

RENEWABLE ENERGIES

1. Industrialisation of low-cost bioclimatic housing

- **Description:** The magnitude of the serious environmental problems, and the fragile equilibrium between the needs of today's techno-industrial society and our ecosystem, have shown the need to reduce energy consumption in our cities and thus mitigate its environmental consequences.

In the building sector, a drastic reduction in energy consumption in the housing stock has become essential and cannot be put off. In this regard, we encounter important obstacles –economic, technological and social- which until now have prevented the generalised application of energy efficiency and saving strategies in buildings.

Based on the above, the objectives pursued by the project are: to foster an innovative technological development that allows for the construction of **low-cost bioclimatic housing via the industrialisation** of its components.

This project includes three parallel research lines, which are conceptually different but which complement each other enough to optimally attain the project objectives.

These research lines are:

- **Bioclimatic Façades.** Research and development of a technology that can be fulfilled by the optimised development of an industrialised façade that is both low-cost and has an exceptional bioclimatic performance. The expected result is one or more optimised prototypes of these elements, both from the energy efficiency viewpoint in all its aspects (thermal performance, lifecycle analysis of its components, possibility of re-use and recycling, etc.) and from the costs viewpoint.

- **Energy roofs.** This research line proposes the development of the roof capacity of buildings to convert them into energy supports that integrate different systems aimed at generating, storing and/or distributing energy. The expected result is the development of an industrialised energy roofing system.
- **Energy systems.** The objective of this sub-project is to achieve optimised developments of efficient and low-cost systems, integrated into the building enclosure, to generate and distribute both renewable and traditional energy.

The results of these work lines will be defined in the construction of a low-cost bioclimatic building, with industrialised construction, which will be monitored in order to verify the degree of accomplishment of the initial objectives.

- **Participants:**

- University Groups: 2. Public University of Navarra. (Group of Mechanical, Applied and Computational engineering) and University of Navarra. (School of Architecture of the University of Navarra).

- Technological Centres and Foundations: 2. National Renewable Energies Centre (CENER) (leader), Centre of Environmental Resources of Navarra.

- Companies: 6. Miyabi, Construcciones ACR, S.A, Acciona Solar, AH (Alonso Hernández & Asociados arquitectos), Abaigar, and Rockwool.

- TOTAL: 10.

- **Project Time:** 01/09/2007 until 30/08/2010

- **Total Budget:** 3,082,600 €

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2. Bioethanol from forest waste

- **Description:**

The BIOETHANOL project aims to develop a biological alternative to the thermochemical pretreatment of lignocellulose waste used in bioethanol production.

The production of bioethanol based on lignocellulose material (second generation biofuel production) requires a thermochemical treatment of the feedstock in order to break it down, altering the lignin and changing the crystalline cellulose to amorphous cellulose. This thermochemical treatment requires energy consumption and the use of contaminating products that will later have to be eliminated with the subsequent increase in price of the process.

This project seeks to use the capacity of white rot to selectively degrade lignin to make the cellulose accessible to the subsequent enzymatic treatment.

The objective of the project is to replace the enzymatic treatment, or at least significantly reduce it so that biotreatment becomes a feasible alternative from the economic viewpoint.

- **Participants:**

- University Groups: 1. Public University of Navarra. (Group of Genetics and Microbiology Research) (leader).
- Technological Centres and Foundations: 1. National Renewable Energies Centre (CENER)

- Companies: 3. Acciona Biocombustibles,
Bioterna, Gurelan S. Coop.



-TOTAL: 5

- **Project Time:** 01/09/2007 until 30/08/2010
- **Total Budget:** 1,295,100 €

3. Study of short rotation woody crops to exploit the energy potential of biomass.

• **Description:** As a general objective of the project we can mention the search for a possible feasible alternative to the use of farming land in Navarra and guarantee supply to the Energy Industries

The following specific objectives will be pursued:

- Determine the agronomic and economic feasibility of poplar cultivation to produce biomass in Navarra. This would not refer to traditional poplar cultivation, but to an application designed purely to generate biomass from poplar plants.
- Determine the energy characteristics of short rotation woody crops selected in the project for energy production.
- Reconcile maximum production with minimum environmental impact, especially from the nitrogen viewpoint.
- Develop a logistic plan that will help make short-cycle forest crops feasible for use in the energy sector, optimising costs and yield.
- Determine optimal processes and systems for the production and logistics of these crops, developing new mechanical equipment.
- Perform tests with the forest processing equipment that exists on the market and that can be adapted to the short-cycle crop process.

The tasks to be carried out in the project with a view to accomplishing the objectives set out are grouped into the following project phases:

PHASE 1

Assessment of the production potential and determination of suitable areas for its production in Navarra.

PHASE 2

Production of biomass for energy based on SRC

2.1. Study of alternatives for the sustainable management of SRC

2.2. Field demonstration tests

PHASE 3

SRC Biomass Logistics.

PHASE 4

Energy characterisation of SRC biomass

- **Participants:**

- University Groups: 1. Public University of Navarra. (Research Group of Plant Physiology and Agrobiotechnology).

- Technological Centres and Foundations: 2. National Renewable Energies Centre (CENER) and Fundagro-UAGN (leader).

- Companies: 3. Innovación verde inver, S.L., Bosqalia, S.L., Acciona

- TOTAL: 6

- **Project Time:** 01/09/2007 until 31/12/2010

- **Total Budget:** 855,400 €