&D results
- To perform RD&D projects that maximize cooperation between national R&D programs.

The U.S. Department of Energy (DOE) is responsible for coordinating U.S. involvement in the working party and for ensuring that U.S. interests are directly served by this involvement. DOE also ensures that the United States achieves several specific objectives by cosponsoring IEA projects:

- Optimize domestic RD&D expenditures
- Promote the development of U.S. industries
- Contribute to the preservation of economic and political stability in the free world
- Strengthen the international position of the United States.

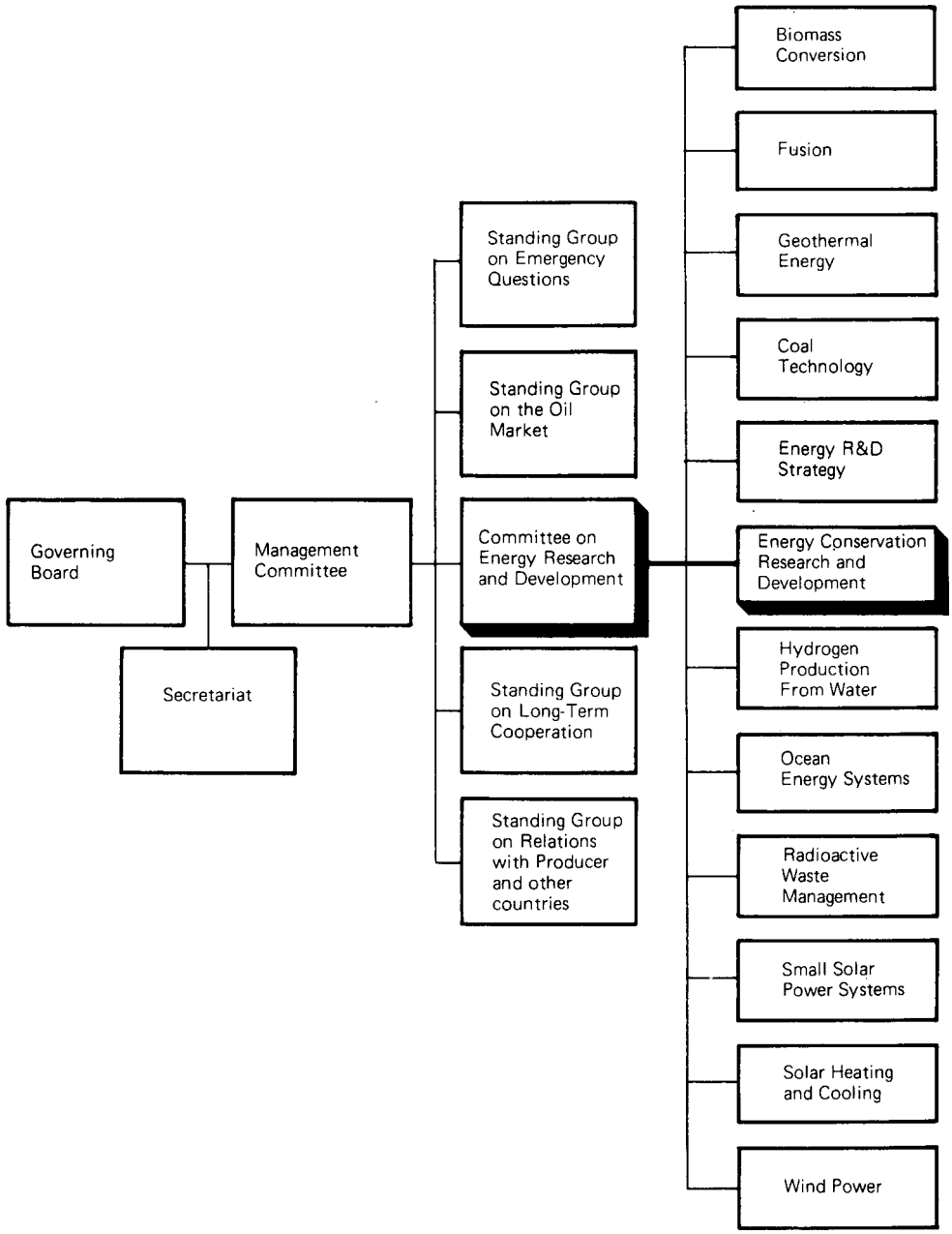
To ensure that these objectives are achieved, each dividion uses its own existing evaluation techniqus. Furthermore, the chairman of the working party is currently developing an appraisal method for evaluating IEA projects in which it is involved or in which it may be interested in participating. Each project must be rigorously evaluated and justified before it is funded by Congress, during the annual review of the DOE budget (see Appendix A). After a project is funded, DOE contacts other IEA member nations to decide on appropriate project areas for cooperative RD&D. They form an ad hoc committee, called an expert group, to draft an implementing agreement, which serves as the legal basis for cooperative RD&D in that project area. After the agreement is signed, annexes are drafted under the agreement to outline the objectives and technical basis for specific projects undertaken within the project area (see Appendix B). The Working Party on Energy Conservation R&D now has nine signed implementing agreements; three new implementing agreements are being considered.

This program plan for DOE participation in the Working Party on Energy Conservation R&D covers DOE's FY 1979 commitments to the signed and new implementing agreements. The plan describes each implementing agreement and related annexes, including the tasks, project status, other participants in the agreement, and financial arrangements. Chapter 1 reviews current and planned DOE commitments to existing implementing agreements; Chapter 2 reviews planned DOE commitments to new implementing agreements. Appendix A explains how DOE commitments to IEA projects interact with the federal budget cycle; Appendix B discusses the mechanisms for establishing implementing agreements and annexes; Appendix C is a list of the members of the Working Party on Energy Conservation R&D.

Exhibit 1

International Energy Agency Organizational Structure

Working parties established under the Committee on Energy R&D.



The Working Party on Energy Conservation R&D is presently sponsoring work under implementing agreements in nine areas:

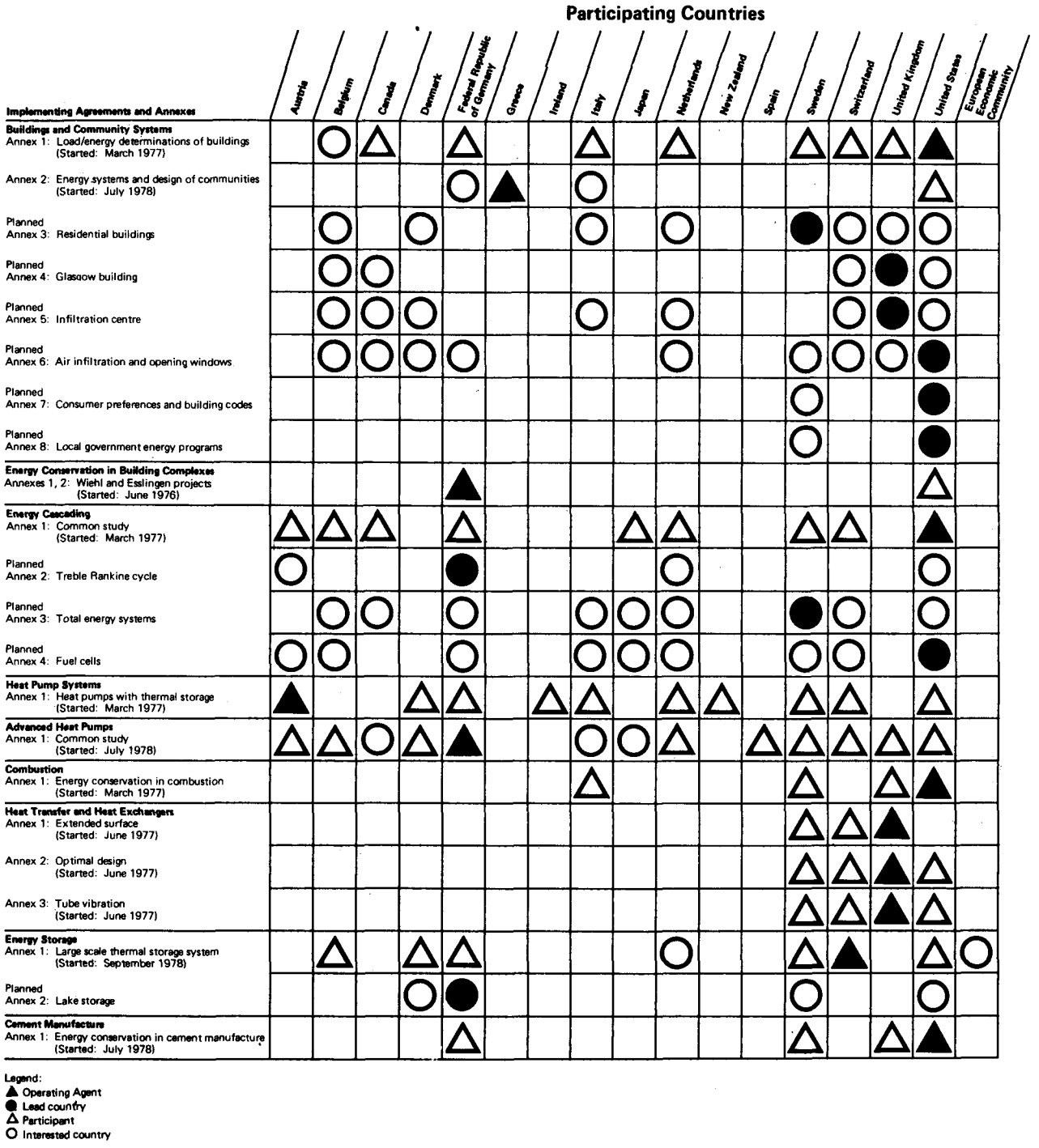
- Buildings and Community Systems
- Energy Conservation in Building Complexes
- Energy Cascading
- Heat Pump Systems
- Advanced Heat Pumps
- Combustion
- Heat Transfer and Heat Exchangers
- Energy Storage
- Cement Manufacture.

