

Bioenergy chains from perennial crops in South Europe.

Contract No: 5FP - ENK6-CT2001-00524
'Bioenergy chains'.

Objectives:

The overall objective of this project is to define and evaluate complete bioenergy chains from biomass production to thermochemical conversion for the production of valuable energy products. A number of perennial energy crops were grown in southern Europe (Greece, Italy, France and Spain), which have been carefully selected to provide a year-round availability of raw material. These were processed thermally by combustion, gasification and fast pyrolysis. The complete chains were evaluated in technical, financial/economic and environmental terms in order to identify the most promising combinations of biomass resources and technologies.



Project results:

The expected project results are:

- Determination and identification of the fuel characteristics in relation to the selected thermochemical conversion technologies.
- Definition and evaluation of biomass production chains from perennial energy crops (growing techniques, harvesting, crop logistics) matching production possibilities to conversion requirements.
- Technical evaluation of the thermal conversion technologies when using perennial crops.
- Practical guidelines for the multi-fuel operation of the thermal conversion plants.
- Financial/economic and environmental assessment of bioenergy chains from perennial crops successively harvested. A list of the best options, of a combination of biofuels and technology, in terms of economic and environmental benefits, for each country is produced.



Challenges addressed:

The project is a practical demonstration of feedstock-to-energy schemes, starting from biomass production in the field and progressing through each stage of handling and processing to a delivered energy product as heat and/or.

The challenges addressed are:

- Achieve year-round availability of raw material.
- Secure fuel supply diversification and reduce raw material shortages.
- Establish practical guidelines for the multi-fuel operation of the thermal conversion plants

Expected benefits:

- Through the *multicropping cultivation* and successive harvesting, a significant reduction of the procurement cost will be feasible.
- The increased *feedstock diversification* leads to fuel security, which is the most decisive parameter in accelerating bioenergy applications.
- More tolerant biomass conversion thermal plants in terms of feedstock variation (*multi-fuel operation*).

Work plan:

Το έργο περιλαμβάνει πέντε κύριες δράσεις:

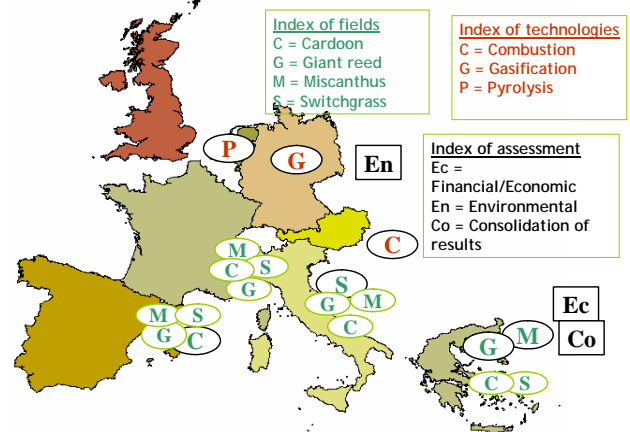
1. Biomass production: Four perennial energy crops were cultivated in large fields and successively harvested, in representative agricultural regions of Greece, Spain, France and Italy. The crops are: cardoon (*Cynara cardunculus* L.), giant reed (*Arundo donax* L.), switchgrass (*Panicum virgatum* L.) and miscanthus (*Miscanthus x giganteus* Moench).
2. Biomass conversion: Each crop was fully characterised and subjected to a comprehensive test programme of combustion, gasification and fast pyrolysis, in laboratory and pilot scale.
3. Economic/financial assessment: A financial /economic assessment was carried out on the data collected from the previous work packages. An overall performance model was derived to provide consistent comparison between different bio-energy chains.
4. Environmental assessment: Environmental Impact Assessment and Life-Cycle Assessment have been carried out and in all stages of the bioenergy chains. A list of the best options, of a combination of biofuels and technology, in terms of economic and environmental benefits, for each country were produced.
5. Consolidation and dissemination of project results

For more information:

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Project activities



Beneficiaries:

Project results are addressed to:

- Farmers, unions of farmers
- Agricultural machinery manufacturers for the development of planting, harvesting machinery for energy crops.
- Equipment manufacturers for feed preparation and handling (baling, chipping, drying, etc).
- Manufacturers for equipment design and specification for thermal conversion
- Industrial design & construction companies for process design and optimisation for thermal conversion, multi-fuel conversion and fuel specifications

Project consortium:

PROJECT CO-ORDINATOR:

- Center for Renewable Energy Sources (CRES), Greece

PARTNERS :

- Polytechnic University of Madrid (UPM), Spain
- Institut National de la Recherche Agronomique (INRA), France
- University of Bologna (UNIBO), Italy
- University of Aston, UK
- Institut fuer Umweltstudien (IUS), Germany
- Technical University of Graz (VT-TUG), Austria
- Biomass Technology Group (BTG), The Netherlands
- Agricultural University of Athens (AUA), Greece
- Institut fuer Energie und Umweltforschung (IFEU), Germany