

Annex XII

Summary

Title: Policy Analysis Tools for Global Sustainability (PAT-SUS)
Subtitle: E4 systems tools and joint studies

Duration: 2011 - 2013

Objectives:

(a) *Coordinated Analysis Tools*

Developing, improving and making available to the members and the IEA:

1. TIMES models, and
2. the Energy Technology Data Source (E-TechDS).

(b) *Research and Development*

The underlying objective is to continually advance the state-of-the-art with respect to energy systems analyses, integrated energy / economic / environmental / engineering modelling and long term scenario analysis of critical issues facing IEA member countries and all sharing this planet.

(c) *Capacity building*

Best practice examples, manuals, online forum and hands-on training opportunities will be offered with the aim of maintaining/improving international/national capabilities for conducting energy systems analyses and the effective use of ETSAP tools.

(d) *Maintenance of the base tools*

The minimum objective of this Annex is to maintain and update ETSAP model generators (MARKAL, TIMES) and users' interfaces (ANSWER, VEDA), and to organize two semi-annual workshops each year.

Budget: Each Contracting Party contributes with an annual fee of €20,000 the first year and not more than that in the following years. The Executive Committee will decide the annual budget, and thereby the participation fee, taking into account the number of participants.

Project Head (Operating Agent): GianCarlo Tosato (ASATREM srl)

Attachment S4 to the
Agenda Item 6 of the
57th Executive Committee Meeting held in Stockholm Thursday June 24, 2010

Annex XII (2011-2013)

Policy Analyses Tools for Global Sustainability (PAT-SUS) **E4 systems tools and studies**

(as amended by the 59th ExCo held in Stanford on July 9, 2011)

1. Introduction

The first oil crisis almost forty years ago made policy makers and the public at large suddenly aware of the need to find alternatives to oil. Nowadays with more urgency owing to concern over energy security, economic sustainability and Global Climate Change individuals and thereby policy-makers are becoming increasingly aware that an energy revolution is necessary. Thus post the COP 15 in Copenhagen policy-makers are increasingly looking at the critical role technological options must play with new interest and hope. The critical need now is identifying the key technologies and the programs and policy that will bring them to the market.

ETSAP is well equipped to carry out coordinate studies and analyses in the field of climate change mitigation options and associated costs and benefits, and to provide decision-makers with global/national insights arising from highly differentiated long term scenarios. A joint international programme of energy systems analysis seems now even more necessary than almost thirty five years ago, when ETSAP started under the aegis of the IEA in response to the pressures arising from that first oil crisis.

2. Objectives

While acknowledging that ETSAP tool users independently offer to national and international organizations their capabilities of building energy models, compiling scenario and conducting analyses, the Contracting Parties to this Implementing Agreement participating in this Annex aim at carrying out the following range of cooperative activities for their mutual benefit.

(a) Coordinated Analysis Tools

This objective aims at developing, improving and making available to the Contracting Parties, the IEA secretariat, in particular the ETP team, and the network of Implementing Agreements in general:

1. MARKAL-TIMES models, and
2. the Energy Technology Data Source (ETSAP-E-TechDS).

(b) Research and Development

This objective aims at continually advancing the state-of-the-art of energy systems analyses and integrated energy / economic / environmental / engineering modelling.

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The research will aim to:

- associate CGE properties to MARKAL-TIMES models, either with the extension of the tools or the association to an existing economy wide model, in order to assess the full economic implications (in particular jobs and GDP) of an energy revolution;
- add feedback loops from climate to the energy system, e.g. hydro, the level of the demand for energy services, and include in MARKAL-TIMES models some representation of adaptation options;
- include consumer choices and multiple consumers in the economic equilibrium framework, learning from the departure of equilibrium solution to actual values of the base years; this could make it possible to model the substitution between modes in transportation sector (intermodal split);
- increase the myopic foresight capabilities of the tools;
- improve the stability analyses of the equilibria with respect to key input parameters, the pre-run elaboration of demand-supply curves, the post-optimal analyses tools, including pre-run and post-run diagnostics on technologies that are not chosen;
- experiment with the inclusion in MARKAL-TIMES model of agriculture, which competes with energy through bio-fuels and GHG emissions, and
- endogenize the demand of materials (steel, non-ferrous, cement, glass, plastics, etc) by energy technologies (e.g. nuclear plant, car, house), starting from the industrial sectors, where the development is dominated by technology substitution processes.

The research activity will materialise also in the preparation of memos, examples and "show me" demos on 'best practice' for a proper representation in MARKAL-TIMES models of

- Renewable and dispersed generation,
- smart grids,
- energy storage,
- GHG accounting and CCS,
- trade-off analyses, etc.

Improvement in the methodologies, and thereby the models, will increase the level and credibility of studies carried out by the Contracting Parties and other users of the ETSAP Tools.