DOE has made commitments to all these agreements and is currently participating in 12 of the 13 annexes under way in these areas (see Exhibit 2). DOE has taken the lead in four annexes. Five of the annexes are jointly funded (i.e., all contributions are pooled) and seven are funded on a task-sharing basis (i.e., each country bears its own costs).

The agreements in which DOE is involved are an integral part of each division's program and contribute to the objectives of DOE's National Energy Plan. All agreements are monitored using the management review and control documents (see Appendix A).

Exhibit 2

Participants in Existing Implementing Agreements



Legend:
- ▲ Operating Agent
- ● Lead country
- △ Participant
- ○ Interested country

Project Area Objectives: The buildings and community systems project represents a long-term effort undertaken, at U.S. initiative, to provide the participating nations with international standards to evaluate, predict and compare energy usage for various energy systems, materials, buildings, and community designs.

The objective of this project is to examine different alternatives for energy conservation through improved design of buildings and community systems. Within this framework, the participating countries will be able to develop internationally accepted measurement techniques and to establish common codes and standards to improve energy conservation in new and existing buildings and communities.

Research is being conducted or is planned in eight areas:

Annex 1:	Establishment of Methodologies for Load/Energy Determination of Buildings
Annex 2:	Energy Systems and Design of Communities
Planned Annexes	
Annex 3:	Evaluation of Energy Conservation Measures for Heating of Residential Buildings
Annex 4:	Glasgow Commercial Building Monitoring Project
Annex 5:	Infiltration Data Management Center
Annex 6:	Air Infiltration in Buildings; Measurement and Modifications of Opening Window Patterns
Annex 7:	Consumer Preferences and Needs; and Buildings Codes, Loans and Grants
Annex 8:	Local Government Energy Programs.
Legal Status:	The implementing agreement was signed in March 1977.
Executive Committee Chairman:	Gerald S. Leighton, U.S. Department of Energy
Participants:	Canada, Denmark, FRG, Greece, Italy, Netherlands, Sweden, Switzerland, United Kingdom, United States. Belgium intends to sign.
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Schedule of Executive Committee Meetings:	Fifth Executive Committee Meeting on May 24, 1979, in Copenhagen, Denmark.

Annex 1:
Establishment of Methodologies for Load/Energy Determination of Buildings

Project Description/Status: The objective of this project is twofold:

- To compare results of computer programs modeling energy loads and consumption in a commercial building
- To compare results of the same computer programs with measured values in an actual building.

In the first area, 17 programs from 8 countries have been compared on a hypothetical building specification to isolate key differences between programs in estimating building energy loads. Major differences were found between the programs in the handling of solar insolation effects. In the second area, the load estimates of the same programs are being compared with the actual loads and energy requirements of a real building, the Avonbank building in the United Kingdom. The second effort is currently under way; initial results were difficult to compare because of varying interpretations of the specifications. This problem will be resolved in future runs.

A final report will be published in December 1979.

Legal Status:	The annex was initiated on March 16, 1977.
Operating Agent:	United States, Department of Energy
Participants:	Canada, Denmark, FRG, Italy, Netherlands, Sweden, Switzerland, United Kingdom, United States. Belgium intends to sign.
U.S. Program Manager:	Howard Ross, DOE/BCS, (202) 376-4672
Project Financing:	The project is funded on a task-sharing basis.
Schedule of Working Meetings:	May 21-22, 1979; Copenhagen, Denmark.

Annex 2:
Energy Systems and Design of Communities (Ekistics)

Project Description/Status: The objective of this task is to develop a practical and widely applicable methodology for the energy-efficient design of new communities. These communities may be part of existing urban developments or associated with existing villages in resource-limited environments.

In the first part of this project, a methodology and associated tools for the design of new or expanded communities and their associated energy systems were developed. A three-volume report on the methodology has been published.

In the second part of this annex, the participants will document this methodology and develop design tools such as cost-benefit analysis, optimization methods for energy systems, techniques for calculating energy balances in buildings, and standard tables. Participants will also discuss and compare case studies.

Legal Status: The annex was initiated in July 1978.

Operating Agent: Greece, National Energy Council of the Ministry of Coordination of the Republic of Greece

Participants: Greece, United States. The Federal Republic of Germany and Italy intend to sign.

U.S. Program Manager: Gerald Leighton, DOE/BCS, (202) 376-4714

Project Financing: The project is jointly funded as follows (U.S. dollars):

Through 7/78:

United States	$147,000
Greece	42,000

Proposed for 9/78 - 3/80:

United States	$140,000
FRG	140,000
Greece	70,000
Italy	70,000

Schedule of Working Meetings: November 27-28, 1978; Athens, Greece
June 19-21, 1979; Genoa, Italy

Planned Annex 3:
Evaluation of Energy Conservation Measures for Heating of Residential Buildings

Project Description: The objective of the project would be to apply the Annex 1 methodology to residential buildings.

The main problem is using the methodology on an international basis, so that findings in one country could also be used in another, and extensive national research programs could then be reduced and rationalized.

Subtask A of the annex will be a comparison of manual and computer calculation methods to predict energy consumption in residential buildings. The influence of habitants will be taken into account. Subtask B will be to publish a handbook of guiding principles concerning design of experiments, instrumentation, and measuring techniques. Subtask C will be to evaluate national case studies and to generalize them for other countries.

Periodic documents and reports on the results of the three subtasks will be published by the Operating Agent.

Legal Status:	This annex was adopted ad referendum at the Executive Committee Meeting in Edinburgh on November 9, 1978 (pending telex vote after final annex has been reviewed).
Lead Country:	Sweden
Interested Countries:	Belgium, Denmark, Italy, Netherlands, Sweden, Switzerland, United Kingdom, United States
U.S. Program Manager:	Howard Ross, DOE/BCS, (202) 376-4672
Estimated Maximum U.S. Involvement:	The project will be funded on a task-sharing basis.
Schedule of Working Meetings:	February 6, 1979; Paris, France.

