Energy Conversion Park (ECP) Interreg project, 2010 - 2013

A biomass energy conversion park (ECP) is defined as a synergetic multi-dimensional biomass conversion site with a highly integrated set of conversion technologies in which a multitude of regionally available biomass (residue) sources are converted into energy and materials. It will increase energy efficiency and improve profitability so biomass can compete better with fossil sources.

5 partners from Belgium and the Netherlands have developed ‘proof of principle’ business cases for 5 cases in the region.

1 Results of the Energy Conversion Park project

Conclusions & Recommendations

- Simple models make possible to optimize integrated processing of waste biomass resources.
- Integration of different biomass processing steps leads to improved product and energy output, better economic performance, and better CO2 emission reduction and sustainability.
- Process integration increases the economic possibilities to use low-value biomass waste streams.
- Combined biomass processing facilities make it easier to respond to seasonal variability in supply and demand.

Public Products & Information

- Simple models and tools to assess and optimize energetic and economic optimisation of possible process integration configurations.
- Webbased knowledge system to disseminate experience gained when developing such optimised biomass procurement plants (accessible through www.ecp-biomass.eu – main information in Dutch)
- 5 case studies for real business models in Flanders and the Netherlands: Breda, Moerdijk, Lommel, Beverse-Merksplas, Sluiskil.
- Papers, posters and publications, in English (accessible through www.bio-based.nl → projects → ECP project)

Fig 1 ECP cases for which business cases have been developed with their main resources area (local low value biomass streams)

ECCE Den Haag April 21 -24, 2013
2 Process Integration example: case ECP Moerdijk

Of the 5 cases for which business models have been made: Moerdijk is a good example to show how an actual and economic feasible business case would look like thanks to extensive process integration and bio-cascading.

- Innovative aspects are the integrated processing of low grade biomass leading to higher value products and at the same time maximal use of the available resources.
- The more expensive technologies: grass refining, pyrolysis and biogas upgrading, are made economically more feasible through the use of ‘cheap’ heat and materials produced by the other processes.

![Diagram of biomass processing](image)

Fig. 2 proposed set-up for the ECP Moerdijk

(heat integration options are shown only partially)
### Sustainability

- Optimal and better use of low valued regional resources is possible.
- ‘2nd generation’ biofuels because of use of real waste streams, no ‘ILUC’.
- Reduction of import of biomass for ‘renewable energy’ requirements through novel technology options using local biomass for biobased chemistry and materials.
- Energy and resources available for further fossil C reduction through biocascading

→ **Extra options for fossil C replacement**

### Effect of input and output variations

- The IRR is hardly influenced by variations of grass input, the energy efficiency somewhat more.
- It implies that the ‘extra’ profit from extracting proteins just balances the extra costs involved.

The profitability is enhanced through use of so-called ‘biotickets’ which are Dutch tradable certificates to comply with biofuel requirements

→ **The basic principle of the ECP, a multidimensional approach and strong process integration, seems to work.**

**Profitability is higher and fluctuations in supply, demand and prices are being dampened out.**
Further development options

- Coupling the ECP to the industrial heat exchange network presently under development on the site
- Greenhouses development close to the site, offers extra sources of biomass and an extra outlet for CO2
- Chemical industry on site and in the surrounding region is developing biobased chemistry

⇒ an ECP will form a focal point and platform for further 'biobased industrial development'

Project references


Conference papers
- ORBIT2012, Rennes, June 2012
- Pelkmans L. et al, ‘Valorisation of biomass waste streams in local energy conversion parks’
- 8th International Conference on Renewable Resources and Biorefineries RBB8 Toulouse 2012
- Pieper, H. et al, ‘A techno-economical evaluation of a biomass energy conversion park’
- 20th European Biomass Conference & Exhibition, Milano, 18-22 June 2012
- Guisson, R., ‘BioEnergy Conversion Park in the province of Limburg (Belgium), An economic viability check of a biomass utilization concept for BioEnergy’
- Marquez Luzardo, N. et al, ‘Biomass Based Energy Conversion Parks: A multidimensional approach for efficient use of biomass’
- CHISA Prague, August 2012
- Márquez Luzardo, N., Venselaar, J., ‘Biobased targeted chemical engineering education, role and impact of biobased energy and resource development projects’

Project websites

- www.ecp-biomass.eu (main information in Dutch)
- papers and documents directly through: www.bio-based.nl → projects → ECP project

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