

EFDA Workprogramme 2011

Call for Participation

EFDA TIMES

Deadline for Responses: 21. Apr 2011

EFDA CSU contact person: Magdalena Gadomska

Introduction

This Call for participation addresses the first pillar of SERF i.e. the activities on EFDA-TIMES and Fusion Economics, aiming at analysing the role of fusion in the future global energy, environment, economic and social system. It covers the 1st part of the SERF 2011 Work Programme endorsed by EFDA Steering Committee on July 2010 and will be implemented on the basis of the provisions given in Art. 5 of the EFDA Agreement,

The EFDA TIMES modelling activities aims at the following long-term objectives:

- developing consistent long-term energy scenarios which contain fusion as an energy option and showing the potential benefits of fusion power as an emission free energy source,
- gaining visibility, credibility and recognition by contributing with these scenarios to the international scientific energy debate,
- bringing the fusion option into other long-term energy models, by making available the latest technical, economic and environmental dataset on future fusion power plants,
- exploring the conditions that make fusion a successful contributor to sustainable energy systems,
- providing domestic and European decision makers with analyses and arguments in support of the potential benefits of ITER and longer term fusion R&D, and
- maintaining and developing the related know-how in the associations

Programmatic Background

The above objectives will be pursued by making use of the EFDA TIMES model. EFDA-TIMES is a multi-regional global and long-term energy model of economic equilibrium, responsive to energy technology innovations, domestic and international trade, energy and environmental policies including climate change mitigation. At the end of 2009 the new master version of the model has been delivered and during the 2010 further improvements have been introduced consisting, mainly, in the update of drivers, enhancements regarding the ways in which other than fusion energy technologies (nuclear fission, renewable and fossil fuel-based) are implemented in the model, and in a more detailed sensitivity analysis.

As foreseen in the SERF 2011 WP, the 2011 works should provide (1) further EFDA TIMES model updates and improvements, (2) introduction of selected currently available TIMES options to the EFDA TIMES model and (3) the selected necessary improvements regarding the TIMES models family in general. These improvements will make the results of ETM more comparable with other models' results, more significant and robust from the research point of view and more relevant from energy policy support point of view.

1. :

Task Agreement WP11-SER-ETM: EFDA TIMES

1.1 Introduction

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1.2 Objectives

Following the above programmatic lines, the 2011 objectives are:

- Maintenance and development of the EFDA TIMES model, its quality assurance and exploitation according to the programmatic objectives. (Activity 1. Project management).
- Improving the way in which specific issues are modeled in EFDA TIMES, namely:
- New regional aggregation and calibration to a new base year (Activity 2).
- Addressing trade-off between demand for food and the use of biomasses for energy generation (Activity 3).
- Climate equation and inclusion of all the GHG (Activity 4).
- Introduction of a “Myopic variant” (Activity 5).
- Modeling infrastructures (Activity 6).
- Further improving of advanced nuclear fission technologies (Activity 7).
- Report on Energy Scenarios (Activity 8).
- Documentation for 2011 model version (Activity 9).

1.3 Work Description and Breakdown

Structure

The 2011 EFDA TIMES works are broken down into 9 activities.

Work Breakdown

WP11-SER-ETM-1.3.1

Activity Project management

1.3.1: Project management

At its 41st Meeting on 8 July 2009 in Barcelona the EFDA Steering Committee approved the 2010 programme on *Socio-Economic Research on Fusion (SERF)* as forming part of the 2010 EFDA Work programme. The overall resources required to fulfil the objectives included the approval of **0.5 ppy** of Manpower under Priority Support for the work of EFDA Times Task Coordinator inside the project management activities. This has been then endorsed by the CCE-FU at its meeting in Brussels on 14 September 2010 which assigned 0.5 ppy of manpower under Priority Support to ETM coordination task. Following this recommendation and after the selection process based on the Associations replies to the Call for participation, interviews with the candidates and their CVs, the EFDA TIMES Task Coordinator and his Deputy have been appointed. The priority support has been awarded according to the following breakdown: ENEA Frascati - ETM Task Coordinator, Manpower 0.3 ppy PS; and IPP - ETM Deputy-Task Coordinator, Manpower 0.2 ppy PS. The appointment of the EFDA TIMES coordinators was convened for a period of 2 years starting from 1 July 2010. While the Task Coordinator will continue his duties till June 2012 as foreseen, the researcher appointed as his deputy has moved position which makes it necessary to select a new person who will cover this role. Priority support of 0.2 ppy will be awarded for the Deputy Task Coordinator role.