Planned Annex 4:
Glasgow Commercial Building Monitoring Project

Project Description: The primary objective of this project will be to measure in detail the energy inputs, flows, and outputs, and the internal and external environment of a commercial office building. These data will allow in-depth comparisons of the actual energy performance of the building with that predicted by load/energy computer programs. This will lead in turn to a better understanding of energy transfers in buildings and to improve computer programs. A secondary objective of this task will be to extend and further the evaluation of computerized energy analysis techniques begun under Annex 1.

The monitored building is the Collins Publishers building in Glasgow, Scotland.

Legal Status:	This annex was adopted ad referendum at the Executive Committee Meeting in Edinburgh on November 9, 1978 (pending telex vote after final annex is reviewed).
Lead Country:	United Kingdom, University of Glasgow
Interested Countries:	Belgium, Canada, Switzerland, United Kingdom, United States
U.S. Program Manager:	Howard Ross, DOE/BCS, (202) 376-4672
Estimated Maximum U.S. Involvement:	The project will be jointly funded as follows (British pounds):

Belgium	24,000
Canada	48,000
Switzerland	24,000
University of Glasgow	96,000
United States	38,000

Schedule of Working Meetings:	March 1, 1979; Glasgow, United Kingdom May 22, 1979; Copenhagen, Denmark

Planned Annex 5:
Infiltration Data Management Center

Project Description: An Infiltration Data Management Center will be established to coordinate research work in air infiltration and to support organizations active in air-infiltration research through collation, analysis appraisal, and dissemination of experimental data and technical information. The center will be located at the Building Services Research and Information Association in the United Kingdom. The program will include publication of a handbook on reduction of air infiltration in buildings.

Legal Status: This annex was adopted ad referendum at the Executive Committee Meeting in Edinburgh on November 9, 1978 (pending telex vote after final annex has been reviewed).

Lead Country: United Kingdom, Building Services Research and Information Association

Interested Counties: Belgium, Canada, Denmark, Italy, Netherlands, Switzerland, United Kingdom, United States

U.S. Program Manager: Howard Ross, DOE/BCS, (202) 376-4672

Estimated Maximum U.S. Involvement: The project will be annually jointly funded as follows (British pounds):

Belgium	9,200
Canada	18,400
Denmark	4,600
Netherlands	9,200
Switzerland	9,200
United Kingdom	36,800
United States	36,800
Italy	18,400

Schedule of Working Meetings: May 23, 1979; Copenhagen, Denmark

Planned Annex 6:
Air Infiltration in Buildings; Measurement and Modification of Opening Window Patterns

Project Description: The project is comprised of three subtasks concerning research on air infiltration and window-opening patterns, and the development of infiltration standards. Subtask A will be an investigation of the use of pressurization tests to predict natural air-leakage rates. Participants will then develop construction quality standards for air leakage. A report on the effectiveness of the pressurization tests will be published along with the standards. Subtask B will establish objective criteria for ventilation standards, and minimum ventilation standards based on activity, air quality, comfort, and moisture. Subtask C will study the users' window-opening behavior.

Legal Status:	This annex was adopted ad referendum at the Executive Committee Meeting in Edinburgh on November 9, 1978 (pending telex vote after review of final annex).
Lead Country:	United States; Lawrence Berkeley Laboratory, Princeton University
Interested Countries:	Belgium, Canada, Denmark, FRG, Netherlands, Sweden, Switzerland, United Kingdom, United States
U.S. Program Manager:	Howard Ross, DOE/BCS, (202) 376-4672
Estimated Maximum U.S. Involvement:	The project will be funded on a task-sharing basis.
Schedule of Working Meetings:	May 23, 1979; Copenhagen, Denmark

Planned Annex 7:
Consumer Preferences and Needs; and Building Codes, Loans and Grants

Project Description: This project is comprised of tasks on consumer preferences and needs, and building codes, loans and grants.

In the consumer preferences and needs area, the objective of the task is to survey and analyze information on consumer preferences and needs, and their effect on energy consumption, and to prepare a report on information and education programs that can reduce energy consumption.

In the building codes, loans, and grants area, the objectives are to compare the technical aspects and implementation procedures of building codes and regulations concerning loan and grant programs; to determine the effect of building codes and loan and grant programs on energy consumption; and to perform a cost-benefit analysis of possible improvements in building codes and loan and grant programs.

Legal Status:	The annex is in the draft stage.
Lead Country:	United States, Minnesota Energy Agency
Interested Countries:	Sweden, United States
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Estimated Maximum U.S. Involvement:	The project will be funded on a task-sharing basis.
Schedule of Working Meetings:	February 8, 1979; Paris, France

Planned Annex 8:
Local Government Energy Programs

Project Description: This project includes four subtasks:

Subtask A is to examine the role of local governments and local planning in meeting short-term and long-term energy problems. This includes a survey and analysis of the role of local government and local planning in meeting energy problems; recommendations for improving the effectiveness of local energy programs will be prepared.

Subtask B is to evaluate the economic, environmental, technical, and institutional issues associated with developing and operating energy supply systems for different energy supply scenarios. This includes a survey and analysis of the status of energy supply systems in meeting local energy requirements, and recommendations on improving energy supply systems to meet future local energy requirements.

Subtask C is an evaluation of the energy-savings potential in the use of underground space, including a survey and analysis of the use of underground space for residential, commercial and industrial purposes. Recommendations for incorporating the use of underground space in local energy planning will be developed.

Subtask D will be to develop feasibility studies for local energy projects in each of the participating countries. A report on innovative solutions to local energy problems will be prepared.

Legal Status:	The annex is in the draft stage.
Lead Country:	United States, Minnesota Energy Agency
Interested Countries:	Sweden, United States
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Estimated Maximum U.S. Involvement:	The project will be funded on a task-sharing basis.
Schedule of Working Meetings:	February 8, 1979; Paris, France

Project Area Objectives: This project is a bilateral agreement between the Federal Republic of Germany (FRG) and the United States to design, implement, and perform experiments and to share information and evaluations on two building complexes at Esslingen and Wiehl, FRG. Demonstrations of heat pumps and other advanced energy systems will be conducted at the two facilities.

Both the Wiehl and Esslingen sites are now in operation, and FRG and the United States are negotiating the exchange of technical personnel in addition to the circulation of reports.

Work is under way in two annexes, Annex 1: Wiehl demonstration project, and Annex 2: Esslingen demonstration project.

Legal Status:	The implementing agreement was signed on June 28, 1976.
Executive Committee Chairmen:	Gerald S. Leighton, U.S. Department of Energy Dr. Helmut Klein, Bundes Ministerium fur Forschung und Technologie, FRG
Participants:	FRG, United States
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Schedule of Executive Committee Meetings:	To be announced

Annexes 1 and 2:
Wiehl and Esslingen Test Facilities

Project Description/Status: The Wiehl large-scale experimental plant project involves a multi-purpose community recreational facility with integrated energy subsystems (e.g., waste-heat utilization, heat recovery from wastewater and ventilation exhaust, wastewater utilization, heat-loss reduction, solar-energy collection, heat pumps). Operating tests, analyses, and technological studies and evaluations will be conducted over a period of 5 to 10 years. Automatic data-collection systems have been installed and initial test runs are under way.

The following deliverables should be supplied to the contracting parties by the Operating Agent:

- Preliminary report of winter operating season — due in January of each year
- Full report of winter operating season — due in May of each year
- Preliminary report of summer operating season — due in July of each year
- Full report of summer operating season — due in October of each year.

In the Esslingen project, virtually all space heating and domestic hot water requirements for a complex of three high-rise apartment buildings are provided by a central water-to-water heat-pump system that extracts heat from river water. In addition, the heat pumps are used to form ice for a skating rink. The other primary systems are solar collectors, various semipassive and passive solar pool heating systems, and ground storage of thermal energy. The building complex has a backup alternate oil-fired heating system which can meet the complex' full heating requirements. The performance of the heat-pump system will be compared with that of the oil-fired heating system. Automatic data-collection systems have been installed and initial test runs are under way.

