

# DERIVING OPTIMAL PROMOTION STRATEGIES FOR INCREASING THE SHARE OF RES-E IN A DYNAMIC EUROPEAN ELECTRICITY MARKET

*Green-X*



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Elektrizitätsgesellschaft Laufenburg AG, CH

European Renewable Energy Council, B

*Duration:* October 2002 – September 2004

## PROJECT SUMMARY

### **Title:**

Deriving optimal promotion strategies for increasing the share of RES-E in a dynamic European electricity market

### **Objectives and problems to be solved:**

The core objective of this proposal is to facilitate a significantly increased RES-E generation in a liberalised electricity market with minimal costs to European citizen. To identify most important strategies the dynamic toolbox GREEN-X will be developed. Related objectives are:

- to find a set of efficient and sustainable dynamic instruments integrating strategies for RES-E, CHP generation, DSM activities and GHG-reduction;
- to address / include major stakeholders and decision makers in the development process of the toolbox GREEN-X;
- to disseminate the toolbox and the results to key stakeholders and policy makers.

By disseminating the toolbox and the results of this project to policy makers and various stakeholders, acceptance of an EU-wide effective promotion system will be improved.

### **Description of work:**

The main product of this project will be a computer-based toolbox containing the following features:

- a database, allowing dynamic changes and calculating potential and costs of RES-E supply, CHP production, efficiency improvement and fuel switching in the electricity sector as well as the corresponding GHG reductions
- a dynamic computer model linking and simulating different scenarios between RES-E, CHP, demand-side activities and GHG-reduction in the electricity sector. The output will allow the following results for both the EU as a whole and for individual Member States for each specified year:
  - electricity generation of RES-E, conventional electricity, and CHP production
  - import / export balance of RES-E, conventional electricity and GHG permits
  - impacts of simulated strategies on generation costs and profits for generators
  - impact of selected strategies on total costs and financial benefits or disbenefits for EU citizens

It is emphasised that analyses will be in a dynamic framework, allowing changes of strategies and scenarios over time.

### **Expected Results and Exploitation Plans:**

The core result of this project is to provide and disseminate essential information with respect to RES-E deployment, CHP, rational use of electricity and GHG reduction to various stakeholders. The main results will be:

- a detailed action plan for policy makers aiming to integrate RES-E with other EU-related objectives such as energy efficiency, and climate change abatement. These recommendations will be derived for each country and for the EU as a whole.
- recommendations for various stakeholders to derive economically efficient portfolios in liberalised electricity markets under the constraints of RES-E development and GHG-reduction;

To facilitate the information and strengthen the decision process, the toolbox GREEN-X will be available via the internet.

## WORK PROGRAMME

The work of this project will be broken down in the following 8 work phases, see also Figure 1.

**WP 1 – Dynamics of cost curves:** The aim of this package is to analyse the dynamics of cost curves (= potential and costs) for the different RES-E technologies, for conventional electricity and CHP generation, and the most important demand-side activities for electricity applications in various EU countries. In addition, potential and costs for GHG reduction will be investigated for the electricity sector.

**WP 2 - Impact of decision makers (Decision making by stakeholders):** The major objective is to understand the relation between risks, required profits and project feasibility as seen and judged from the perspective of different stakeholders involved in the decision making process for new investments. These understandings will be translated for the dynamic market model into rules and approaches which (i) promote the growth of renewable energy, (ii) provide stable market conditions and (iii) take into account the position of various stakeholders.

**WP 3 - Impact of Policies (Evaluation of promotion strategies and barriers):** The objective of this work package is to identify and evaluate the appropriate policy instruments in place in EU Member States. These seek to (a) promote RES-E, (b) support a more rational use of electricity (industry, household and tertiary sectors), (c) regulate conventional electricity production, and (d) control GHG emissions (taxes, emissions trading...).

**WP 4 - Trade-offs:** The objectives of this work package are to analyse the various interactions of different types of policy instruments and market conditions, society restrictions, stakeholder behaviour in a dynamic way, and the linkage of RES-E, CHP, conventional electricity generation and GHG-reduction, and to evaluate how new environmental markets, such as CO<sub>2</sub> emission permits/credits, may affect or overlap with the promotion of CHP and/or RES-E. In addition, the theoretical framework for the toolbox GREEN-X will be derived.

**WP 5 – Development of the toolbox GREEN-X:** The toolbox will be developed, based on the formal framework, on the dynamic cost curves and on the determination of various promotion schemes gained in previous packages. The core element of this tool is the computer model aiming to maximise societal benefit for the EU. This would allow a comparative, quantitative analysis of interactions between RES-E, conventional electricity and CHP generation, demand-side activities and GHG-reduction in the electricity sector, both within the EU as a whole and its Member States. The interactive *dynamic* simulation model would be developed on basis of the existing *static* computer model EIGreen, developed for a previous EU project. In addition, a comprehensive database for various cost curves and CO<sub>2</sub> reduction costs in the electricity sector (initiated in WP1) will be created and integrated within the new model.