The ETM task coordination entails:

- Leading the development and maintenance of the EFDA TIMES energy model, its quality assurance and exploitation according to programmatic objectives and
- Advising EFDA on:
 1. Multi-year EFDA TIMES plan and objectives, i.e. elaborating/updating proposals of a consistent multi-year plan with clear objectives and milestones. Task coordination will present them to the EFDA RO and the EFDA Leader.
 2. Each year work programme for EFDA TIMES. The work programme shall aim at fulfilling the multi-year objectives and milestones and ensure that no important actions are missing and all the tasks are appropriate and form a consistent and coherent set. Task coordination will present the draft work programme to the EFDA RO and the EFDA Leader. This Work Programme will be the basis for issuing calls for expression of interest to the Associations.
 3. Development and maintenance of the EFDA TIMES energy model, including:
 1. Addressing major EFDA TIMES *design issues*
 2. Model database *maintenance*, including advice on data sources and advice on estimates and own calculations where no general data is available
 3. *Quality assurance* of EFDA TIMES, including: definition and monitoring of quality guidelines for ETM, advice on validation and benchmarking.

4. Links with the international TIMES community and keeping in touch with latest evolutions (e.g. ETSAP, TIAM, NEEDS).
5. The ETM task coordination will advice the EFDA RO on the quality of final reports, publications and talks and on the consistency and coherence of the representation of the model to the external world.

The ETM task deputy–coordinator will be additionally in charge of the model management and transversal technical support to tasks in order to ensure the implementation of changes to the model

WP11-SER-ETM-1.3.2

Activity 1.3.2. New regional aggregation and calibration to a new base year

Re-aggregation of the regions in ETM to make the regional structure corresponding better to current geo-politic and economic division of the world (rearranging of regional aggregation for WEU EEU and FSU; aggregation of MEX to CSA or creation a NAFTA area). Recalibration of the model to a new base-year and changing the first mile-stone period.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

WP11-SER-ETM-1.3.3

Activity 1.3.3. Addressing trade-off between demand for food and energy use of biomasses

The activity will be performed by adding the demand for food to the energy demand when implementing biomass energy in the model, considering that in the extreme climate change mitigation scenarios the demand for food would put a limit to the use of land for producing energy biomass. This extension should allow to explore, among others, at what climate change mitigation levels the switching from bio-fuels in transport to electric transport becomes competitive and with what technologies – the question which has an obvious impact on fusion market chances.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

WP11-SER-ETM-1.3.4

Activity 1.3.4. Climate equation and inclusion of all the greenhouse gases (GHG)

In order to increase the model's scope and to generate scenarios directly comparable with the four "representative concentration pathways" being prepared for the next Intergovernmental panel on Climate Change Assessment Report (due in 2014), it is crucial to fully exploit model capabilities by introducing the climate equation and all the GHG other than CO₂.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

WP11-SER-ETM-1.3.5

Activity 1.3.5. Introduction of a "Myopic variant" to EFDA TIMES

Myopic variant which is already available in other TIMES options restricts the assumption that all future events and decisions represented in the model are known from the beginning and thus it

makes it possible to evaluate the impact of various options of the model optimization on predictions.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

WP11-SER-ETM-1.3.6

Activity 1.3.6. Modeling infrastructures

Introduce endogenous infrastructure for electricity, natural gas and heat within regions. This will allow a proper modelling of technologies that require piped transmission and distribution of energy carriers. Each grid is defined in the topology by commodity flows in and out, efficiencies (losses), and investment and O&M costs per GJ of annual flows. The following subtasks will be considered:

Parameter studies. Test of the full supply chain for all end-use heat technologies – comparing EFDA-TIMES and TIAM. More detailed representation of heat and electricity infrastructure. Infrastructure (network and storages) for intermittent electricity generation.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

WP11-SER-ETM-1.3.7

Activity 1.3.7. Further improving of advanced nuclear fission technologies in EFDA TIMES

The task is a continuation of the task initiated under the WP2010 (which could not be fully implemented due to temporary human resources problems in the association in charge).

