Evaluation Biopark Terneuzen

Innovation strategy: Vital Clusters
Project period: May 2006 – September 2008 (final report received on January 20, 2009)
Project director: Peter Smeets
Project number: VC-029

1. Background to the project

Agroparks offer great opportunities to realise substantial sustainability gain due to their spatial clustering, closing cycles of energy and matter and reduction of transport. They apply principles of industrial ecology. Co-operation between greenhouse farming and agro-processing industry (ethanol- and fertiliser production, manure processing) is the opportunity that is taken in the port area of Terneuzen.

The aim of Biopark Terneuzen is to establish connections between activities of existing and new agro-industrial companies in Terneuzen Port area, in order to increase employment, attract new business, decrease environmental emissions and increase companies profits, all of which shoul take form as an integrated agropark.
By doing so Biopark Terneuzen addresses more general issues that contribute to sustainable development of agriculture:

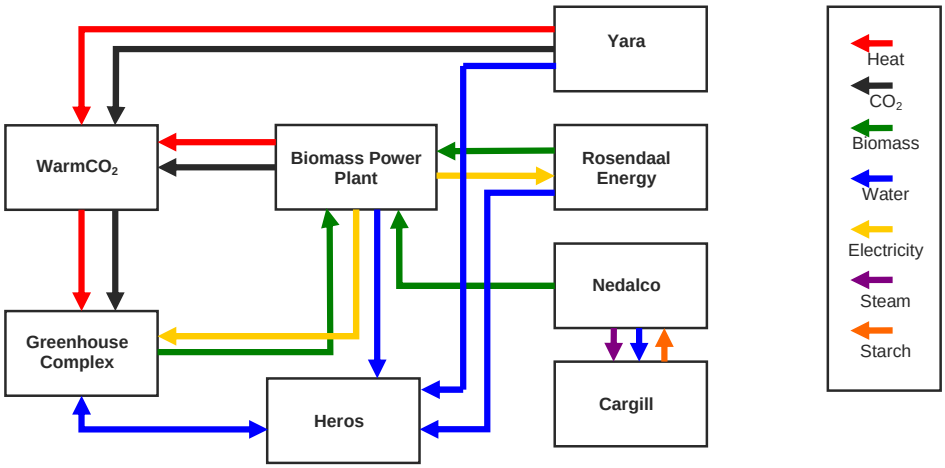
- Efficient space use to develop new greenhouses, which are able to process CO_2 from other industries.
- Processing rest products of arable chains, that until now have been handles as waste
- Processing pig manure from an expanding pig growing industry in the Zeeland hinterland
- Producing dry organic manure that can be applied during spring in order to reduce field losses
- Producing biodiesel and bio-ethanol from agricultural waste.

2. Key knowledge issues

TransForum has supported the feasibility study of the above described ambition. Not only in technical terms but also in organisational and communicative terms.

Technical and economic aspects of feasibility have been inquired by scientific institutes covering following aspects:

- Greenhouse horticulture, energy and CO_2
  - Can CO_2 from fertiliser and bio-ethanol producing industries be used in green-houses. Are amounts produced sufficient?
  - Do the processing industries produce sufficient heat for greenhouses?
  - What back-up systems are needed?
- Water management
  - Is it possible to use any processing water from industry for irrigation in greenhouses?
  - Redesign of general water management on basis of new water purification plant
- Biomass
  - What existing flows of biomass can be applied in the new co-digestor
  - How can digestate be used as organic fertiliser or as fuel in bio-energy installations



Organisational aspects of present and future co-operation have been discussed, resulting in concrete agreements on co-operation, of which many have been fixed in contracts and new companies.

Project participants were Zeeland Seaports, Ecoservice Europe Ltd, Nedalco, Yara, the Municipalities of Terneuzen and Gent, the Provinces of Zeeland and Vlaanderen (Belgium), TransForum, ZLTO, the Universities of Amsterdam, Nijmegen and Wageningen, Kortrijk College, Meersma Project Development and Van de Bunt Adviseurs.

Cultural differences between all these participants were many. They have been identified during the working process but have not been described in a scientific publication.

3. Project outcome

The general outcome of the project is the network of participating companies that have established or are implementing a more sustainable practice as a result of co-operation inspired by principles of clustering an industrial ecology. This is an ongoing process. Most recently the participating parties have successfully applied for a Eu-regio subsidised project aimed at building a bio-refinery pilot plant and connected to that a new polytechnic training course for process engineers, based on a co-operation between Zeeland Polytechnic and University of Ghent.

Specific outcomes of the TransForum project were following:
1. General hardware design of the project based on detailed feasibility studies
Based on studies as mentioned above (Greenhouse horticulture, energy and CO_2, Water management Biomass) the physical lay out of industrial ecology network has been integrally designed and is being implemented. A 200 ha area for greenhouse growing has been assigned and is being implemented.

2. Relevant Orgware-issues have been identified, discussed and many of them solved.
Basic agreements between partners regarding share of power, revenues and costs were easy to reach during the design phase (this project) under the inspiring and efficient leadership of Zeeland Seaports and the process management of Van de Bunt. Organisational and juridical structures (loose network structures, daughter companies, alliances) between parties have been implemented to cope with these issues during operation. Biopark Terneuzen itself has now been established as a foundation between four public parties and one member of the board representing the participating companies. Two separate companies (WarmCo en WaterCO) have been established for management of heat, water and CO_2).

