



RESIPE:

Reform of the European Sugar Industry based on Polygeneration with the use of Energy Crops

TREN/07/FP6/EN/S07.71205/038667

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Niki KOMIOTI

Energy Technology Dept., Director
EXERGIA S.A.

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exergia ENERGY & ENVIRONMENT
CONSULTANTS



The project

- **Title:** Reform of the European Sugar Industry based on Polygeneration with the use of Energy Crops
- **Acronym:** RESIPE
- **Duration:** 18 months
Contract was entered into force on May 29, 2007
Effective starting date July 16, 2007
Duration 18 months from the effective starting date
- **Aim:** to assist the take-off of polygeneration in the **sugar industry** leading to energy, environmental, societal and economic benefits. The targeted sector of the sugar industry will be that of Greece, Italy, Poland and Sweden.

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The partners

1. **EXERGIA S.A.**, Energy & Environment Consultants - Greece
2. **KSC**, Krajowa Spółka Cukrowa S.A. - Poland
3. **ETA**, Renewable Energies S.A. - Italy
4. **ECBREC/IPiEO**, EC Baltic Renewable Energy Centre - Poland
5. **BAFF**, The BioAlcohol Fuel Foundation - Sweden

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The objectives

- To appoint the sugar industry as a prime candidate for polygeneration based reform under the concept of bio-refineries supplying low-cost non conventional energy via cogeneration, bioethanol the transport sector and other valuable materials;
- To investigate the conditions under which sugar-beet ethanol production can be upgraded to polygeneration applications for the short term;
- To increase knowledge of polygeneration with the use sweet sorghum in the sugar industry of the participating countries for the short to medium term;
- To transfer expertise in design and engineering, and practical experience from application, from the technology developers to the end-users;
- To increase commercial availability of the results of EU research projects;
- To prove the applicability of the technology to a variety of implementation environments, and to understand its limitations;
- To produce and disseminate information on technical and economic feasibility of polygeneration in the European sugar industry and beyond.

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Work Packages

- WP 1. Project management and coordination**
- WP 2. Sectoral and technology update**
- WP 3. Technology transfer**
- WP 4. Elaboration of pre-feasibility studies**
- WP 5. Consolidation of results and recommendations on sugar industry reform**
- WP 6. Dissemination**



WP1 Project management and coordination

WP title: Project management and coordination		WP 1
Starting date: Month 1	Duration: 18 months	
Partners involved	Role / Responsibilities	Person-months
Exergia (coordinator)	Project management functions and coordination of project work	1.2
All partners	Participation in project management meetings	0.8
Inputs Contract with the European Commission.		
Objectives		
<ul style="list-style-type: none"> To coordinate the work of all partners; To facilitate the flow of information among partners and to third parties; To ensure that the project is executed within its timeschedule and budget; To liaise with the Commission; To establish contacts with other projects under FP6 or other programmes, as required by the Commission or is considered essential for successful implementation 		
Description of work		
<ul style="list-style-type: none"> Liaison with the Commission on behalf of the consortium partners; Networking of the project stakeholders; Organisation of the project Steering Committee; Contractual arrangements, including the preparation and signing of the consortium collaboration agreement, the submission of cost statements and the distribution of funds among partners; Coordination of the project activities and facilitation of the contacts among partners; Organisation of project meetings; Consolidation of the work in the WPs; Formulation of the project implementation plan; Quality control and assurance regarding project outputs (reports and deliverables), based on QMS certified to ISO9000; Organisation of project management meetings; Preparation of progress, interim and final reports. 		
Expected Results		
That the project is executed in line with its objectives, time schedule and budget, and according to the expectations of the Commission and related stakeholders.		
Milestones and Deliverables		
Consortium collaboration agreement. Kick-off meeting at the beginning of the project. Progress reports at months 6 and 12 (D1, D2). Final report at the end of the project (D3). Steering Committee meeting at month 1 of the project and further on as required.		

