



Gobierno
de Navarra

BIOCLUS – Developing Research and Innovation Environment in five European Regions in the field of Sustainable Use of Biomass Sources

Navarra

Project 245438



Model for sharing RTD facilities

Navarra

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1. Model for Sharing 2nd Generation Biofuel Centre in Navarra

In the following section, the model behalf of the region of Navarra is presented. This is a draft version and could be modified during the next weeks. However, this is a first step, and at the same time a template that other regions must use in order to complete each regional sharing RTD Model.

1.1. General Information

By clicking on the title “**Second Generation Biofuel Centre**”, general information related to the facility is presented. This information will be useful in order to know the type of the RTD facility, what is the use of this facility, and will help the user to know his/her interest in the facility.

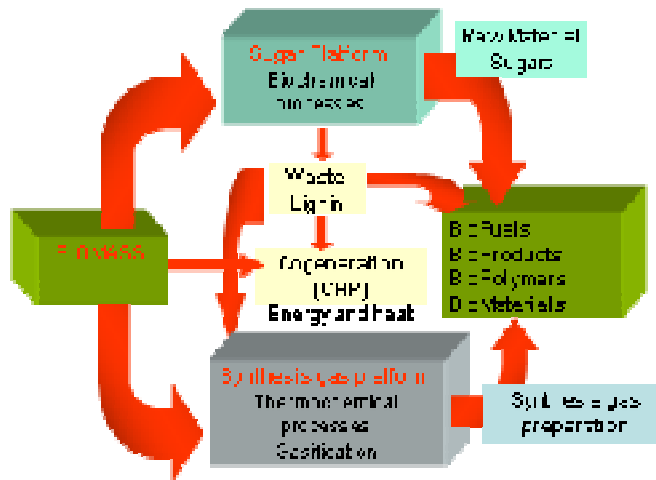
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|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of research facility, environment or equipment | Second Generation Biofuel Centre |
| Keywords | Biofuels, Biomass, Lignocelluloses, Enzymatic hydrolysis, Fermentation, Bioethanol |
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| Description of the research facility, environment or equipment | <p>The general objective of the 2nd Generation Biofuel Centre of Navarra is to constitute a Process Development Unit (PDU) to produce 2nd generation biofuels on a pilot scale level as an intermediate step towards the industrial scale-up of these technologies and as a biorefinery test platform.</p> <p>The PDU considers a complete range of alternatives, which permit the integration of both conversion routes (thermochemical and biochemical) and the development of biorefinery concepts aimed at an integral use of the biomass and by-products generated in each one of the processes.</p> |



It will provide the opportunity to use:

- different biomasses (both herbaceous and woody biomasses),
- different pre-treatments and
- transformation processes (by both the thermochemical and biochemical pathways) and
- with the capacity for the production of different BTLs.

Main research topics where equipment is used



Expert knowledge includes:

- Biomass (wood & herbaceous) handling and physical pre-treatment
- Advanced thermo-chemical pre-treatment (Torrefaction)
- Vegetable cell wall deconstruction technologies
- Enzymatic Hydrolysis
- Aerobic & anaerobic fermentation
- Product fractionation

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| <p>Special features of the equipment</p> | <p>Distinguishing feature:</p> <ul style="list-style-type: none"> ○ Integral development of 2nd generation biofuels production processes by both Thermo-chemical & Biochemical routes. ○ The possibility of processing all types of biomasses. ○ A wide range of 2nd generation biofuels of interest. ○ The constitution of a test platform for biorefinery processes. |
| <p>Techniques and application</p> | <ul style="list-style-type: none"> ○ Biomass and biofuels characterization ○ Bioenergy (2nd generation biofuels: cellulose based bio ethanol): Lignocellulosic biomass pre-treatments, enzymatic hydrolysis, fermentation, separation & fractionation techniques... Able to produce other oxygenated biofuels. ○ Fermentation for bio-based building blocks production (succinic acid, lactic acid, butanol...) ○ Other Bioenergy conversion routes: Biomass thermo-chemical conversion processes |
| <p>Standard(s) used for measurements</p> | <p>To be completed</p> |
| <p>Selected R&D references</p> | <p>To be completed</p> |
| <p>Access Policy</p> | <p>The 2nd generation Biofuels Centre has a clear vocation to be open and at the disposal of the scientific and enterprise community, proposing a high availability for this access to both public and private organizations.</p> <p>CENER has a Business Development Department in charge of offering services and installations to interested 3rd parties. In case of interest in any of the services and/or techniques, each case would be analyzed and quoted separately.</p> |

1.2. Detailed Information

In this section more detailed information will be included. This is information more related to the parameters related to the facility: ie: amounts, sizes, capacity, etc...