(c) *Capacity building*

This objective, strictly related to the previous ones, aims at maintaining and improving international and national capabilities, across developed and developing countries, for

- familiarization and fostering of proper use of the ETSAP Tools;
- analysing of energy systems – markets and technologies;
- modelling possible long term development paths with ETSAP tools;
- building consistent energy / engineering / economic / environment scenarios, and
- evaluating policies to promote economic sustainability, energy security, environment protection, and global climate mitigation based upon technical feasibility of future energy systems.

Concretely, the activity will include:

- improvement of the users' guide and "getting started" manuals;
- availability of online web support systems;
- regular offering of training courses, and
- regular organisation of two workshops per annum.

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Training new experts in methods to conduct quantitative impact analyses using the ETSAP Tools brings to the Contracting Parties the advantage of establishing tighter collaborations with energy systems analysis groups in developed as well as developing countries, building compatible models to facilitate cross-country comparisons, sharing experiences and data, and improving the international dimension of their own analyses.

(d) *Tools maintenance*

Maintaining, updating and developing ETSAP Tools and methodologies is the minimum objective of the Annex. This includes the continuous effort to make the model “shells” (ANSWER and VEDA) more ‘user-friendly’. ETSAP can influence this objective, working with the owners of the shells, NobleSoft and KanORS respectively to set development priorities, only through funds provided by the Contracting Parties.

3. Means

The Participants shall achieve the objectives through the following means:

- (a) Carrying out common analyses on key aspects of present energy technology systems and their possible future developments;
- (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) Organization of training courses to inform 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;
- (j) Exchange of specialists, experts and students active in the sector;
- (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;

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

4. Deliverables

- (a) Publications of independent analyses and background material resulting from the studies carried out towards the achievement of the above objectives; this will materialise in a common report / book as well as contributions to journals and other reports;
- (b) Technical reports on the feasibility or actual extension of ETSAP tools in general to neighbouring fields;
- (c) Updated common tools for energy systems analysis, including improved versions of users' manuals and guides for the use of ETSAP tools;
- (d) An improved website to better support the global community of ETSAP Tool users, including a password protected area with models and data accessible only to Contracting Parties and others approved by the OA/ExCo;
- (e) Periodic reports on workshops or seminars, and on analytical studies undertaken in connection with the Annex, and
- (f) A final report on the activities carried out under this Annex.

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 studies using ETSAP Tools and energy systems analyses in general;
- (b) Collection and validation of national/regional quantitative data on flows of energy commodities, and the capital stock of technologies 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 [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, as well as the review of the Energy Technology Data Source (ETSAP-E-TechDS), and
- (e) Contribution to the efforts of disseminating the methodologies and their use in assessing local, national, regional or multi-regional global systems, offering lessons and courses, carrying out "Outreach" activities.

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Participants have special rights to the results of the joint work, not available to non-participants, as may be decided by the Executive Committee, subject only to the limitations laid out in paragraph 10 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 taken by the Executive Committee. This includes:

- (a) Small group (5-user) license to the ANSWER and VEDA model management systems for MARKAL and TIMES;
- (b) Access to ETSAP models at no charge;
- (c) Discounted fees for the GAMS language in which the MARKAL and TIMES model generators are written for own and Outreach purposes;
- (d) Participation free of charge to the training courses organised by ETSAP.

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 perform or engage in the activities noted below.

- (a) *Establish the Project Staff*
For the purpose of carrying out the above objectives and to fulfil this program of work the Operating Agent shall establish a project staff and such additional assistance as may be required, including external staff.

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 for approval by the Executive Committee. The common work may be performed by the Project Head, other Operating Agent staff, or organizations or professionals designated by the Operating Agent, according to the work plan(s) established 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 each task.

Upon completion 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 Committee on Energy Research and Technology.

The Committee on Energy Research and Technology may, during this Annex, 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, or other sources of funding is secured.

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

The Operating Agent shall bear the following main responsibilities:

- (1) To manage the agreed upon common program of work;
- (2) To supervise the maintenance of the ETSAP tools;
- (3) To assure appropriate communication among the Participants;
- (4) With the approval of the Executive Committee, to represent ETSAP in various international conferences, bodies, and groups;
- (5) To prepare and distribute material on the work of ETSAP through the Internet;
- (6) In co-ordination with the Participants, to use its best efforts to avoid duplication of activities with other related programmes and projects implemented by or under the auspices of the IEA or of other competent bodies;
- (7) To provide the Participants with the necessary guidance for the work they carry out, assuring minimum duplication of effort;
- (8) At the request of the Executive Committee, to organize workshops and seminars, and
- (9) 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 private consulting company ASATREM s.r.l. (Italy), under the leadership of Mr. GianCarlo Tosato, is designated as Operating Agent. Beginning January 2012 CRES (Greece) is designated ETSAP Operating Agent, under the leadership of Mr. GianCarlo Tosato continuing as Project Head. CRES will be represented by George Giannakidis.

