

INTERNATIONAL ENERGY AGENCY
 Implementing Agreement
 For a Programme of
 Energy Technology Systems Analysis

Annex X

Global Energy Systems and Common Analyses

Climate friendly, Secure and Productive Energy Systems

(text approved by the Executive Committee on November 26, 2004; amended on April 05, 2006)

1. Introduction

The Contracting Parties of this Implementing Agreement carry out a Programme consisting of co-operative Energy Technology Systems Analysis (ETSAP). The aim of ETSAP is to assist Contracting Party and other key decision-makers around the world in the assessment of new energy technologies and policies in meeting the challenges of energy needs, environmental concerns, and economic development.

In the last few years this general aim was realized mainly through the development and refinement of common ETSAP Tools. Traditionally this has been accomplished by means of the MARKAL model and associated software, but increasingly the new TIMES model generator, with its new users' interface, is entering into use. The ETSAP website (www.etsap.org) has been enhanced and now provides easy access to the new documentation of both MARKAL and soon TIMES. The common effort of the Participants has given rise to several major, high-profile projects making use of ETSAP Tools. A synthesis of the many recent achievements is reported in the End of Term report, posted at the ETSAP website.

The benefits of ETSAP have been acknowledged by the IEA Committee of Energy Research and Technology (CERT), the End Use Working Party (EUWP), and several national delegates, in the process of the IEA approving the extension of the ETSAP Implementing Agreement for another five more years.

2. Objectives

Building on previous achievements, in the next three years this task proposes to carry out again some degree of common analysis and foster advanced national analyses, establish tighter collaborations with other major energy modelling groups (most notably the EMF, IIASA and SEI-Tellus), and continually advance the state-of-the-art with respect to integrated energy/economic/environmental modelling. It is proposed to implement and make use of a global multi-regional ETSAP TIMES, and as part of an "in-reach" effort for Annex X participants to become well versed in the use of it, and/or other global models. Practically the Annex has the following objectives.

(a) *The carrying out of common global analysis.*

The Participants aim to cooperate in implementing a new multi-regional ETSAP-TIMES long term model of the global energy system. Further to the properties already available, this version will include some endogenous representation of the climate equations and possibly of macro-economic aspects. ETSAP will employ this model as part of contributing to the Energy Modelling Forum N. 22 "Climate Policy Scenarios for Stabilization and in Transition". Given the opportunity and adequate funds, ETSAP intends to contribute with some global model to other relevant projects in the field such as economic sustainability, climate change mitigation, energy security and energy R&D priority

setting. In order to allow ETSAP to fully participate in these activities, a program of continuous improvement and maintenance of the ETSAP-TIMES world model and its technology databases will be undertaken. In addition, some new model features will be examined and adopted as budget permits (see items b) and c) below).

The ETSAP participants have the advantage of participating and contributing to relevant international studies, of receiving recognition on the soundness of the methodology, understanding of the framework for their own use, and of gaining insight for future improvements of the ETSAP Tools.

(b) *The implementation of a global / national modelling framework – “Global modelling In-reach”.*

ETSAP intends to develop a capability, which allows the participants to transform the global ETSAP-TIMES model into a tool for domestic or regional policy analyses. Practically it is planned to fully familiarize the ETSAP partners with the selected models, to improve interactively the technology data bases that support the global models, and implement a procedure allowing to subtract one or more countries to be redefined (broken out) from the existing regions of the global model and to add them as separate regions to the global models that ETSAP partners can configure the regionalization as desired.

The advantage for ETSAP participants will be to have a high calibre global model available with their nation or region embedded in a multi-region global framework; by means of this model, analysts will be able to study the interactions of domestic policies and measures with the ones of other countries. This will be particularly useful as forward planning for the post-Kyoto era needs to begin in earnest within the next five (5) years, or sooner, and such a framework could be of great value to Contracting Parties, enabling them to examine differing proposals that are sure to arise while trying to define a truly global response to Climate Change.