The following deliverables should be supplied to the contracting parties by the Operating Agent:

- Semiannual evaluation of joint project operations for July 1 through December 31 — due in January of each year
- Semiannual evaluation of joint project operations for January 1 through June 30, and July 1 through June 30 — due in July of each year.

Annexes 1 and 2: (continued)
Wiehl and Esslingen Test Facilities

Legal Status:	Annexes were initiated on June 28, 1976.
Operating Agent:	FRG
Participants:	FRG, United States
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Project Financing:	This project is jointly funded as follows (U.S. dollars): Calendar year 1978 FRG 365,260 - (Initial Investment: 5,000,000) U.S. 156,540 - (Initial Investment: 150,000)
Schedule of Working: Meetings:	To be announced

Project Area Objectives: The objective of this project is to study better ways of exploiting the useful work in primary fuels. Technologies being studied include those using thermofluents cascading from high temperatures through thermocycles, discharging heat to the environment or to low-temperature fluents. Other technologies being studied are those used to capture waste-heat streams. In general, cascading systems are of the following types: (1) all-electric systems for high-efficiency electricity generation; (2) combined systems that supply energy through electricity generation as well as other forms of energy; (3) all-heat energy systems, in which no electricity is produced; and (4) total systems, which maximize the efficiency of overall energy use from source to end use.

Work is under way in one annex, Annex 1: Common Study for Energy Cascading: Establishing Priorities for Cooperative Research and Development. A second annex has been developed and is being considered by the Executive Committee, Annex 2: Treble Rankine Cycle Project: Design Analysis Study and Establishment of an R&D Program.

Plans are being developed for two other annexes, Annex 3: A Comparative Analysis of Small Combined Heat and Power Technologies, and Annex 4: Demonstration of Fuel Cell Project.

Belgium, Germany, Japan, Netherlands, Sweden, and the United States have expressed an interest in demonstrating the organic Rankine cycle bottoming system. This new project will be discussed at the next Annex 1 working meeting.

Legal Status:	This agreement was signed on March 16, 1977.
Executive Committee Chairman:	Dr. G. E. Rajakovics, Austria
Participants:	Austria, Belgium, Canada, FRG, Japan, Netherlands, Sweden, Switzerland, United States. Italy is interested in signing the agreement.
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Schedule of Executive Committee Meetings:	April 23-26, 1979; Brussels, Belgium

Annex 1:
Common Study for Energy Cascading: Establishing Priorities for Cooperative Research and Development

Project Description/Status: The objective of the project is to identify R&D projects that could enhance the future market for advanced energy conversion technologies, including (1) all-electric systems; (2) combined systems; (3) all-heat systems; and (4) total systems. Participants estimate the market for new technologies using a common technical approach. The treble Rankine cycle, organic Rankine cycle in total energy and low-temperature applications, and the advanced combined cycle have been analyzed.

In the first phase of the study, the countries prepared a brief survey and preliminary ranking of several Rankine technologies. Specifically, each country collected performance, economic, and technical data for each technology. The technologies analyzed were: treble Rankine cycle, advanced combined cycle, organic-Rankine-cycle bottoming systems and combined heat and power systems, fuel cells and advanced diesel combined heat and power systems.

In the next phase, the most promising technologies were analyzed in more detail, and estimates of their technical and economic feasibility and the likely market size were developed. Barriers to rapid commercialization were identified in each country. This in-depth analysis has been completed for the TRC, ACC, ORC combined heat and power system, and ORC bottoming systems. A detailed analysis of fuel cells is ongoing.

Legal Status: The annex was initiated on March 16, 1977 (duration: 2 years and until Executive Committee terminates).

Operating Agent: United States, Resource Planning Associates, Inc.

Participants: Austria, Belgium, Canada, FRG, Japan, Netherlands, Sweden, Switzerland, United States

U.S. Program Manager: Gerald S. Leighton, DOE/BCS, (202) 376-4714

Project Financing: The project is funded jointly as follows:

Austria	$ 10,850	Netherlands	25,050
Belgium	19,560	Sweden	20,750
Canada	55,343	Switzerland	18,800
Germany	135,350	United States	215,450
Japan	189,909		

Schedule of Working Meetings: January 30 – February 3, 1979; Geneva, Switzerland

Planned Annex 2:
Treble Rankine Cycle Project: Design Analysis Study and Establishment of an R&D Program

Project Description: The objective of the project is to specify in detail the cost and technical problems associated with the treble Rankine cycle to provide a sound basis for decisions about developing components and additional technological work. The treble Rankine cycle consists of three energy conversion processes using potassium, diethyl, and water as working fluids. The final step would be to specify a research program to address the more significant problems.

Legal Status:	The annex is in the final draft stage, and will probably be initiated in September 1979.
Lead Country:	Germany, Kernforschungsanlage, Julich
Interested Countries:	Austria, FGR, Netherlands, United States (tentative)
U.S. Program Manager:	To be determined
Estimated Maximum U.S. Involvement:	The project will be jointly funded (details to be negotiated among the participants).
Schedule of Working Meetings:	January 31, 1979; Geneva, Switzerland

Planned Annex 3:
A Comparative Analysis of Small Combined Heat and Power Technologies

Project Description: The objective of the study is to achieve the basis for a program to use small combined heat and power technologies. The study will characterize combined heat and power technologies, specify the load curves in important applications, identify the combined heat and power technologies that best suit each application, estimate the market for these technologies, and specify the R&D projects that could remove barriers to the implementation of the most promising technologies.

Legal Status:	The annex is in the draft stage.
Lead Country:	Sweden
Interested Countries:	Belgium, Canada, FRG, Italy, Japan, Netherlands, Sweden, Switzerland, United States
U.S. Program Manager:	*To be determined*
Estimated Maximum U.S. Involvement:	The project will be jointly funded (details to be negotiated among interested countries).
Schedule of Working Meetings:	To be discussed at the working meeting on Annex 1 on January 30, 31, and February 1, 1979, in Geneva, Switzerland.

Planned Annex 4:
Demonstration of Fuel Cell Project

Project Description: The objective of this project is to demonstrate the technical feasibility of the fuel cell by measuring its reliability, fuel conservation, and environmental and performance characteristics, and by identifying institutional, regulatory, and legal barriers to its commercialization in each of the participating countries.

Legal Status:	The annex is in the draft stage.
Interested Countries:	Austria, Belgium, FRG, Italy, Japan, Netherlands, Sweden, Switzerland, United States
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Estimated Maximum U.S. Involvement:	The funding arrangements are not yet specified.
Schedule of Working Meetings:	To be discussed at the next working meeting on Annex 1 on January 30, 31, and February 1, 1979, in Geneva, Switzerland.

Project Area Objectives: The objectives of this project are to conduct theoretical and experimental development programs on heat pump systems, and to establish a central collection, collation, and distribution center for the exchange of information on heat pumps with thermal storage capabilities. The project will be limited to heat pump systems with thermal storage, for generating domestic space heating and cooling and water heating through the compression cycle.

The heat pump executive committee is primarily an information-sharing venture at this point. Each contracting party is assuming responsibility for a project relating to demonstration of a heat pump system with thermal storage.

Work is under way in one annex, Annex 1: Heat Pump Systems with Thermal Storage. New annexes will be pursued under the advanced heat pump agreement.

Legal Status:	The implementing agreement was signed in March 1977.
Executive Committee Chairman:	Mr. Steen Rolf Jacobsen, Denmark
Participants:	Austria, Denmark, FRG, Ireland, Italy, Netherlands, New Zealand, Sweden, Switzerland, United States
U.S. Program Manager:	Gerald Leighton, DOE/BCS, (202) 376-4714
Schedule of Executive Committee Meetings:	January 17, 1979; Paris, France

Annex 1:
Heat Pump Systems with Thermal Storage

Project Description/Status: The project is designed as an information-sharing vehicle. Each nation is responsible for an experimental demonstration of a heat pump system with thermal storage, with the exception of Denmark, which is fulfilling its responsibilities by evaluating all projects and preparing and publishing reports.

This project will be limited to heat pump systems with thermal storage for the generation of heat for nonindustrial purposes, such as domestic space and water heating, using the compression cycle.

The U.S. project is designed to demonstrate the capability of the annual cycle energy system (ACES) at Oak Ridge National Laboratory, Oak Ridge, Tennessee. The principal component of this system is an insulated tank of water which serves as a thermal storage bin. In winter, heat is obtained by a heat pump, which also turns the water in the bin into ice over a period of months. In summer, the chilled water is used to provide air conditioning without the operation of the heat pump compressor.

Legal Status:	The annex was initiated on March 16, 1977 (duration: 3 years or until Executive Committee terminates).
Operating Agent:	Austria
Participants:	Austria, Denmark, FRG, Ireland, Italy, Netherlands, New Zealand, Sweden, Switzerland, United States.
U.S. Program Manager:	Gerald S. Leighton, DOE/BCS, (202) 376-4714
Project Financing:	The project is financed on a task-sharing basis with each country assuming its own expenses.
Schedule of Working Meetings:	January 15, 16, 1979; Paris, France

Project Area Objectives: The objective of this project is to characterize the current state of the art for advanced heat pumps. The project will include three major tasks: (1) technology survey, (2) market survey, and (3) identification of new R&D cooperative projects.

Work is under way in one annex, Annex 1: Common Study of Advanced Heat Pump Systems.

Legal Status:	The implementing agreement was signed in July 1978. It is an extension of the heat pump systems agreement to which no new annexes can be added.
Executive Committee Chairman:	Dr. Ulrich Plantikow, Kernforschungsanlage, Julich, Federal Republic of Germany
Participants:	Austria, Belgium, Denmark, FRG, Netherlands, Spain, Sweden, Switzerland, United Kingdom, United States. Italy plans to sign. Japan and Canada have indicated interest.
U.S. Program Manager:	Gerald Leighton, DOE/BCS, (202) 376-4714
Schedule of Executive Committee Meetings:	January 19, 1979; Paris, France

Annex 1:
Common Study of Advanced Heat Pump Systems

Project Description/Status: The objectives of this project are to characterize the current state of the art for advanced heat pumps and to study market potential for the technology in all participating countries. The Federal Republic of Germany will perform the technical portion of the study; the United States will perform the market portion.

The results of the technical and market studies will be used to propose a series of new R&D activities.

Legal Status: The annex was initiated on July 27, 1978 (duration: 2 years or until Executive Committee terminates).

Operating Agent: Federal Republic of Germany, Kernforschungsanlage, Julich

Participants: Austria, Belgium, Denmark, FRG, Netherlands, Spain, Sweden, Switzerland, United Kingdom, United States. Italy plans to sign. Japan and Canada indicated an interest.

U.S. Program Manager: Gerald S. Leighton, DOE/BCS, (202) 376-4714

Project Financing: The project is jointly funded as follows (deutschemarks):

Austria	21,905	Spain	43,810
Belgium	43,810	Sweden	43,810
Denmark	21,905	Switzerland	43,810
FRG	400,000	United Kingdom	87,620
Netherlands	43,810	United States	400,000

Schedule of Working Meetings: January 18, 1979; Paris, France

Project Area Objectives: Energy Conservation in Combustion was established as a separate project area to improve the energy efficiency of combustion technologies and develop the fuel-switching capability of combustion equipment. The major objective of this project area is to concentrate on improving the information, instrumentation, and calculating procedures used by the designers, users, and fabricators of engines and furnaces. Work is currently ongoing on one area, Annex 1: Energy Conservation in Combustion. An extension of this implementing agreement is already being considered and a scope of work is currently being developed.

Legal Status:	The implementing agreement was signed on March 16, 1977 (duration: 3 years).
Executive Committee Chairman:	Dr. Philip Hutchinson, AERE, Harwell, United Kingdom
Participants:	Italy, Sweden, United Kingdom, United States
U.S. Program Manager:	Dr. E. Karl Bastress, DOE/FFU, (202) 376-4602
Schedule of Executive Committee Meetings:	April 27, 28, 1979; Harwell, United Kingdom September 19, 20, 1979; Stockholm, Sweden

Annex 1:
Energy Conservation in Combustion

Project Description/Status: This project consists of cooperative R&D and information exchange among participating countries in three areas related to engine and furnace technology: (1) combustion system modeling, (2) instrumentation and studies of fundamental processes in combustion, and (3) resource exchange. Fourteen tasks are being conducted within these three project areas.

Research in combustion system modeling is directed toward developing combustion technology codes for engines and furnaces. In the work related to fundamental processes in combustion, participants are developing instruments and experimental techniques for measuring fundamental parameters and properties of combustion systems and various fuels, and to investigate the basic physical phenomena relevant to the combustion process. The purpose of the resource exchange area is information exchange among the contracting parties on the numerical analysis methods, laboratory analysis, objectives and results of past programs, and experimental test facilities.

Currently, the United States is conducting five tasks under this annex:

- Experimental methods for measurements in internal combustion engines. This task involves the measurement of turbulence levels and velocity fields in a motored engine, using laser Raman spectroscopy. The 1979 research program will address fuel-injected high-swirl engines and the use of a pulsed-laser system for precision measurements.

- Numerical modeling of internal combustion engine performances. This task involves developing computer models of swirling combustion in two-dimensional engine configurations. A new procedure, developed to predict spray droplet transport, requires significantly less computer storage.

- LDA measurement of velocities in time-varying flows. This task resulted in the development of a backscatter LDA system for measuring velocities and turbulence intensities dependent on crank position in internal combustion engines. The system is currently being perfected.

- Raman spectroscopy for remote measurement of temperature and concentration. The United States is developing a number of laser Raman systems for measuring local temperatures and species concentrations in combustion systems. These laser systems are currently being tested.

- Combustion facility inventory. The United States has conducted a detailed survey of the technical characteristics of combustion research facilities in the United States and Europe. The final report will be available in January 1979.

Annex 1: (continued)
Energy Conservation in Combustion

Legal Status:	The annex was initiated on March 16, 1977 (duration: 3 years).
Operating Agent:	United States, Department of Energy
Participants:	Italy, Sweden, United Kingdom, United States
U.S. Program Manager:	Dr. E. Karl Bastress, DOE/FFU, (202) 376-4602
Project Financing:	The project is financed on a task-sharing basis. The U.S. funding is: FY 1978 FY 1979 $420,000 $600,000
Schedule of Working Meetings:	April 27, 1979; Harwell, United Kingdom

Project Area Objectives: The participants in the heat transfer and heat exchangers project are seeking, through cooperative R&D and information exchange, to improve the design and operation of heat transfer systems, particularly heat exchangers, to conserve fuel. The specific objectives of the project are to: (1) increase the efficiency of thermal-energy conservation by developing more effective heat transfer systems; (2) reduce free energy losses in processes by facilitating the operation of inexpensive heat exchange systems at reduced temperature differences; and (3) investigate mechanical and other design constraints to higher thermal efficiencies.

Work is under way in three annexes: Annex 1: Extended Surface Heat Transfer; Annex 2: The Optimal Design of Heat Exchanger Networks; and Annex 3: Heat Exchanger Tube Vibration.

The United States is participating only in Annexes 2 and 3.

Legal Status:	The implementing agreement was signed in June 1977.
Executive Committee Chairman:	Dr. G. F. Hewitt, United Kingdom
Participants:	Sweden, Switzerland, United Kingdom, United States
U.S. Program Manager:	Mr. Perlsweig, DOE/FFU, (202) 376-9348
Executive Committee Meetings:	February 1979, Argonne Laboratory, Argonne, Illinois

Annex 2:
The Optimal Design of Heat Exchanger Networks

Project Description/Status: The objectives of this project are to:

- Develop a better understanding of the various optimization methods used to design heat exchanger networks
- Promote a more widespread use of these techniques in the industry
- Further develop the state of the art on optimization of thermal design through appropriate R&D efforts.

Subtasks include optimization methods and case studies. Sweden is studying theories for predicting the conjugated heat transfer and conduction problem in extended-surface systems. The United Kingdom is studying the performance of practical extended-surface systems. The United States is surveying waste-heat recovery from energy-intensive industries. The results of this survey will be available next year. Switzerland is conducting analytical and experimental investigations of fin-tube bundle gas-liquid heat exchangers, and optimizing heat exchanger design.

Legal Status:	The annex was initiated on June 28, 1977 (duration: 3 years).
Operating Agent:	United Kingdom, Atomic Energy Authority
Participants:	Sweden, Switzerland, United Kingdom, United States
U.S. Program Manager:	Mr. Perlsweig, DOE/FFU, (202) 376-9348
Project Financing:	This project is funded on a task-sharing basis. The U.S. contribution is: FY 1978 $320,000 FY 1979 $70,000
Schedule of Working Meetings:	February 1979; Argonne Laboratory, Argonne, Illinois

Annex 3:
Heat Exchanger Tube Vibration

Project Description/Status: The objectives of this project are to:

- Develop an understanding of the mechanisms of tube vibrations within heat exchangers, leading to calculation methods for idealized cases
- Consider in detail the application of fundamental methods for predicting vibration in actual heat exchanger configurations
- Confirm the applicability of predictive methods in field and other large-scale tests
- Develop practical predictive methods.

In this area, Sweden is working on turbulent buffeting and the interaction between turbulent-flow field and cylinders in cross-flow. Switzerland is studying vortex shedding in tube-bank heat exchangers. The United Kingdom is working on the effect of tube layout on fluid-elastic whirling. The United States is building a full-sized heat exchanger that will provide detailed measurements of tube vibration. The preparations for this test and the design of the experiment are completed; testing will start in February 1979.

Legal Status:	The annex was initiated on June 28, 1977 (duration: 3 years).
Operating Agent:	United Kingdom, Atomic Energy Authority
Participants:	Sweden, Switzerland, United Kingdom, United States
U.S. Program Manager:	Mr. Perlsweig, DOE/FFU, (202) 376-9348
Project Financing:	The project is funded on a task-sharing basis. The U.S. contribution is: FY 1978 FY 1979 $180,000 $180,000
Schedule of Working Meetings:	February 1979; Argonne Laboratory, Argonne, Illinois

Project Area Objectives: This project will perform and compare preliminary design studies of a variety of experimental and advanced energy-storage technologies. The Executive Committee is working to determine which systems are suitable for demonstration projects that will lead to the widespread use of energy-storage techniques. Participating countries are exchanging funds, personnel, and information to conduct the projects.

Work is being performed in Annex 1 and is currently being considered in Annex 2. Annex 1: Large-Scale Thermal Storage Systems; Planned Annex 2: Lake Storage Demonstration in Mannheim, Germany.

Before January 15, 1979, Belgium, in collaboration with the Netherlands, will prepare a draft annex on small storage systems. Denmark, the EEC, the Netherlands, Germany, Switzerland, and the United States have expressed some interest in participating in such an annex.

Before January 15, 1979, Sweden will prepare a draft annex on hydrated hydrogen storage.

Legal Status:	The implementing agreement was signed on September 22, 1978.
Executive Committee Chairman:	Dr. George F. Pezdirtz, U.S. Department of Energy
Participants:	Belgium, Denmark, FRG, Sweden, Switzerland, United States. The Netherlands and the European Economic Community intend to join.
U.S. Program Manager:	Dr. George F. Pezdirtz, DOE/STOR, (202) 376-9287
Schedule of Executive Committee Meetings:	November 9, 10; Lausanne, Switzerland March 8, 9, 1979; Mannheim, Germany

Annex 1:
Large-Scale Thermal Storage Systems

Project Description/Status: This project is a cooperative effort to study a variety of experimental and advanced energy-storage technologies, including aquifers for electricity storage, geothermal systems, batteries, and reactive chemistry. The first objective of this task is to undertake preliminary design studies of a variety of large-scale, low-temperature thermal storage systems. The second objective is to carry out comparative evaluations of the design studies, and to select at least one for a proposed, jointly funded hardware demonstration project.

The conceptual design studies should be completed by mid-1980.

Legal Status:	The annex was initiated on September 22, 1978.
Operating Agent:	Switzerland, Universite de Neuchatel, Centre d'Hydrogeologie›
Participants:	Belgium, Denmark, Germany, Sweden, Switzerland, United States. EEC and the Netherlands are planning to participate.
U.S. Program Manager:	Dr. George F. Pezdirtz, DOE/STOR, (202) 376-9287
Project Financing:	The project is funded on a task-sharing basis.
Schedule of Working Meetings:	March 8, 9, 1979; Mannheim, Germany.

Planned Annex 2:
Lake Storage Demonstration in Mannheim, Germany

Project Description: The objective of this project is to obtain operational experience in the construction and operation of a large-scale, insulated, artificial body of water in which waste heat is stored for seasonal use. The insulated storage lake is located in the city of Mannheim, Germany, and has a capacity of 30,000 cubic meters. The emphasis will be placed on research questions such as construction techniques, removal of rainwater, charging and discharging facilities, temperature stratification, and long-term material studies. The construction of the lake storage facility should start in May 1979.

Legal Status: The annex is expected to be signed in March 1979.

Lead Country: Germany

Interested Countries: Denmark, Germany, Sweden, United States

U.S. Program Manager: Dr. George F. Pezdirtz, DOE/STOR, (202) 376-9287

Estimated Maximum U.S. Involvement: The proposed funding of this project is on a joint basis as follows (deutschemarks):

Denmark	100,000
Germany	8,700,000
Sweden	200,000
United States	1,000,000
Total	10,000,000

Schedule of Working Meetings: March 8, 9, 1979; Mannheim, Germany

Project Area Objectives: This project provides for cooperative RD&D and exchange of information among the participating countries with regard to energy conservation in cement manufacture. Initial areas of study are kiln research, blended cements, sulfate specifications, possible gypsum substitutes, and alkali-aggregate reaction research.

Work is under way in one annex, Annex 1: Energy Conservation in Cement Manufacture.

Legal Status:	The implementing agreement was signed in July 1978.
Executive Committee Chairman:	Dr. B. Warris, Sweden
Participants:	Germany, Sweden, United Kingdom, United States
U.S. Program Manager:	Mr. A. J. Streb, DOE/INDUS, (202) 376-1671
Schedule of Executive Committee Meetings:	April 1979; Washington, D.C.

Annex 1:
Energy Conservation in Cement Manufacture

Project Description/Status: The objectives of the program are to:

- Increase the efficiency of energy use in cement manufacture
- Reduce the use of premium fuels in cement manufacture by permitting increased use of high-sulfur fuels, particularly high-sulfur coals
- Reduce the amount of energy needed to produce high-quality concrete.

The R&D program that has been undertaken to date includes a number of products that fall into four basic areas:

- Kiln research
- Blended cements
- Sulfate specifications and possible gypsum substitutes
- Alkali-aggregate reaction research.

Legal Status:	The annex was initiated in July 1978.
Operating Agent:	United States, Department of Energy
Participants:	Germany, Sweden, United Kingdom, United States
U.S. Program Manager:	Mr. A. J. Streb, DOE/INDUS, (202) 376-1671
Project Financing:	The project is funded on a task-sharing basis.
Schedule of Working Meetings:	April 1979; Washington, D.C.

In addition to its current commitments, DOE has been discussing the initiation of implementing agreements with other IEA member nations in six other project areas:

- Combustion (extension of current agreements)
- High-Temperature Materials for Automotive Propulsion Systems
- Industrial Processes
- Pulp and Paper
- Iron and Steel
- Food Processing.

DOE is planning to make commitments to all of these new agreements. Seven annexes are currently being considered in these three project areas; DOE has taken the lead in five, and indicated interest in a sixth (see Exhibit 3).

Exhibit 3

Countries Interested in Planned Implementing Agreements

Planned Implementing Agreements and Annexes	Austria	Canada	Federal Republic of Germany	Italy	Japan	Netherlands	New Zealand	Spain	Sweden	United Kingdom	United States
Combustion (extension of current agreement) Planned Annex 1: Combustion system modeling			○	○	○				○	○	●
High-Temperature Materials Planned Annex 1: Ceramic material properties			○								●
Planned Annex 2: Experimental material characterization methods			○		○				○		●
Industrial Processes	○	○	○						○		●
Pulp and Paper		○		○	○	○	○	○	○	○	●
Iron and Steel	○	○	○						●		○
Food Processing				○					●		○

Legend:
● Lead country
○ Interested country

Project Area Objectives: The objective of the planned implementing agreement is to accelerate the development of new combustion equipment that is more efficient, less polluting, and capable of using alternative fuels. Calculation procedures used by the designers, users, and manufacturers of combustion equipment will be improved.

The implementing agreement will include two annexes. The first annex, Combustion System Modeling, was initially drafted in November 1978. It concentrates on three areas: (1) advanced piston engine technology, (2) furnaces and fluidized beds, and (3) fundamentals and supporting activities. The second annex will include projects that could be jointly funded by the participating countries. A project currently considered for this annex is a new research furnace facility to be built jointly by some or all of the signatories.

Legal Status:	The implementing agreement will be signed in March 1980.
Lead Country:	United States
Interested Countries:	FRG, Italy, Japan, Sweden, United Kingdom, United States
U.S. Program Manager:	Dr. E. Karl Bastress, DOE/FFU, (202) 376-4602

Planned Annex 1:
Combustion System Modeling

Project Description: The combustion project involves tasks in experimental and computational areas. The project will emphasize the application of tools to produce codes, together with supporting data bases. These codes will be used by industry to predict performance of advanced combustion equipment. The United States will be involved in the following areas:

(1) Advanced piston engine technology: The objective of this area is to jointly develop combustion technology, both analytical and experimental, that would provide improved models (e.g., data bases and system codes) for advanced internal combustion piston engines, such as open-chamber stratified charge, divided-chamber stratified charge, and diesel engines.

(2) Furnaces and fluidized beds: The objective of this area is to jointly develop combustion technology, both analytical and experimental, which will provide improved models (e.g., data bases and system codes) for furnaces and fluidized beds.

(3) Fundamentals and supporting activities: The objective of this area is to provide necessary instrumentation and analytical and administrative support for programs in areas 1 and 2, and to support investigations of new combustion techniques.

Legal Status:	The annex will begin in March 1980.
Lead Country:	United States
Interested Countries:	FRG, Italy, Japan, Sweden, United Kingdom, United States
U.S. Program Manager:	Dr. E. Karl Bastress, DOE/FFU, (202) 376-4602

Project Area Objectives: An expert group in transportation has been formed to study applications of high-temperature materials in automotive gas turbines and Stirling engines. The group will concentrate particularly on high-temperature structural ceramics. Two annexes dealing with high-temperature materials are in the preliminary stages: Investigation of Ceramic Material Properties, and Definition of Experimental Material Characterization Methods.

Legal Status:	A preliminary implementing agreement has been drafted by the United States; it is expected to be signed by April/May 1979.
Lead Country:	United States (Corning Glass)
Interested Countries:	FRG, Japan, Sweden, United States
U.S. Program Manager:	Robert Schulz, DOE/TEC, (202) 376-4676

Planned Annex 1:
Investigation of Ceramic Material Properties

Project Description: The objective of this project is to organize and carry out investigations of high-temperature mechanical properties of ceramic materials applicable to automotive gas turbine and Stirling engines. Each participant shall undertake investigations on at least two advanced structural ceramic materials suitable for economical engine applications. Data analyses by each participant will include statistical interpretation, failure mechanisms, and other observations made during the course of investigation.

Legal Status:	The annex is expected to begin in April/May 1979.
Lead Country:	United States (Corning Glass)
Interested Countries:	FRG, United States
U.S. Program Manager:	Robert Schulz, DOE/TEC, (202) 376-4676
Estimated Maximum U.S. Involvement:	This project will be financed on a task-sharing basis

Planned Annex 2:
Definition of Experimental Material Characterization Methods

Project Description: The objectives of this project are to evaluate current experimental methods for characterizing materials that are applicable to high-temperature structural ceramics for automotive gas turbine and Stirling engines; the project will also recommend experimental studies to remedy deficiencies in the data base.

The evaluation will include mechanical and thermophysical properties, high-temperature creep behavior, fracture toughness, slow crack growth, and environmental resistance.

The recommendations will include a definition of specific data required, recommended test procedures, and recommended data analysis methods.

Legal Status:	The annex is expected to begin in April/May 1979.
Lead Country:	United States (Corning Glass)
Interested Countries:	FRG, Japan, Sweden, United States
U.S. Program Manager:	Robert Schulz, DOE/TEC, (202) 376-4676
Estimated Maximum U.S. Involvement:	This project will be financed on a task-sharing basis.

Project Area Objectives: The expert group on industrial processes was established in 1976 to develop cooperative R&D projects in the cement, pulp and paper, chemicals, iron and steel, and food processing industries. (An implementing agreement has been signed in the cement manufacture area.) To ensure that the projects developed are directly relevant to industrial needs, extensive consultations with private industry are being undertaken in all sectors. Implementing agreements are being considered in pulp and paper, iron and steel, and food processing.

Legal Status:	The implementing agreement has not yet been signed.
Lead Country:	United States
Interested Countries:	Austria, Canada, FRG, Sweden, United States
U.S. Program Manager:	Mr. A. J. Streb, DOE/INDUS, (202) 376-1671

Project Area Objectives: Interest has been indicated in research and information exchange on energy conservation in: (1) pulping and bleaching, (2) energy recovery and generation, (3) materials recovery, (4) paper making and drying, (5) coating and converting, and (6) energy management.

Legal Status:	The annex has not yet been drafted.
Lead Country:	United States
Interested Countries:	Canada, Finland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom, United States
U.S. Program Manager:	Mr. A. J. Streb, DOE/INDUS, (202) 376-1671

Project Area Objectives: FRG has proposed a jointly funded study of iron and steel processes. Interested parties are discussing general energy questions, reduction processes, metal forming, hot inspection, and waste-heat utilization.

Legal Status:	The annex has not yet been drafted.
Lead Country:	Sweden
Interested Countries:	Austria, Canada, FRG, Sweden, United States
U.S. Program Manager:	Mr. A. J. Streb, DOE/INDUS, (202) 376-1671.

Project Area Objectives: Areas of interest include drying and concentration, heating conservation, and preservation.

Legal Status:	The annex has not yet been drafted.
Lead Country:	Sweden
Interested Countries:	Italy, Sweden, United States
U.S. Program Manager:	Mr. A. J. Streb, DOE/INDUS, (202) 376-1671

Appendix A — Interaction of DOE International Projects and the Federal Budget Cycle

In developing the program plan for participation in the IEA Working Party on Energy Conservation R&D, DOE program officers must identify those domestic R&D projects that could be conducted most effectively as international cooperative projects. The program officers keep abreast of projects similar to their own in IEA member countries and receive proposals for cooperative work from these countries.

The program officers then evaluate the opportunities for participating in cooperative projects to determine which should be seriously pursued. These projects are included in the program plan, which is submitted along with the DOE budget for review by Congress. During congressional review, DOE begins developing the management review and control documents needed to monitor the day-to-day execution of the programs.

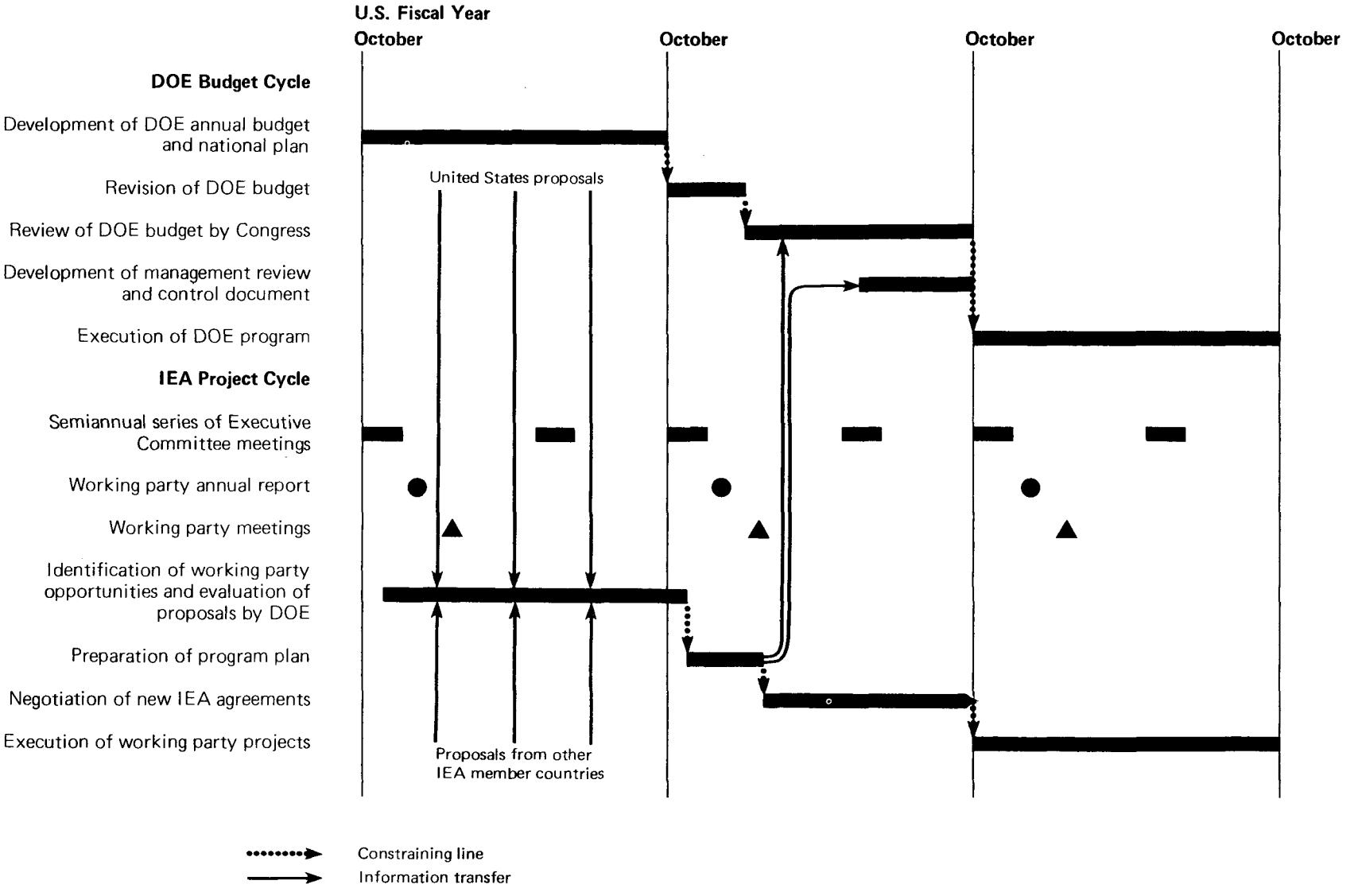
At the same time, DOE program officers negotiate the details of projects contained in the program plan with representatives of IEA member nations. The IEA agreements resulting from these negotiations are initiated at the end of the year, after congressional approval of DOE's budget, and at roughly the same time as the domestic programs they are designed to complement.

DOE program officers then monitor the execution of the U.S. share of the cooperative projects. Each year, they evaluate the projects within the working party to ensure that they are fulfilling their promise and justifying DOE's international involvement.

Exhibit A.1 traces the interaction of DOE international projects and the federal budget cycle from initial development of the national plan and budget, through congressional review, and finally through execution. Almost 3 fiscal years elapse during this process.

Exhibit A.1

Interaction of DOE International Projects and the Federal Budget Cycle



Appendix B

Implementing agreements do not specify the details of the research to be carried out in a given area; the expert group writes an annex for each specific project, covering:

- Detailed objectives
- Summary descriptions of specific tasks to be performed
- Responsibilities of Operating Agent and participants
- Results or products
- Funding
- Designation of the Operating Agent
- Time period during which the annex will remain in force
- Countries and organizations participating in the task.

The annex does not usually describe the project's technical approach in full detail. In some cases a technical description is appended to the annex to provide background information to readers not familiar with the discussions of the expert group.

The expert group submits its draft implementing agreement, annexes, and any background documents to the working party for approval. Following working party approval and legal review by the IEA Secretariat, the Secretariat circulates the complete draft implementing agreement and annexes to all IEA member countries so that they may have an opportunity to participate. After comments on the draft are received, potential participants are confirmed, and contracting parties designated, the Secretariat finalizes the agreement and circulates a printer's proof to contracting parties intending to sign.

Agreements are usually signed at meetings of the IEA Governing Board; they must be signed by officials designated by the governments of IEA member countries as having the legal authority to bind the contracting parties they represent. In signing the agreement, a contracting party must agree to participate in at least one annex.

Each implementing agreement is administered by an Executive Committee consisting of representatives of the contracting parties to the agreement. Often, the members of the expert group become the founding members of the Executive Committee. Any country that was not an original signatory may express its interest in joining an ongoing agreement and be invited to sign the agreement by unanimous vote of the Executive Committee.

Each year, IEA's Committee on Energy R&D establishes priorities for its cooperative energy research programs. Each of the committee's working parties reviews ongoing implementing agreements and annexes governing individual projects and proposes new agreements consistent with the committee's R&D program.

In general, new implementing agreements are suggested by one country, called the lead country, that is especially interested in a project area and willing to make the effort to organize the necessary meetings between potential participants, report to the working party, and draft preliminary agreements. The first step in establishing a new implementing agreement is to set up an ad hoc expert group, which is composed of representatives from those countries interested in the subject matter to be covered by the new agreement.

The expert group, chaired by the lead country, then meets separately from the working party to discuss the R&D activities it would like to perform in the given subject area. The members first review research proposals and agree on the tasks they would like to carry out. They then group these tasks into projects, which are either funded on a task-sharing basis (i.e., each country bears its own costs) or jointly funded (i.e., cash contributions are pooled and used to pay one or more organizations to carry out the work).

The expert group, with the assistance of the IEA Secretariat, then drafts an implementing agreement and a series of annexes which govern specific technical activities on one or more projects. An implementing agreement specifies:

- Objectives for the research
- Procedures for initiating specific tasks or annexes under the agreement
- Procedures for the administration of the annexes by an Executive Committee, which is established by the agreement
- Procedures for designating countries responsible for administering an annex; these countries are call Operating Agents
- Administration and finance procedures
- Legal responsibilities and insurance
- Legislative provisions
- Admission and withdrawal of contracting parties to the agreement
- Provisions on information and intellectual property (may be specified in the annexes).

Once the Executive Committee is formed, the project functions independently of the working party and is only required to submit a formal annual report to the Secretariat, in addition to certain required internal reports. If the Executive Committee administers and implementing agreement with more than one annex, only participants to a given annex may vote on affairs concerning that annex.

When an Executive Committee wishes to adopt a new project, one or more participants draft an annex in consultation with the Secretariat, and propose it to the committee which may suggest revisions. The annex is drafted and circulated to all nonparticipating IEA countries, who are invited to participate. After the Secretariat reviews the annex, it may be adopted by the Executive Committee. Then, those contracting parties in the agreement intending to participate in the annex notify the Secretariat. Countries not party to the implementing agreement may participate in the new annex only by first signing the agreement.

Appendix C — Working Party Members

Chairman	Dr. M.H. Chiogioji Assistant Director for Systems Analysis Office of Conservation and Solar Applications U.S. Department of Energy Washington, D.C. 20545 Tel: (202) 376-4711 Tlx: 578229249
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Appendix C

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	Mr. R. Bolton Chief Geothermal Engineer Ministry of Works and Development Box 12041 Wellington Tel: None Tlx: 3844
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Appendix C

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