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WP2 Sectoral and Technology update

WP title: Sectoral and technology update		WP 2
Starting date: Month 1	Duration: 4 months	
Partners involved	Role / Responsibilities	Person-months
Exergia (coordinator)	Overall WP coordination. Overview of the Greek sugar industry, establishment of contacts and registering of interest	1
ETA – ECBREC – KSC - BAFF	Overview of national sugar industries. Establishment of contacts	3
Inputs Project implementation plan		
Objectives		
<ul style="list-style-type: none"> To obtain an overview of the sugar sector of selected European countries, with emphasis on technological issues affecting polygeneration applications To contact sugar plants in the participating countries and increase their awareness on the use of polygeneration based on energy crops; To collect "expressions of interest" for polygeneration applications by sugar plants. 		
Description of work		
<p>The project partners from Greece, Italy, Poland and Sweden will undertake to review the sugar sector in the respective countries. The review will comprise establishment of contacts with sugar plant operators, provision of information on the concept of polygeneration based on the use of energy crops (sugar beet and sweet sorghum in particular), collection of information regarding sugar plants and recording of the interest of plant operators to participate in project activities. Establishment of contacts will be sought with all sugar plants in the participating countries in order to avoid complaints of selective treatment. The necessary information regarding sugar plants will mainly comprise data on energy generation and energy performance of individual plants, as well as specific technological details that affect the applicability of the polygeneration using energy crops. Expressions of interest will need to demonstrate a commitment on behalf of the plant operators and will take the form of a written memorandum. It should be noted that a number of sugar plant operators have already expressed their interest in participating to the project.</p>		
Specific project activities will comprise:		
<ul style="list-style-type: none"> Establishment of contacts with sugar plant operators in the countries concerned; Collection of information and increase of awareness over polygeneration with the use of energy crops (sugar beet and sweet sorghum); Expressions of interest from sugar plant operators. 		
Expected Results		
Increased awareness regarding polygeneration with the use of energy crops. Creation of a critical mass of sugar plants for technology dissemination. Expressions of interest.		
Milestones and Deliverables		
WP Report: Overview of the sugar sector (D4), covering the participating countries. Expressions of interest from sugar plants, at month 4, to participate in the next phase of the project.		
Performance indicators		
At least 20 expressions of interest from different sugar plants in the four countries.		

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WP3 Technology Transfer

WP title: Technology transfer		WP 3
Starting date: Month 5	Duration: 5 months	
Partners involved	Role / Responsibilities	Person-months
ETA	WP coordination. Knowledge transfer (formal training) at national training workshops	2
EXERGIA	Coordination of training activities. Responsibility for the national training workshop in Greece. Organisation of the study tour.	2
EC-BREC, BAFF	Organisation of training activities in the respective countries	4
<p>Inputs Contacts with sugar plant operators. Expressions of interest.</p> <p>Objectives</p> <ul style="list-style-type: none"> To inform sugar plant operators on the technical details and experience from the application of polygeneration with the use of energy crops in the sugar industry To allow sugar plant operators to make informed decisions regarding their interest on the technology <p>Description of work A training workshop will be organised in each of the countries involved. ETA, the technology provider will be invited to present polygeneration with the use of energy crops to these workshops, as the technology applies to sugar industry. Sugar plant operators and other stakeholders relevant to the sugar industry will be invited to attend the workshops. The expert knowledge and documentation presented in the workshops will mostly comprise technical details of polygeneration applications as well as the limitations of the technology in terms of applicability. For every training workshop, an assessment of the workshops results will be carried out, which will contribute to the formation of a short-list of sugar plants that present real potential for the application of polygeneration with the use of energy crops. A study tour will be organised to an existing application of the technology in Europe or elsewhere (potential sites in UK, Italy or South America). The sugar plant operators on the short-list will be invited to participate. The companies will suggest who will attend the study tour and the coordinator with the Steering Committee will final approve each application according to rigorous criteria such as the qualifications and the technical background of the representatives, or the level in the hierarchy of the company. Priority will be given to candidates at positions having the potential to promote the technology within their company. In total, a group of around 10-12 people are expected to participate in the study tour.</p> <p>Project activities comprise:</p> <ul style="list-style-type: none"> Organisation of national training workshops addressed to the sugar industry; Assessment of the workshops and formulation of a short-list of sugar plants with real potential; Organisation of the study tour. <p>Expected Results Widespread knowledge of the polygeneration technology with the use of energy crops in the sugar industry. Understanding of the limitations for its application</p> <p>Milestones and Deliverables Four training workshops (one in each participating country)/ at least 20 key-players of the sugar industry in each country (D5-D8). Study tour (10-12 participants from the sugar sector of all participating countries) (D9)</p> <p>Performance indicators At least 80 staff from sugar plants trained in the application of polygeneration in the sector</p>		