(c) *The maintenance and enhancement of the existing capabilities and Tools.*

The core activity of maintaining, updating and enhancing ETSAP Tools will continue. Depending on the funds, possible improvements include:

- continued advancement of the underlying systems analysis methodology including coupling with, or introducing methodologies and approaches to encompass, general equilibrium models or sub-components, climate change and earth models or sub-components, game theory, Life Cycle Assessment, damping costs to model consumers “hidden costs” affecting the adoption of new technologies, ETL heuristics, stochastic programming capability with risk aversion that preserves the model’s linearity;
- adoption of MARKAL features into TIMES and semi-automatic migration of existing MARKAL models to TIMES, that would include the definition of compatibility data exchange framework for ANSWER and VEDA, as well as other potential sources of data (see d) for both MARKAL and TIMES models;
- simplification of the procedures to generate alternative scenarios, to link with established energy/economic/demographic databases, and continued improvements in the user interfaces, as well as maintaining of the associated documentation;
- establishment of a list-server on the ETSAP website to better support the global community of ETSAP Tool users; and
- enhancing the structural modelling features of MARKAL and TIMES models and facilitating remote joint work at the same model, remote use of existing models and procedures, some “expert systems” capabilities.

These new features will be developed and implemented subject to budget availability.

(d) *Expanding the framework for ETSAP expertise and Tools.*

Beyond the technical objectives, ETSAP will explore ways to ensure continuity and advancement of ETSAP expertise and Tools. One possibility is to link ETSAP activities more tightly to the IEA secretariat, as suggested at the IEA CERT when the ETSAP Implementing Agreement was extended. Another possibility is to enhance the collaborations with organizations and institutes carrying out energy systems analyses with similar tools (e.g. IASA, SEI-Tellus, etc.). A closer collaboration with IASA could have mutual benefits on both the modelling and data fronts, while doing so with SEI-

Tellus could enhance usability of the ETSAP models, improve data for the global models and make ETSAP Tools available to the large base of LEAP users in developing countries. Each of these possibilities implies activities to foster a common understanding and advance the underlying methodology, and to make the models more compatible; further leveraging skills, available data, and limited resources.

The advantage to the Contracting Parties would be to make the expertise and Tools even more widely recognized as a global standard, and promote an ongoing substantive role for ETSAP and its Tools.

3. Means

The Participants shall achieve the objectives through the following means:

- (a) Carrying out common analyses on key aspects of energy technology systems;
- (b) Collecting, analysing and disseminating information and consistent data related to energy systems, energy technologies, energy and environment models and scenarios;
- (c) Promotion of common research on energy systems analysis, integration of existing tools in the present methodology and development of new tools, together with other groups active in the field;
- (d) Enhancement of existing ETSAP Tools and implementation of new ones, also by linking ETSAP methodology to other approaches;
- (e) Improvement of ETSAP Tools documentation and dissemination of representative analyses carried out with them;
- (f) Organization of semi-annual meetings of experts, as appropriate, to exchange information and experience in the area of work covered by the Agreement;
- (g) Participation in joint meetings with related international projects, making a concerted effort to communicate with the wider professional community, and by otherwise involving decision-makers;
- (h) Promotion of and participation to relevant common projects;
- (i) Exchange of specialists, experts and students active in the sector;
- (j) Organization of training courses to form new experts or to widen the analytic capabilities of existing experts domestically, locally and in outreach activities, including “in-reach” capability building for participants in the use of the global models;
- (k) Using national and multi-national reference groups for the development and analysis of the models and linkage to users;
- (l) Twinning established ETSAP Contracting Parties with new countries, providing materials to guide new and recent users of ETSAP methodologies, as part of “Outreach” initiatives, and
- (m) Carrying out such other activities as may be agreed in the Annual Programme of Work.

4. Deliverables

The products of this Task shall be:

- (a) Maintenance and improvement of an international capability for the analysis of energy systems markets / technologies and their future contribution to economic sustainability, energy security, environment protection, global climate mitigation and technical feasibility;
- (b) Implementation of a multi-region global ETSAP TIMES model;
- (c) The report of ETSAP participation with the above global multi-regional TIMES model to the Energy Modelling Forum N. 22 “*Climate Policy Scenarios for Stabilization and in Transition*”;
- (d) A new tool allowing to subtract one or more countries from the existing regions of the global ETSAP TIMES model and adding them as separate regions to the global model, in order to carry out national analyses in a global framework;
- (e) A list-server will be established on the ETSAP website to better support the global community of ETSAP Tool users;
- (f) Maintenance, enhancement and development of ETSAP common Tools for energy systems analysis, to be distributed to the Participants;
- (g) Periodic reports on workshops or seminars, and on analytical studies undertaken in connection with the Task, including semi-annual publication of the ETSAP newsletter, and
- (h) A final report on the activities carried out under this Task.

5. 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) Performance of national and co-operative, multi-national scenario analyses using ETSAP Tools and energy systems models in general;
- (b) Collection and validation of national/regional quantitative data on flows of energy commodities, stock of capital of technologies and devices transforming energy commodities into one another consistent with the national energy balances, emissions of pollutants and greenhouse gases consistent with existing inventories, status of emission control technologies, economic value of energy systems consistent with national accounts, any other information on energy system structure and related data;
- (c) 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 energy related policies;
- (d) Participation to the development of ETSAP models and Tools, including testing of newly developed versions of software, and
- (e) Contribution to the efforts of disseminating the methodologies and their use in assessing local, national or regional systems, offering lessons and courses, carrying out “Outreach” activities¹.

¹ An ETSAP “Outreach” licensing procedure has been worked out with 3rd party software providers that will permit ETSAP to have a special Project License permitting dissemination and use of the ETSAP Tools by associated non-OECD institutions for the duration of an “outreach” undertaking. This will substantially reduce the cost of “Outreach” initiatives undertaken by ETSAP partners.

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 ETSAP Tools, 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.

6. 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:

(a) *Establish the 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 fulfil the Tasks.

The individual 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.

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.

(b) *Prepare the Program of Work and Reports*

The common program of work will be proposed by the Operating Agent and be approved by 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 work plan(s) determined by the Executive Committee.

The Operating Agent shall submit yearly to the Executive Committee a draft Programme of Work, with an accompanying task-level budget, for the following year. The Operating Agent shall report yearly to the Executive Committee 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 IEA secretariat and to the members of the IEA End Use Working Party and 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 10 below, or other sources of funds are secured.

(c) *Coordinate the Task and Manage the Programs of Work*

The Operating Agent shall bear the following main responsibilities:

- (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;
- (4) To prepare and distribute material on the work of ETSAP for distribution through a Newsletter or the World Wide Web;
- (5) In co-ordination with the Participants, to use its best efforts to avoiding duplication with activities of other related programmes and projects implemented by or under the auspices of the IEA or of other competent bodies;
- (6) To provide the Participants with the necessary guidance for the work they carry out, assuring minimum duplication of effort;

- (7) At the request of the Executive Committee, to organize workshops and seminars, and
- (8) At the request of the Executive Committee, to 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.

7. Operating Agent

The Poly-Technical University of Turin (Politecnico di Torino, Italy), acting through the Department of Energy Studies (Dipartimento di Energetica), is designated as Operating Agent. Starting from May 1, 2006, the private consulting company ASATREM srl (Italy) is designated as new Operating Agent.

8. Time Schedule

This Annex shall enter into force on January 1, 2005 and shall remain in force till December 31, 2007. Within the limits of the term of the Agreement, this Annex may be extended by two or more Participants, acting in the Executive Committee, and shall thereafter apply only to those Participants.

9. Funding

(a) *Common Financial Obligations*

The Common Program will be funded through the Operating Agent. The actual costs of the Common Program 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 2005 budget of the Operating Agent will be EURO 200,000; based on 10 Participants at EURO 20,000 each. The Executive Committee will decide the annual budget for subsequent years based on no more than EURO 20,000 per Contracting Party, and taking into account the actual number of Participants, inflation and any agreed changes in the Common Program.

(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.

(c) *Additional contribution*

Voluntary contributions from participants and other possible sponsors, if any, are welcome and will be used to increasing the common means and pursuing more actively some objectives, as approved by the Executive Committee.

10. Information and Intellectual Property

(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.

(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 IEA Member 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 to the Participants and to the Executive Committee on all work performed under the Task and the results thereof, including studies, assessments, analyses, evaluations and other documentation, but excluding proprietary information.

- (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.

11. Participants

The Contracting Parties which are Participants in this 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 + new accessions)

<u>Contracting Parties</u>	<u>Date of Signature</u>
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 Commission of the European Communities	11.01.82.
The National Technology Agency of Finland (TEKES)	09.01.02
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 Ente Nazionale Idrocarburi (Italy) replaced by the National Research Council, Institute for Advanced Environmental methods	13.11.80. 02.03.05
The Korea Institute of Energy Research (KIER)* replaced by the Korea Energy Management Corporation (KemCo)	15.05.96. 06.04.05
The Government of Japan	17.09.81.
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 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)	01.04.81. 19.12.91.
The Kocaeli University (Turkey)	22.03.96.
The Secretary of State for Energy (United Kingdom) (succeeded by the Secretary of State for Trade and Industry)	09.06.81.
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.