8. **Time Schedule**

This Annex shall enter into force on January 1, 2011 and shall remain in force till December 31, 2013. 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 by contributions by the Participants and managed by 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 the annual fees. New Participants will pay a full share of the costs beginning in the year in which they become Participants.

The annual fee for 2011 is to be €20,000 per participant, and not more in the following years. The Executive Committee will decide the annual budget taking into account the number of participants. To the extent possible the cost of base activities – maintenance of the ETSAP tools, workshops and management, i.e. objective (d) above - will be maintained below €100,000. In the allocation of the remaining part of the budget priority will be given to R&D, and the development of ETSAP models and E-TechDS.

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The Executive Committee will decide the annual budget for subsequent years, 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 associated with carrying out this program of work, including the costs of its national team to carry out the program and their participation in workshops and seminars.

(c) *Additional contribution*

Any fees collected for carrying out training programs and for licensing the use of the ETSAP models, as well as those secured from ETSAP's share of commissions associated with new distributions of the ETSAP tools, will add to the ETSAP budget.

Voluntary contributions from participants and other possible sponsors, if any, are welcome and will be used to more actively pursue the objectives and goals for the program of work, as approved by the Executive Committee.

ETSAP may provide seed money for (large) capacity building and analysis projects, to be decided on a case-by-case by the ExCo. In addition the Operating Agent and the Contracting Parties are urged to seek funding sponsors ready to co-finance projects for training and analysis based on ETSAP tools, similarly to what presently happens with competing modelling tools.

With the approval annually of the Executive Committee, ETSAP will continue to be a sponsor of the International Energy Workshop, which in 2011 will be celebrating its 30-year anniversary, during which time ETSAP partners have continually been contributors and participants.

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.

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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 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 program of work. The Participants should notify the Operating Agent of all pre-existing information, and information developed independently of the program of work known to them which is relevant to the Annex and which can be made available to the Annex 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 Annex 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 Annex, and
- (2) If substantial costs must be incurred by the Participant to make such information available, any such charges to be reimbursed from the Annex 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 or ETSAP collaborating institution 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/collaborating institution 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 others except as may be agreed in writing between the Operating Agent and the Participant/collaborating institution which supplied such information.

(g) *Acquisition of Information for the Annex*

Each Participant shall inform the Operating Agent of the existence of information known to the Participant that can be of value to the Annex, but which is not freely available, and the Participant shall endeavour to make the information available to the Annex 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 Annex 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 Annex. 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*

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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.

(k) Intellectual Property Rights held by ETSAP

The Operating Agent, in trust for and for the benefit of the Participants, as directed by the Executive Committee, holds the Intellectual Property Rights of:

- the MARKAL and TIMES model generators;
- the official 2010 version of ETSAP-TIAM;
- the Energy Technology Data Source, E-TechDS;
- the two web sites: www.etsap.org and www.iea-etsap.org; and
- the ETSAP final reports and NewsLetters.

(l) Assignment of ETSAP IPR to another organisation

With a majority vote, the ExCo can assign such rights to another organisation based on future events.

(m) New Intellectual Property Rights

New IP created during this Annex will be held by the Operating Agent, in trust for and for the benefit of the Participants, as directed by the Executive Committee.

11. Participants

The Contracting Parties which are Participants in this Annex are the following:

(To be filled with the names of the Contracting Parties that will join the Annex XI.)

[For the record, Countries and Contracting Parties to Annex XI or previous annexes are listed below.]

Country	IA Date of signature	Contracting Party	Participating till / from Annex:
IEA			
Austria	19.12.80	EVA	V/
Australia	13.11.80	ABARE -	X/
Belgium	08.09.81	The Government	Current
Canada	07.07.82	NRCan	Current
Czech Republic			
Denmark	04.12.80	DEA	Current
EC	11.01.82	DG Research	Current
Finland	09.01.02	TEKES	Current
France	29.01.08	ADEME/EMPT	/XI
Germany	13.11.80	IER	Current
Greece	01.12.80	CRES	Current
Hungary			
Ireland	01.05.09	SEI	/XI
Italy	13.11.80	IMAA/CNR-ENEA	Current
Japan	17.09.81	The Government	X
Korea	15.05.96	KEMCO	Current
Luxembourg			
The Netherlands	02.04.82	ECN	Current
New Zealand			
Norway	13.11.80	IFE	Current
Portugal			
Spain			VIII/
Sweden	18.11.80	The Government	Current
Switzerland	01.04.81	PSI	Current

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Turkey	22.03.96	Kocaeli -	X/
United Kingdom	09.06.81	The Government	Current
United States	13.11.80	DOE	Current

Others

	Invited to join / rejoin ETSAP:
52 nd meeting, Brasilia, November 2007:	Turkey China India Mexico South Africa Brazil Russian Federation
53 rd meeting, Paris, July 2008:	Australia, Austria Indonesia Kazakhstan Portugal Spain
55 th meeting, Venice, June 2009	Croatia