Within this WP the following tasks will be carried out: (1). Update of the database concerning the uranium resources regarding their amount and costs (2) Enhancing of the already implemented simplified fuel cycle by adding fast reactors, incorporating possibilities to burn minor actinides and Plutonium, and reducing thus the amount of nuclear waste. (3) Adding Plutonium resources (from the recycling of nuclear weapons and from already existing nuclear waste) and thorium resources, taking into account the accelerator driven systems (ADS) needs. (4). Based on the final implementation of the enhanced nuclear fuel cycle into the model, scenarios including the technical, economic and social acceptability assumptions will be generated in order to evaluate the role of fission technologies in future energy systems.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012)

WP11-SER-ETM-1.3.8

Activity 1.3.8. Energy scenarios

Even if the results provided by the “November 2010” version of ETM are comparable with IEA results as far as the energy demand predictions are concerned, it is important to model more in detail the final energy demand factors since the reduced growth of electricity demand would have relevant effects on the role of fusion at the end of the century. The elastic demand module should be used to model very extreme cases of demand reduction. Also the supply side affecting fusion

penetration should be studied deeper, and this entails first of all the role of the advanced nuclear fission (including the restrictions on its penetration) and RES infrastructures and storage options.

This task will carefully describe and model the above issues, producing the Report on energy scenarios which will be used as reference for EFDA TIMES modeling activities.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

WP11-SER-ETM-1.3.9

Activity 1.3.9. Model documentation for 2011 ETM version

Writing a synthesis introducing the model and identifying the different documents part of the “model documentation” (e.g. appropriate reports written by the different teams; technical report on the description of the technologies; generic documentation available on the ETSAP website); Preparation of a technical report presenting the techno-economic data related to the technologies, resources and user’s constraints included in the model.

Deliverables: Intermediate Report (November 2011), Final Report and set of Veda Templates (February 2012).

JET related activities

Not applicable to this Task Agreement.

Resources

Up to 10 ppy of baseline support is available for the 9 activities listed, plus up to 0.5 ppy of priority support for the activity 1 (task coordination).

1.4 Scientific and Technical Reports

Progress reports

At the end of each calendar year and at intermediate times where appropriate, the Task Coordinator – Project manager shall present a report on activities (under baseline and priority support) under the Task Agreement to the EFDA Leader for his approval. These reports shall integrate the progress made by each Association on each activity, and they shall indicate the level of achievement of the objectives, the situation of the activities, the allocation of resources and recommendations for the next year when applicable.

The EURATOM financial contribution will be made through the usual procedures for baseline support through the Contract of Association.

Report of achievements under Priority Support

In addition, achievement of Priority Support deliverables will be reported separately to the EFDA Leader. A final report shall be prepared by the ETM team member in charge of the task coordination (project management) and submitted to the EFDA Leader.

The EURATOM financial contribution will be made after approval of these reports by the EFDA Leader.

Milestones and Deliverables

Milestones:

For the technical management of this task, the following milestones are foreseen:

- Three coordination and progress meetings, one in early 2011, one in November 2011 and possibly one in February 2012 (time and place to be decided together with Associations involved).
- a series of videoconferences and visits of the Task coordinator(s) to the associations involved for coordination and presentation of the progress of the activities.

Final reports should be sent to EFDA CSU Garching within February 2012.

The detailed requirements for technical reports and milestones will be defined for each activity separately together with the experts from the responding Associations. Joint contributions to international conferences, such as The Energy Technology Systems Analysis Programme (ETSAP) meeting in November and a joint publication in an international journal, are foreseen.

Deliverables:

Deliverables of this Task will consist of updated templates, documentation of changes in the model, scenario files and technical reports. The list of deliverables foreseen for each activity is given separately in the respective activity's description. The detailed requirements for deliverables and final reports will be defined for each activity together with the ETM task coordinator(s).

According to the decision of the 31st EFDA Steering Committee in Barcelona on 14 July 2006 (EFDA (06)-31/5.3), all draft publications in the area of socio-economics, based on or using information developed under EFDA Tasks, will be systematically sent by the Associations for EFDA clearance prior to submission. Furthermore, EFDA TIMES related publications are subject to the review and comments of the ETM steering group members.