The information proposed here is the one more adequate for the CB2G of Navarra. However, if there are not useful parameters in this section for your facility or you need any other, this section can be modified depending on the characteristics of the facility to be presented.

| PRE-TREATMENT UNIT | | |
|-------------------------------|----------------------------------------|----------|
| Woody Biomass Gridding | | |
| Feeding rate capacity | 500 kg/h | |
| Material | Woody biomass | |
| Moisture content | 10 – 55% | |
| Feeding material size | Diameter < 150 mm. Length < 2500 mm | 2200 Kg |
| Straw Chopping | | |
| Feeding rate capacity | 500 kg/h | |
| Material | Herbaceous biomass | |
| Moisture content | < 30% (possible until 60%) | |
| Feeding material size | 1110 mm x 1900 mm diameter | 3000 Kg |
| Drying | | |
| Feeding rate capacity | 500 kg/h | |
| Material | Woody and herbaceous biomass | |
| Moisture content | all | |
| Feeding material size | 500x600 mm | 2500 Kg |
| Evaporation capacity | 800 kg/h water at 800°C | |
| Hammer Milling | | |
| Feeding rate capacity | 500 kg/h | |
| Material | Woody and herbaceous biomass | |
| Moisture content | < 19 % | <10% fat |
| Particle size | 1-65 mm | 600 kg |
| Disc Milling | | |
| Feeding rate capacity | 500 kg/h | |
| Material | Woody and herbaceous biomass | |
| Moisture content | < 19 % | |
| Particle size | From the hammer milling | 291 Kg |
| Pelletizing | | |
| Feeding rate capacity | 500 kg/h | |
| Material | Woody and herbaceous biomass | |
| Moisture content | 12 – 15 % | |
| Particle size | < 6 mm | 1250 kg |

| TORREFACTION UNIT | | |
|------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Biomass Feeding System data | | |
| Feeding rate capacity | 0.75 - 5 m ³ /h | |
| Hopper capacity | 4,2 m ³ | |
| Hopper | Kept under suction with an integrated bag filter to minimize dust emission. | |
| Hopper discharge | Moving floor conveyor | |
| Torrefaction reactor data | | |
| Capacity | 500 kg / h (wood chips) | |
| Working temperature | <300 °C | |
| Working pressure | <5 bar | |
| Type reactor | Rotary | With internal elements designed specifically for this application. |
| Heating of the reactor | Carried out indirectly through the wall, the shaft and the reactor internals using thermal fluid. | |
| Thermal oxidizer | | |
| Vapours generated | Oxidized before being emitted to atmosphere | |
| Exhaust gases temperature | 850-950 °C | |

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| Residence time | >2 seconds | |
| Addition of secondary air | Controlled by lambda probe | |
| Torrefied biomass is cooled in a cooling screw | | |
| Cooling liquid | Water | |
| Water temperature | < 40°C | |
| Biomass temperature at exit | <100 °C | |
| Cooling system | Air-cooler | |
| Thermal fluid circuit | | |
| Boiler capacity | 600 KW | |
| Thermal fluid temperature | <300 °C | |
| Torrefactor cooling system | air-cooler | |

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|---------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------|
| GASIFICATION UNIT | | |
| Process data | | |
| Reactor type | Bubbling fluidized bed | |
| Nominal power | 2 MWt | |
| Minimum power | 60% nominal | |
| Operating pressure | 0,3 barg | |
| Bed temperature | 650-950°C | |
| Freeboard temperature | 700-1000°C | |
| Operating modes | Air gasification Steam-oxygen gasification | O2/biomass ratio <0,6 kg/kg daf Steam/biomass ratio <1,2 kg/kg daf |
| Biomass: widest range | | |
| Bulk density | 80-800 kg/m3 | |
| Moisture | <20% | |
| Size | < 30 mm | |
| Volatiles | 68-87% daf | |
| Ash | < 13% dry basis | |
| LHV | 16,1-20,6Mj/kg | |
| Inertization and purge gas CO2 | | |

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| THERMOCHEMICAL UNIT | | |
| To be completed by CENER. Not available data at the moment. | | |
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1.3. Sheets to be completed for good cooperation and sharing

The company, university, research centre, that would like to use the 2nd Generation Biofuel Centre is kindly requested to contact the contact person, and to fill in the sheets presented in section 2.4.3 with the information requested via email.

The contact person will contact you as soon as possible with further information for the collaboration.

1.4. Facility Sharing Agreement Model

There has not been presented an obligatory Facility Sharing Agreement model for easier collaboration. If needed, some examples of agreement models are shown in section 2.3.4.