

Abstract submitted to the organizing committee of the International Conference on “Energy & Security in the Changing World”, hosted by the Iranian Association for Energy Economics (Teheran, May 25 – 27, 2004)

Title: *Technologies for secure energy systems: insight from MARKAL – TIMES studies*

Author: GianCarlo. TOSATO
Project Head, IEA/ETSAP
IPP/MPG, Boltzmannstr. 2
D-85748 Garching bei Muenchen (Germany)
Tel: +49(0)89.3299.4194, fax: 4197; e-mail: gct@etsap.org

The Implementing Agreement of the International Energy Agency for a research Programme of Energy Technology Systems Analysis (IEA/ETSAP) has developed the MARKAL – TIMES methodology. Since 1976 many OECD countries – Austria, Australia, Belgium, Canada, Denmark, EC, Finland, Germany, Greece, Ireland, Italy, Japan, Korea, Netherlands, Norway, Spain, Sweden, Switzerland, Turkey, UK, USA – have cooperated to make available to analysts across the world a flexible tool that generates partial and general equilibrium expansion models of the most different energy systems. Hundreds of such models of global, regional, national and local energy systems have been built and used by teams in 50 or more countries around the world to evaluate the impact of energy – environment policies and measures. The paper provides an overview of models and results relevant to the discussion of energy security issues.

A first section of the paper illustrates with examples the gaps observed in most models between equilibrium and actual quantities and prices in the base year. Some results will exemplify the problem. Based upon a discussion of some theoretical reasons for these differences, the paper provides suggestions to improve the consistency of models with actual market conditions. On the other side this gives the opportunity to illustrate some energy policies capable of improving market conditions and the deployment of more efficient end use technologies.

The second part of the paper will present some model results for longer time horizon. The analysis of the gaps between the need for security and the model projections will give the opportunity to discuss the need to enhance R&D efforts in the field of new technology and supply options.

Abstract submitted to the organizing committee of the International Conference on “Energy & Security in the Changing World”, hosted by the Iranian Association for Energy Economics (Teheran, May 25 – 27, 2004)

Title: *Socio economic analysis of fusion as a long term energy option*

Author: GianCarlo. TOSATO
Responsible Officer, EFDA/SERF
IPP/MPG, Boltzmannstr. 2
D-85748 Garching bei Muenchen (Germany)
Tel: +49(0)89.3299.4194, fax: 4197; e-mail: giancarlo.tosato@efda.org

Since 1997 the European Fusion Development Agreement has complemented its base program of research in fusion with a Socio Economic Research program. Independent groups and researchers in countries across Europe have investigated the characteristics of fusion as an energy supply option through the best methodologies developed by social scientists and advanced economic modelling techniques of energy technology systems analyses. This paper presents the main findings of the program and reasons for arriving at a commercial fusion power plant.

Within the uncertainties of long term assessments, base load electricity produced by different fusion power plant concepts is cost competitive with other sustainable options. Fusion electricity has external costs of the same order of magnitude as renewable technologies, according to studies with ExternE. According to energy environment scenarios built with economic global models, the need for better environmental performance and for substitutes for scarce non renewable resources makes fusion power plants economically beneficial before the end of the century.

Social science experiments, such as “Focus Groups” around Cadarache (France) and “European Awareness Scenario Workshops” in Porto Torres (Italy), have shown that local communities are ready to support large experimental fusion facilities if transparent and open information procedures are set up.

According to theoretical social science studies on “mega-science” projects, the early proponents of fusion created unnecessary overoptimistic expectations. However scientific and technical progress in recent years and the present international momentum to build the ITER experimental facility make realistic the prospect of having commercial fusion power plants available by the middle of the century. Since it integrates very well with other electricity supply options in a complex power grid, fusion can provide an important contribution to sustainable energy futures, together with new hydrogen based distribution concepts and with more efficient end use devices.