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WP4 Elaboration of pre-feasibility studies

WP title: Elaboration of pre-feasibility studies		WP 4
Starting date: Month 10	Duration: 6	
Partners involved	Role / Responsibilities	Person-months
ETA	WP coordination. Technical support to carrying out the pre-feasibility studies. Review and editing	2.5
EXERGIA	Validation of the methodology. Preparation of the pre-feasibility studies for Greece.	2.5
EC-BREC, KSC,BAFF	Preparation of the pre-feasibility studies for the respective country.	6.5
Inputs List of sugar plants with real potential for polygeneration applications with the use of energy crops.		
Objectives		
<ul style="list-style-type: none"> To demonstrate that polygeneration with the use of energy crops (sugar beet or sweet sorghum) is a viable investment in technical and economic terms; To prove the applicability of the technology in different technical and socioeconomic environments; To promote polygeneration among sugar plant operators using market terms. 		
Description of work		
At least 4 pre-feasibility studies regarding polygeneration with the use of energy crops will be carried out, one in each of the participating countries. The prefeasibility studies will be carried out by the respective project partners in each country and will address investments in the whole production chain (raw material production, harvesting, delivery to the plant, treatment, sugar production, storage and marketing) of the sugar plants with real application potential, as identified in the previous WP.		
The studies will be supported by ETA, which has demonstrable expertise in the application of polygeneration in the sugar industry, including knowledge dissemination during a symposium in Hungary, and who have significant experience in the technical and economic aspects related to such investments.		
Among the issues that will be examined are the following:		
<ul style="list-style-type: none"> Utilisation of different energy crops in existing plants (i.e. sweet sorghum) Utilisation in new, purpose-built facilities Handling/processing requirements (biomass and wastes logistics) Optimisation among competing products Environmental issues Control and integration issues 		
The sustainability of the projects will be assessed using the key sustainability factors listed below:		
<ul style="list-style-type: none"> policy support and co-ordination; economic and financial sustainability; technical sustainability; institutional and management sustainability; environmental sustainability. 		
The project team will also assess the project risks, including implementation risks (obtaining consents, permits, and other agreements necessary for financial closure), technical risks (limitations in local technical capacity, construction delays, etc.) and project environment risks (risks that arise from the economic and regulatory or legal factors).		
The following activities are foreseen:		
<ul style="list-style-type: none"> Selection of sugar plants to base the studies; 		

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WP4 Elaboration of pre-feasibility studies

- Preparation and circulation of guidelines for the studies, focusing on addressing the technical issues;
- Carrying out of the studies;
- Review and editing;

Expected Results

4 pre-feasibility studies proving the attractiveness of polygeneration investments in sugar industry.
Increased interest on behalf of sugar plant operators.

Milestones and Deliverables

4 Pre-feasibility study reports at month 14 (D10-D14)
Publishable summary on the results of the pre-feasibility studies (D15).

Performance indicators

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Contents of pre-feasibility study

General data for the Project

project site; agency in charge of implementation; background and purpose; outline of project (name-max output); expected results and beneficiaries; budget; project implementation team; contact details, etc.

Existing technology status and Description of new technology employed (boilers,, fermentation installations etc.)

What is the energy profile (heat and mass balance, for sugar and its by-products)? What is the steam and electricity consumption? Estimation of the cogeneration of heat and power possibilities.

Potential for Polygeneration with the use of energy crops

What kinds of energy crops and in which amounts (in ton/year and in GJ) are currently used?

Is there anymore supply of the current energy crops possible, or is the (local/ regional) supply already fully used?

Costs of energy crops compared to conventional (i.e. sugar beet).

Costs of implementation, logistics, handling and/or processing (rough first estimate appropriate to a pre-feasibility study) .

CO2 reductions (ton/year).

Key decision factors

Analysis of key factors for implementation:

Economic and financial appraisal (viability indices: NPV, IRR, DPB, BCR, return of investments, etc.)

Technical sustainability & product quality

Environmental/ecological sustainability

Institutional and management effects (including health & safety)

Analysis of risks (including non-technical barriers) and opportunities.

Conclusions

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WP5 Consolidation of results and recommendations

WP title: Consolidation of results and recommendations on sugar industry reform		WP 5
Starting date: Month 16	Duration: 3	
Partners involved	Role / Responsibilities	Person-months
EXERGIA (coordinator)	WP coordinator. Development of recommendations	4
ETA, EC-BREC, KSC, BAFF	Support to the development of recommendations	8.5
<p>Inputs Results of all previous WPs, and specifically of the sectoral and technology update and of the pre-feasibility studies</p> <p>Objectives</p> <ul style="list-style-type: none"> To elaborate on the results and reach overall project conclusions; To develop recommendations for the European sugar industry with relation to the application of polygeneration using energy crops (sugar beet and sweet sorghum in particular) To provide a roadmap for the application of polygeneration in those sugar plants where such technology is sustainable (economically and environmentally) <p>Description of work</p> <p>The results of the previous WPs will be consolidated here and contribute towards the development of recommendations addressed to the European sugar industry. The major responsibility for the development of the recommendations lies with the coordinator while the rest of the partners will contribute to finetuning recommendations to fit to different national environments.</p> <p>These recommendations will be relevant to the introduction of the polygeneration concept with the integration of sweet sorghum in the raw materials. Specifically, they are expected to comprise such issues as the technological preconditions affecting the applicability of the use of sweet sorghum in specific sugar plants, technological preconditions for the applicability of polygeneration, the required process modifications, the anticipated changes in the production and supply of raw materials, as well as the feasibility of such changes for a number of different scenario, the costs related to the necessary changes and preconditions for the economic sustainability of the reform and the preconditions for the environmental sustainability of the reform.</p> <p>The recommendations will comprise a generic assessment whether a specific plant is suitable for such a reform, and will provide a roadmap for the implementation of the necessary actions, where applicable, and contacts for further help. They will be submitted to the sugar industry, individual sugar plants and the CEFS, for review and comments prior to final release.</p> <p>The following activities are foreseen:</p> <ul style="list-style-type: none"> Consolidation and evaluation of project results Development of recommendations for sugar industry reform Consultation with sugar industry Release of elaborated recommendations <p>Expected Results Project results are elaborated and appropriate to draw broader conclusions. Recommendation for sugar industry are developed, reviewed by the industry and become available to individual plants.</p> <p>Milestones and Deliverables WP Report: Consolidated project results and conclusions drawn (D15) Recommendations for the introduction of polygeneration based on energy crops to sugar industry (D16)</p> <p>Performance indicators At least 20 sugar industry representatives take part in the consultation process and provide comments towards the finetuning of recommendations</p>		

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WP6 Dissemination

WP title: Dissemination		WP 6
Starting date: Month: 2	Duration: 18	
Partners involved	Role / Responsibilities	Person-months
EXERGIA (coordinator)	Design, preparation and participation in dissemination activities	8
ETA, EC-BREC, KSC, BAFF	Preparation and participation in dissemination activities at national level	10
<p>Inputs Prefeasibility studies for the application of polygeneration with the use of energy crops in selected sugar plants. Contacts with the sugar industry in the participating countries</p> <p>Objectives</p> <ul style="list-style-type: none"> To make project results available to a wider audience related to the European sugar industry; To instigate investments on polygeneration with the use of energy crops; To disseminate existing experience with the application of polygeneration; <p>Description of work The WP activities are the following:</p> <p><i>The project website:</i> the development and maintenance of the project website is foreseen as a means for communication, as well as a vehicle for the presentation of collected data, case studies, events and project results. Attention will be paid to the examination of its effectiveness in relation to its accessibility (good linking and internal map/directory), its visual appeal; and ultimately the provision of information.</p> <p>The project internet site will be established within the first 2 months of the start of the project and will be regularly updated. After the end of the project the national associations of the sugar industry could be responsible for the maintenance of the site.</p> <p><i>Information brochure:</i> This is a major publicity and information dissemination tool that will receive wide distribution across conferences and public meetings in order to reach the largest possible number of stakeholders and interested parties of the sugar industry. Its content will be based on the publishable summary of WP4 and technology related information.</p> <p><i>Technology implementation guide:</i> Technology-related information, as well as data regarding the applicability of the technology in sugar plants will be used for the development of a guide in CDs, which will be disseminated by the Consortium in collaboration with sugar industry associations to the sugar industry community in Europe.</p> <p><i>Networking:</i> Transfer of know-how on technologies, implementation and financing methods is still in high demand in Europe, in respect to the wide-scale implementation of RTD results and technologies. The establishment of networking at national and international level will support the transfer of best-practice methods on promoting and financing this polygeneration technology in the sugar industry.</p> <p><i>Final workshop:</i> The final workshop will be organised in Brussels or another suitable location towards the end of the project. The workshop will be addressed to the full spectrum of stakeholders from all countries and will focus on the cooperation opportunities in polygeneration with the use of energy crops in the sugar industry.</p> <p>Expected Results European sugar industry becomes aware of the polygeneration with the use of energy crops, its applicability in sugar plants, its limitations and the overall technical and economic aspects of implementation.</p> <p>Milestones and Deliverables WEB site (D15) Information brochure in English language (2000 copies) (D16) Technology implementation guide (500 CDs) (D17) Final workshop (up to 50 participants) (D18)</p>		

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Deliverables list

Deliverable No ⁹	Deliverable title	Delivery date ¹⁰	Nature ¹¹	Dissemination level ¹²
D1-D3	Project Reports	Month 6, Month 12, Month 18	R	PU
D4	WP Report: Overview of the sugar sector in the participating countries	Month 4	R	PU
D5-D8	National workshops (one in each participating country)/ at least 20 key-players in each country.	Month 7-8	O	RE
D9	Study tour (UK, Italy or other country as appropriate); 10-12 participants from all participating countries	Month 9	O	RE
D10-D13	Pre-feasibility study reports in English	Month 14	R	PU
D14	Publishable summary of the Pre-feasibility study reports in English	Month 15	R	PU
D15	WP Report: Consolidated project results and conclusions drawn	Month 17	R	RE
D16	Recommendations for the introduction of polygeneration based on energy crops to sugar industry	Month 18	R	PU
D17	Project WEB site	Month 2	D	PU
D18	Information brochure in English language (2000 copies)	Month 17	D	PU
D19	Technology implementation guide (500 CDs)	Month 15	D	PU
D20	Final workshop (up to 50 participants)	Month 18	O	RE

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RESIPE

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SIXTH FRAMEWORK PROGRAMME

An initiative of 5 EU organisations

RESIPE is a co-financed project by the European Commission through the Sixth Framework Programme (2002-2006) for research, technological development and demonstration (RTD). A consortium of 5 partners from Northern, Central Europe and Mediterranean countries proposed to overhaul the EU sugar sector and contribute to the reform of the European sugar industry assigning them the role of supplier of low-cost heat and electricity via cogeneration and bioethanol for the transport sector as well as other valuable materials, using polygeneration technology.

► More Information

► **Sugar Platform Biorefineries**

Fostering the use of agricultural biomass to reduce the dependence from fossil fuels, R&D community made efforts for developing the technological concept of biorefinery. A biorefinery facility integrates biomass conversion processes and equipment to produce biofuels, power, and value-added chemicals from biomass.

Industries converting lignocellulosic

► **Partners Area**

The RESIPE partners area.

► Click here to enter

► **Latest News**

7th February, 2008
1st RESIPE workshop in Verona, Italy.

► More Information

8th October, 2007
RESIPE kick-off meeting in Athens.

► More Information

www.re-si-pe.com/...

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Thank You

Niki Komioti
EXERGIA S.A.
Energy & Environment Consultants

Apollon Tower, 64, Louise Riencourt St., Postal code: 11523 Athens, GREECE

tel:+30 210 6996185, fax:+30 210 6996186,

Internet homepage: www.exergia.gr

Niki Komioti, Energy Technology Dept. Director

mobile: +30 6944944810 email: n.komioti@exergia.gr, skype: n.komioti

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