**WP 6 – Recommendations for dynamic policies:** Results and recommendations will be derived based on various simulations using the toolbox GREEN-X and insights gained from the formal assessment model and the evaluation of current promotion schemes. The objective of this phase would be to integrate and update the results from the previous work packages and to extract dynamic policy recommendations for a European-wide enhanced introduction of RES for electricity generation, more efficient use of electricity included linkage to conventional electricity and GHG reduction measures. The Action Plan will help policy makers find a set of efficient and sustainable policies to integrate RES-E with other EU-related objectives, such as energy efficiency and climate change abatement over time, and to help various stakeholders derive an economically efficient portfolio strategy in a liberalised electricity market under the constraints of RES-E development and GHG reduction.

**WP 7 – Conferences and Dissemination:** The dissemination of the products, results and recommendations is of high importance to reach the core objective of this project, i.e. the achievement of a significant increase in the share of RES-E and an more rational generation and use of electricity.

**WP 8 – Management:** The objective of the management is to organise the whole project and to disseminate information including via the web-site.

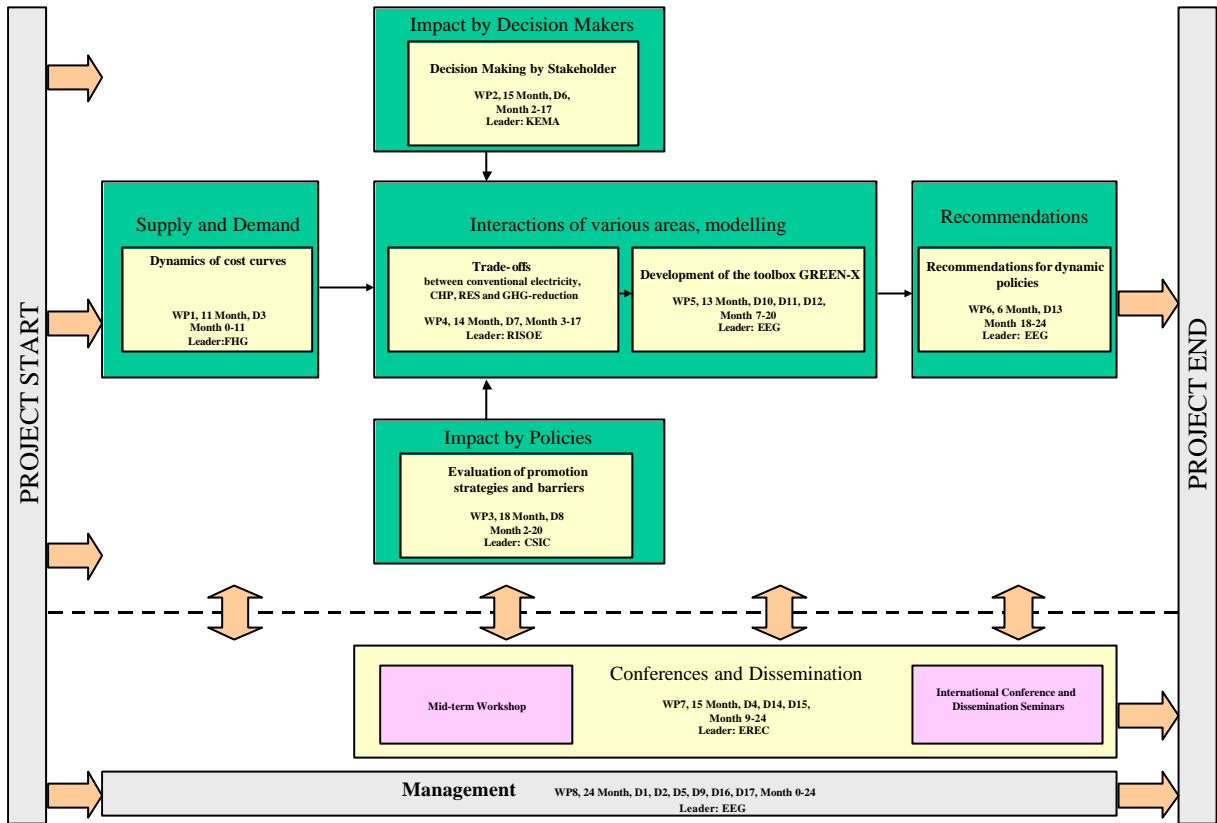


Figure 1: Project planning