3. Ambition strategy

During the project, the co-operating parties have extensively discussed three alternative levels of ambition: (i) establish industrial ecology between existing industries; (ii) create an image of Biopark Terneuzen as an important cluster in biobased economy; (iii) establish co-operation with Ghent Bio-Energy Valley and create an image of the whole Canal Zone Ghent Terneuzen as the number 1 European cetre for biobased economy. The choices were to go for the highest ambition level. The award of the Euregio-subsidy is an important step confirming this choice and implementing it.

4. Significance of the project for TransForum

Being implemented as an agropark with primary production of flowers and food, allocated in the industrial ecological setting of an agro-chemical production site, Biopark Terneuzen will be the first operating example of Metropolitan Agriculture in the Netherlands.
The process of Shared Value Development consists of three stages (1) Shared Value Proposition (2) Shared Value Creation (3) Shared Value Capturing. Whereas most innovative practice projects remain at the Shared Value Creation stage, this project has reached the second stage of Shared Value Development in its implementation and it is well under way towards and has the orgware in place for the phase of Shared Value Capturing.. The (expanding) network is a promising example of a structural relationship between knowledge institutes, enterprises and governmental organisations. Non governmental organisations have explicitly declared their consent. In this sense a fully developed KENGi network is functioning.
The award of the Euregio subsidy enables the creation of an innovative knowledge infrastructure, specifically aimed at industrial ecology of bio-economy processes, which guarantees the continuity of the TransForum project.

5. Learning experiences

The learning experiences made in the project are numerous and varied. The most important are:

1. *Finding a motivated project leader who can activities as figure head is crucial*

This is not a role that knowledge institutes or consultants should play. The project leader should have a number of key qualifications: The project's objective should be within the domain and responsibility of the project leader. The project leader should have the perseverance to be able to realise the project. It should have authority among the other participating parties. Zeeland Seaports took this role in Biopark Terneuzen successfully.

2. *Identifying a short term objective and organising the necessary support.*

During the first phases of the design, when opportunities and potential revenues are out of sight but the many uncertainties and risks very evident, the readiness to invest is very limited, especially from entrepreneurs. Especially in that phase the support of an organisation like TransForum has proven to be of great importance, not only with subsidy but also with its experience and knowledge. Formulating the TransForum project was the first attractive goal that brought parties together.

3. Creating support on content

Participation in a cluster should deliver direct material and economic gains. New opportunities to deliver products, new suppliers, new qualities. This perspective is created by engineers and economists. Immaterial objectives of clustering, such as new employment, a new network, co-design are important but rank second. Core of this project have been meetings that brought together engineers and economists and that lead to immediate business deals. These deals are the pushing power behind Biopark Terneuzen.I

4. *Knowledge workers have difficulties to connect to practice problems of entrepreneurs. Entrepreneurs have difficulties in formulating scientifically relevant questions.*

Many of the questions that were raised by entrepreneurs and governmental organisations appeared to be more easily solvable by engineering firms and consultants than by knowledge institutes, which differ in their ability to cope with this. In the co-design process of projects like Biopark Terneuzen this asks for permanent attention from the project management. Moreover, formulating the political and practical consequence of the scientific output is not a task for the knowledge institutes alone.

5. Branding Biopark Terneuzen

Branding the project proved to be very important to communicate on it and to give the opportunity for people and organisations to connect. Putting the brand in publicity should be done while attracting attention of media and broad public. This publicity resulted immediately in more companies taking part in Biopark Terneuzen.

6. Keep crucial fundamentals

During the project serious reverses can occur or specific developments can come under pressure. Fundamentals of the concept (i.e. spatial clustering, applying industrial ecology) should than not be abandoned. In Biopark Terneuzen, this occurred when the first group of invited Dutch Greenhouse entrepreneurs set as precondition to be allowed to generate their own power (a practice very common in Dutch greenhouse farming). This would have implied that one fundamental: delivering power, heat and CO_2 form industry to greenhouses would have been abandoned. Zeeland Seaport however decided to formulate the taking of these industrial generated products as a precondition for greenhouse settlement and than went to acquire successfully for Belgian growers.

7. The Belgian connection

During project development contacts between Biopark Terneuzen and Ghent Bio-Energy Valley have developed very fruitful, in the end resulting in the common project to develop a joint pilot plant and an international knowledge infrastructure. The lesson learned here is that initial boundaries and limitations to the project should never be maintained dogmatically and eventually be redefined if the environment of the project changes or opportunities arise. Co-design is management of uncertainties.

6. Conclusions

The project clearly contributes towards TransForum's vision and approach. It will be the first operating agropark in the Netherlands, which has been truly designed on the basis of industrial ecological principles. The substantive project results have been attained. Moreover, on the basis of TransForum Biopark Terneuzen project a € 21 mln follow up has been successfully gathered.

The co-design approach of project leader van de Bunt, operating very effectively on the background and putting Zeeland Seaports in the picture as the projects figurehead, has in a short term resulted in an inspiring value proposition that now is being implemented (value development) and has a good perspective in real value capturing, once the basic infrastructure of industrial ecology is in place and the first greenhouses have become operational.

The monitoring and evaluation of the project has resulted in important lessons learned, that can immediately be applied in other TransForum Vital Cluster projects, such as Greenport Shanghai, New Mixed Company and C2C Greenport Flevoland.