

**A SUCCESUL INITIATIVE – INDUSTRIAL SYMBIOSIS
APPLIED IN ROMANIA**

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ABSTRACT

The new Industrial symbiosis approach to business can be defined as a way of sharing services, utilities, expertise and knowledge, production capacities, and by-product resources among diverse industrial actors in order to add value, reduce costs and improve the environment footprint of anthropic activities. The

concept has been incorporated in a LIFE+ Project (ECOREG), financed by EU and active since Feb 2009 in the Suceava County. (ECOREG, 2011).

Specific activities included the creation of a Project Advisory Group, including most important business managers and authorities in the area, the organization of several Workshops each gathering managers from 40-50 organizations and leading to the identification of resources that can circulate among partners (wooden waste, demolition waste, oil waste, production capacities, transport facilities, laboratory expertise, etc.). A large data base was set up with the aid of the UK Partner in the Project (ISL-UK). Results of the Project include more than 500,000 tons of materials diverted from landfill, important areas of virgin forests saved, important reduction in GHG emissions, ca 40 new jobs, important quantities of fossil fuel spared, re-commissioning of some existing equipment.

Keywords: Industrial symbiosis, industrial ecology, resources from waste

FOREWORD

The Romanian Ministry of Environment and Forests, the National R&D Institute for Industrial Ecology - Bucharest, The Ecological Group for Collaboration (GEC) – Suceava and International Sinergies Ltd (UK) joined forces to create a team dedicated to the implementation in Romania of the Industrial Symbiosis concept, a model that proved successful in Denmark (Ehrenfeld and Gertler, 1997), has already 10 years of experience and a nation-wide dimension in UK (NISP, 2011) and spreads rapidly in other areas of the world. (Hungary, Mexico, Brazil, China, etc.). The Life+ Ecoreg Project represents the materialization of their efforts.

THE Ecoreg OBJECTIVES

The main idea behind the Ecoreg Project was the application of industrial symbiosis principles in the area of Suceava county (the focal area of the project). As industrial ecology, in general, and symbiosis, in particular, involves cooperation, partnerships, synergies, the Project was based on a tight collaboration strategy. The principles of industrial ecology require the involvement of all the interested parties in a *win-win* approach based on the three pillars of sustainable development: economic development, environmental protection, social progress.

The implementation of the project was limited to a geographic area of approx. 8500 km² in the North-Eastern part of Romania, but it tested and evaluated the potential for project replication at national level.

The *general objective* of the project was the demonstration of industrial symbiosis potential for sustainable development of the Romanian socio-economic system.

The *specific objectives* of the project are listed below.

- Reduction of natural resource consumption (raw materials, energy, utilities) at all interested partners through implementation of innovative methods and instruments
- Significant reduction of the environmental impact through evidence-based development policies at enterprise level
- Improving the public image of the networking participants
- Conservation and improvement of leisure and tourist potential of the focal area, thus creating conditions for new job availability in the region
- Awareness raising and training of interested partners and local communities on industrial symbiosis
- Identification of best practices and dissemination at national level for further implementation of industrial symbiosis concepts

IMPLEMENTATION

From May 2009 to Sep 2011, a number of Workshops were organized in the focal area of the ECOREG Project.

Each Workshop gathered some 40-50 local managers, representatives of the local communities, city mayors, local regulatory agencies, schools, universities, etc.

Preliminary contacts with the invitees led to understanding, by them, of the philosophy of the ECOREG Project:

1. The invitees represent economic entities that have some resources to share or give (materials, waste, utilities, premises unused, equipment, specialists, laboratory facilities, transportation capacities, etc.)
2. The invitees represent entities that need resources and are in search of them
3. The invitees understand the importance of a rational use of virgin resources and are ready to use waste or second hand resources in order to save the environmental footprint of anthropic activities in the focal zone.

Special forms were devised to help invitees to present their offer (the HAVE form) or needs (the WANT form). These forms are illustrated below.

Table 1. The HAVE Form used at ECOREG Workshops

I'm offering the resource / service / expertise													I'm interested in the resource / service / expertise		
Code		Name Organization - Locality											Organization (Code), Localitate	Name Phone	Quantity
Representative Name, Phone, Fax, E-mail															
Available resource															
Yearly quantities (tons, m ³ , Gcal. kWh, ha, m ² , etc.)															
Location															
Months when the resource is available															
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec.				

Table 2. The WANT Form used at ECOREG Workshops

I need the resource / service / expertise													I can offer the resource / service / expertise		
Code		Name Organization - Locality											Organization (Code), Localitate	Name Phone	Quantity
Representative Name, Phone, Fax, E-mail															
Available resource															
Yearly quantities (tons, m ³ , Gcal. kWh, ha, m ² , etc.)															
Location															
Months when the resource is available															
Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb				

Once completed, the forms circulated among all the invitees, so that everyone could see the offers and needs of their partners. More than that, after each Workshop, the information included in the forms was inserted in an on-line database devised by ISL-UK and made available by INTERNET. Special tables centralizing all offers and needs of the companies attending the Workshops were made available to all invitees of subsequent Workshops or sent via e-mail or personally handed to all interested parts in the focal zone. Such a vast programme of information dissemination aimed at giving, transparently, all the relevant information to any potential partner in a possible symbiosis.

The ECOREG team processed all the forms and set up a priority list of symbiotic links that would have the largest impact (economic, environmental, social). In order to classify the possible partnerships, a multiple criteria decision making matrix was devised. A number of criteria were selected to judge the performance of each potential partnership. The score of a symbiotic partnership is then calculated. A final hierarchy is established in this way. The ECOREG team then contacted the possible future partners and encouraged them to start a collaboration, supporting them with background expertise, laboratory analysis, technical advice, all efforts being directed to set up the partnership.

ECOREG RESULTS

Some 200 companies, agencies, communities took part to the ECOREG Workshops.

Almost 100 potential partnerships have been identified and many of them are already operational.

As a result of the already established symbiotic partnerships, the following outcomes emerged, for the period June 2009 – Oct 2011:

1. Some 500,000 tons of biomass (sawdust, wooden waste) were collected, diverted from landfill or from polluting the landscape and directed to a local chipboard manufacturer
2. Some 150000 m³ (30000 tons) biomass (sawdust, wooden waste) were collected, diverted from landfill or from polluting the landscape and directed to a local wooden briquette manufacturer.
3. Some 30000 tons of demolition waste were diverted from landfill and used in the reconstruction of the environment at a local power plant (to ecologize the ash landfill)
4. Use of wooden briquettes instead of fire – wood:
 - a. saved some 688 Ha of virgin forests
 - b. saved huge quantities of fossil fuel (equivalent to the 30000 tons of briquettes in terms of calorific power):
 - i. 14 Million m³ methane
 - ii. or 22200 tons lignite
 - iii. or 12900 tons fuel oil
 - c. avoided the emission of some 12000 tons of GHG from fossil fuel (replacing it with benign CO₂ from renewable biomass)
 - d. avoided the emission of more than 120 tons SOX from fossil fuel
5. