

*Implementing Agreement
for a Programme of
Energy Technology Systems Analysis*

ANNEX VIII

Exploring Energy Technology Perspectives

Learning Strategies for Technological Development toward Sustainable Futures

FINAL VERSION

*Drafted according to the minutes of the Executive Committee meeting held in Paris, 10.10.2001
Completed by means of 2 written procedures*

1. Aims

Building on the results of Annex VII, comprising a new generation of assessment tools and first generation global energy technology models, Annex VIII will make a substantial contribution to the work conducted by the International Energy Agency, national governments, the IPCC and other international organizations on global strategies for sustainable development. Guided by on longer term ambitions, specific attention will be for shorter term initiatives and actions, e.g. of Parties to the Kyoto Protocol seeking to meet the commitments made in December 1997 and plan the next stages of their work in climate change and other sustainability concerns. This will include:

- (a) the widespread and successful use of ETSAP tools, methodologies, data services and knowledge by the governments of the ETSAP Contracting Parties;
- (b) the use of ETSAP tools, data services and analytical capacity to perform scenario analysis for the IEA Energy Technology Perspectives Project [IEA/CERT(2001)25];
- (c) the constructive use of ETSAP tools by other countries - OECD Member and non-Member countries - as well as international organizations, in multi-lateral collaboration, discussions, and negotiations;
- (d) the establishment of linkages with economic and environmental models and approaches that complement the work of ETSAP;
- (e) the maintenance and ongoing use of ETSAP networks for analytical support;
- (f) the demonstration and deployment of new methods, with increased flexibility to depict complex energy systems:
 - (1) to evaluate common or joint actions implemented by groups of countries, including emission trading in the Kyoto Protocol or trade in energy commodities;
 - (2) to treat evolution in the costs of new technologies endogenously, including spill-over effects of international collaboration; and
 - (3) to explicitly deal with strategic planning under uncertainty.

The overall goal of this Annex is thus to serve national governments, the IEA and other international fora like the IPCC, the Kyoto Protocol, and the Subsidiary Bodies of the FCCC, by fostering and supporting the assessment of constructive policy options for the development and deployment of energy technologies that are compatible with long-term sustainable development goals.

2. Background

There is widespread recognition that the global challenges of climate change and other sustainable development issues call for concerted and coordinated response strategies. At the same time the notion that technological change is a key factor in shaping future economic, energy and emission trajectories has become common wisdom. For example, the most recent Third Assessment Report of the IPCC indicates that costs to meet greenhouse gas stabilization targets can probably be lower than previously estimated as a result of targeted and effective technological development pathways. What pathways to pursue and how to initiate and foster promising technological development processes is however due to significant uncertainties. Short term policy interventions in the fields of R,D&D (“technology supply push”) and market stimulation (“technology demand pull”) will be required to enhance the prospects for longer term solutions to reduce emissions while meeting economic and social aspirations, an important contribution to the practical realization of sustainable development. For example, the United Nations Framework Convention on Climate Change (FCCC) acknowledges that the global nature of climate change calls for the widest possible co-operation by all countries and their participation in effective and appropriate international response. The Kyoto Protocol reflects this approach by adopting flexible policy instruments aiming at worldwide participation to meet binding targets to reduce the emission of six greenhouse gases. During Annex VII the first steps were made to explore the mutually linked issues of international policy measures (Kyoto Mechanisms) and spill-over of technological improvements.

The ETSAP tools are available not only in most OECD countries, but in many other countries in Eastern Europe and the developing world. Alternative proposals for differentiated national targets have already been evaluated with respect to cost-effectiveness and equity indicators. ETSAP has the capability to estimate the cost savings of common actions implemented by wider groups of nations - within the industrialized world or developing countries, or between them as provided for by the Clean Development Mechanism in the Kyoto Protocol. It is also able to address an important emerging issue, namely, dealing with uncertainties in many factors that bear on the international economic activities, including emission trading in the Kyoto Protocol or trade in energy commodities.

ETSAP provides powerful support to the users of its methodologies and tools. It has established, and continues to nurture, a network of nations and expert analysts who co-operate in developing sound, technologically-informed options and in calculating the cost of restricting emissions of greenhouse gases and other pollutants. The family of ETSAP

models use consistent formulations and data on technologies that consume, transform, or produce energy commodities. The ability to calculate the marginal costs of increasingly stringent reductions in emissions makes it possible to propose distributions of agreed levels of emissions among the countries that minimize the total costs, including optional mechanisms to partially meet national emission reduction commitments by exchanges with other countries. The evolution of the research conducted during Annex VII by the ETSAP research partnership includes the development of hard-linked multi-country models to assess joint actions including issues of international emissions trading in the Kyoto Protocol or trade in energy commodities, and stochastic formulations to take uncertainties into full account. Simultaneously the endogenous treatment of technological progress ("learning") was consolidated as an operational feature in the ETSAP tools. During Annex VII, ETSAP developed the next generation of its main tools, inter alia, to enhance adoption of further methodological developments and linkages in many different areas in the next decade. Within Annex VIII these instruments are to be developed further into products for operational and widespread use. The core tool is the TIMES model (The Integrated MARKAL-EFOM System).

3. Services and Objectives

(a) The principal services that ETSAP provides to its Participants are:

(1) an analytical facility for constructively studying:

- (i) energy technology strategy
- (ii) greenhouse gas abatement policy;

(2) a worldwide network of systems analysts and users that fully supports the use of the methodologies employed by ETSAP and related tools, resulting in the establishment of national technology and energy demand databases that can be used to promote the understanding of technologies in climate change analysis.

(b) The specific objectives of this Annex are:

(1) Analysis of regionalized global energy systems:

To maintain consistent databases and to develop methodologies for combined optimization of regional models, together providing global coverage, in order to analyze the role of energy demand, conversion and supply technologies, and trade in balancing national or multi-national energy budgets while collectively meeting broad economic and environmental requirements;

(2) Analysis of national energy systems:

To develop and control the quality of data needed by ETSAP tools used in support of decision-making; to make these data available for use in other applications as may serve the goal of this Annex; and to improve linkages between technological and non-technological factors in ETSAP tools;

(3) Expansion:

To expand the availability and application of ETSAP methodologies in countries that are party to the FCCC or the Kyoto Protocol, or other countries that are considering becoming a party to either instrument;

(4) Establish operational links with other complementary approaches:

To ensure a mutually beneficial exchange with economic and environmental models, such as general equilibrium and integrated assessment models, and other approaches with different scope and resolution;

(5) Develop advanced tools:

To continue to foster the advancement of tools to enable local, regional, national and international authorities to better address the complex questions associated with energy and environmental issues. This includes both extension of the framework within which complex energy systems are represented, as well as the means for managing and fostering the effective use of such tools.

4. Means

The objectives shall be achieved by:

(a) Regionalized, Global Technology Models:

Further development and application of internally consistent global technology models, consisting of interlinked regional datasets to cover co-operative policies and measures toward sustainable development and appropriate technological development strategies;

(b) Links with Other Approaches:

Establishing links with other approaches, in particular, integrated assessment models to ensure a consistent background for ETSAP analyses and to provide results back to such models; support combined applications with other models at local and regional level;

(c) Technology Dynamics:

Introduction of technological change in ETSAP analyses as a function of policy and market developments or plans;

(d) Data Sets:

Discussing and jointly validating data developed by the ETSAP Contracting Parties, by making non-proprietary data available to others, and by developing default data sets to facilitate initial application of ETSAP methods in new countries;

(e) Internal Peer Review:

Doing internal peer review of each other's model formulations and data bases to ensure that combined results are consistent among countries;

(f) External Review:

Inviting outside experts, including policy analysts and those who use other methods, to discuss methodologies and to review results before the Annex is completed;

(g) Reference Groups:

Using national and multi-national reference groups for the development and analysis of the models and linkage to users;

(h) Workshops:

Organizing workshops and seminars to exchange information and experience in the areas of work covered by this Task, participating in joint meetings with related international projects, making a concerted effort to communicate with the wider professional community, and by otherwise involving decision-makers;

(i) Twinning:

Twinning established ETSAP Contracting Parties with new countries; providing materials to guide new and recent users of ETSAP methodologies;

(j) Other Activities:

Carrying out such other activities as may be agreed in the Annual Programme of Work.

5. Programs

There will be four principal programs in this Annex:

5.1 National Programs

National programs of work, appropriate to and funded by the individual Participants, aimed at supporting the objectives of Annex VIII, with guidance from national reference groups;

5.2 Common Program

A common program of work, funded by the core ETSAP budget and any other financial support from IEA Member Countries, directly or through the IEA Secretariat, in which the international and global analyses will be integrated to draw conclusions regarding co-operation in technological development strategies toward sustainable development;

5.3 Ongoing Research and Development Program

A program, funded by the core ETSAP budget, to complete the development of the new generation of ETSAP tools to fully tested and operational versions for general use. These tools include Windows-based analyst's Shells and the new core energy model TIMES designed to facilitate wider ranges of application areas, provide a platform for ongoing research and evolution and improve integration with other approaches such as Integrated Assessment Models and Geographical Information Systems.

6. Operating Agent

The Operating Agent is the Politecnico di Torino (Italy), acting through the Dipartimento di Energetica.

7. Specific Obligations and Responsibilities of the Operating Agent

In addition to the obligations and responsibilities enumerated in Article 4 of the Implementing Agreement the Operating Agent shall establish:

(a) Project Staff

For the purpose of carrying out the above objectives the Operating Agent shall establish, within sixty days after the Annex has entered into force, a Project Staff composed of a Project Head and such additional assistance as may be required, including external staff, to fulfill the Task.

Activities requiring common work may include quality assurance review, development of the procedure for comparing and integrating the national models, preparing the final conclusions and report of the Task, and other activities that may be decided upon by the Operating Agent or the Executive Committee. The common work may be performed by the Project Head, by other Operating Agent staff, or by organizations or professionals from the participating countries following the plans determined from time to time by the Executive Committee.

The person who will act as Project Head, and the members of the Project Staff, will be appointed by the Operating Agent, acting upon the unanimous approval of the Executive Committee.

(b) Executive Responsibilities

The Operating Agent shall be responsible for overall co-ordination of the Task. The main responsibilities will be:

- (1) To manage the common program;
- (2) To assure appropriate communication among the Participants;
- (3) With the approval of the Executive Committee, to represent ETSAP in various international conferences, bodies, and groups, and
- (4) To prepare and distribute material on the work of ETSAP for distribution through a newsletter or the World Wide Web.

(c) Workshops and seminars

At the request of the Executive Committee, the Operating Agent shall organize workshops and seminars.

(d) Validation

At the request of the Executive Committee, the Operating Agent shall co-ordinate the work of a small group of experts charged with reviewing the consistency and accuracy of input data, national models, and the main findings.

(e) Preparation of Draft Programme of Work and Reports

The Operating Agent shall prepare and submit to the Executive Committee, prior to its first meeting, a draft Programme of Work for the three-year period of the Task. The Operating Agent shall report to the Executive Committee at least once a year on the progress of the activities under this Task. Upon termination of this Annex, the Operating Agent shall prepare and submit to the Executive Committee for approval, a draft final report on the activities carried out during the period of this Annex. Following approval, the Operating Agent shall transmit the report to the Agency and to the members of the IEA Committee on Energy Research and Technology.

The Committee on Energy Research and Technology may, during this Task, propose additions to the Programme of Work. The Executive Committee shall decide whether these proposals will be added to the Programme of Work, provided such additional work can be carried out within the resource levels set out in paragraph 9 below.

(f) Secretarial and Administrative Support to Task Sharing Activities

Following guidance and instructions from the Executive Committee, the Operating Agent shall give secretarial and administrative support to establishing activities of Contracting Parties on a task-sharing basis, subject to specific budgets made available for those purposes by the Executive Committee.

8. Specific Obligations, Responsibilities and Rights of the Participants

Participants shall carry out, to the extent possible, the following activities and communicate the results to the Operating Agent:

- (a) Collection of national data on emission release and emissions control technologies;
- (b) Collection of information on energy system structure and related data;
- (c) Establishment and validation of data on technology characterizations and related data;
- (d) Performance of national and co-operative, multi-national scenario analyses using energy systems models;
- (e) Establishment of national and multi-national reference groups to discuss and advise on data bases, assumptions, methodology, model results and their application to the development of policy, especially under the auspices of the FCCC;
- (f) Contribute to the development of ETSAP models and tools, including testing of newly developed versions of software.

Participants have special rights to the results of the joint work, not available to non-participants, as may be decided by the Executive Committee from time to time, subject only to the limitations laid out in paragraph 11 below. This includes privileged access to the support systems and related services contracted on behalf of ETSAP or made available to Participants by the Operating Agent acting on decisions made by the Executive Committee

9. Funding

(a) Common Financial Obligations

The Common Program will be funded through the Operating Agent. The actual costs of the Operating Agent's activities during this Annex will be divided equally among all Participants. If the number of Participants changes, the Executive Committee will decide whether or not to adjust the budget and fees. New Participants will pay a full share of the costs beginning in the Task year in which they become Participants.

The 2002 budget of the Operating Agent will be EURO 312,000; based on 13 Participants at EURO 24,000 each. The Executive Committee will decide the annual budget for subsequent years based on this amount, and taking into account the actual number of Participants, inflation and any agreed changes in the work of the Operating Agent.

(b) Individual Financial Obligations

In addition to the contributions set out in subparagraph (a) above, each Participant shall bear all costs it incurs in carrying out this Task, including the costs of its National Program and participation in workshops and seminars.

10. Time Schedule

This Annex will enter into force on the 1st of January, 2002 and will remain in force for a period of three years. It may be extended by agreement of two or more Participants acting in the Executive Committee and taking into account any recommendation of the Agency's Committee on Energy Research and Technology concerning the term of this Annex which shall thereafter apply only to those Participants.

11. Information and Intellectual Property

In addition to the provisions of Article 7 of the Implementing Agreement:

(a) Executive Committee Powers

The publication, distribution, handling, protection and ownership of information and intellectual property arising from this Annex shall be determined by the Executive Committee acting by unanimity in conformity with this Agreement, and the laws of the countries of the Participants and of the Operating Agent.

(b) Right to Publish

Subject only to copyright restrictions, the Participants shall have the right to publish all information provided to or arising from this Annex except proprietary information, but they shall not publish it with a view to profit, except as agreed by the Executive Committee, acting by unanimity.

(c) Proprietary Information

The Operating Agent and the Participants shall take all necessary measures in accordance with this Annex, the laws of their respective countries, and international law to protect proprietary information. For the purposes of this Annex proprietary information shall mean information of a confidential nature such as trade secrets and know-how (for example, computer programmes, design procedures and techniques, chemical composition of materials, or manufacturing methods, processes, or treatments) that is appropriately marked, provided such information:

- (1) Is not generally known or publicly available from other sources;
- (2) Has not previously been made available by the owners to others without obligation concerning its confidentiality; and
- (3) Is not already in the possession of the recipient Participant without obligation concerning its confidentiality.

It shall be the responsibility of each Participant supplying proprietary information to identify the information as such and to ensure that it is appropriately marked.

(d) Production of Relevant Information by Governments

The Operating Agent should encourage the governments of all Agency Participating Countries to make available or to identify to the Operating Agent all published or otherwise freely available information known to them that is relevant to the Task. The Participants should notify the Operating Agent of all pre-existing information, and information developed independently of the Task known to them which is relevant to the Task and which can be made available to the Task without contractual or legal limitations.

(e) Production of Available Information by Participants

Each Participant agrees to provide to the Operating Agent all previously existing information and information developed independently of the Annex which is needed by the Operating Agent to carry out its function in this Task and which is freely at the disposal of the Participant and the transmission of which is not subject to any contractual and/or legal limitations:

- (1) If no substantial cost is incurred by the Participant in making such information available, at no charge to the Task;
- (2) If substantial costs must be incurred by the Participant to make such information available, at such charge to the Task as shall be agreed between the Operating Agent and the Participant with the approval of the Executive Committee.

(f) Use of Proprietary Information

If a Participant has access to proprietary information which would be useful to the Operating Agent in conducting studies, assessments, analyses, or evaluations, such information may be communicated to the Operating Agent in accordance with an agreement between the Operating Agent and the specific Participant setting forth the terms and conditions for such acceptance, but the proprietary information shall not become part of reports, handbooks, or other documentation, nor be communicated to the other Participants except as may be agreed in writing between the Operating Agent and the Participant which supplied such information.

(g) Acquisition of Information for the Task

Each Participant shall inform the Operating Agent of the existence of information known to the Participant that can be of value to the Task, but which is not freely available, and the Participant shall endeavor to make the information available to the Task under reasonable conditions, in which event the Executive Committee may, acting unanimously, decide to acquire such information.

(h) Reports on Work Performed under the Task

The Operating Agent shall provide reports on all work performed under the Task and the results thereof, including studies, assessments, analyses, evaluations and other documentation, but excluding proprietary information, to the Participants.

(i) Copyright

The Operating Agent may take appropriate measures necessary to protect copyrightable material generated under this Task. Copyrights obtained shall be the property of the Operating Agent in trust for and for the benefit of the Participants, provided, however, that Participants may reproduce and distribute such material, but shall not publish it with a view to profit, except as otherwise directed by the Executive Committee.

(j) Authors

Each Participant shall, without prejudice to any rights of authors under its national laws, take necessary steps to provide the co-operation with its authors required to carry out the provisions of this paragraph. Each Participant will assume the responsibility to pay awards or compensation required to be paid to its employees according to the laws of its country.

12. Products

The products of this Task shall be:

- Maintenance and improvement of an international capability for the analysis of energy technologies and their future prospects and extension of such a capability within the context of energy and the environment, and in particular climatic change post Kyoto;
- Periodic reports on workshops or seminars and on analytical studies undertaken in connection with the Task; and
- A final report on the activities carried out under this Annex.

13. PARTICIPANTS

The Contracting Parties that are Participants in the Task are the following:

(list of parties to be added following their notification to the Executive Director of the IEA and to be selected from the following list)

<u>Contracting Parties</u>	<u>Date of Signature</u>
Energieverwertungsagentur (Austria)	19.12.80.
The Department of National Development and Energy (Australia) succeeded by the Australian Bureau of Agriculture and Resource Economics (ABARE)	13.11.80.
The Government of Belgium	08.09.81.
The Department of Energy, Mines and Resources (Canada) succeeded by the Department of Natural Resources	07.07.82.
The Ministry of Energy (Denmark), replaced by the Ministry of Environment and Energy, Danish Energy Agency	04.12.80.
The Commission of the European Communities	11.01.82.
The Government of Finland	09.01.2002
Kernforschungsanlage Jülich GmbH (Germany) name changed to Forschungszentrum Jülich GmbH replaced by the Institute for Energy Economics and Rational Use of Energy (IER) of the University of Stuttgart	13.11.80. 12.05.97.
The Scientific Research and Technology Service of the Ministry of Coordination (Greece)	01.12.80.
The National Board for Science and Technology (Ireland)	17.07.81.
The Ente Nazionale Idrocarburi (Italy) replaced by the National Agency for New Technologies Energy and Environment (ENEA)	13.11.80.
The Government of Japan	17. 9.81.
The Korea Institute of Energy Research (KIER)*	15.05.96.
The Stichting Energieonderzoek Centrum Nederland (ECN) (Netherlands)	02.04.82.
The Royal Ministry of Petroleum and Energy (Norway) (name changed to the Royal Norwegian Ministry of Industry and Energy)	13.11.80.
The Centro de Estudios de la Energia (Spain)	13.11.80.
The Energy Research and Development Commission (Sweden) (subsequently succeeded by the Energy Research Commission and later by the Swedish National Board for Industrial and Technical Development (NUTEK))	18.11.80.
The Office Fédéral de l'Energie (Switzerland) (replaced by the Paul Scherrer Institute)	1. 4.81. 19.12.91.
The Kocaeli University (Turkey)	22. 3.96.
The Secretary of State for Energy (United Kingdom) (succeeded by the Secretary of State for Trade and Industry)	9. 6.81.
The United States Department of Energy (replaced by The Government of the United States of America; then again by the United States Department of Energy)	13.11.80.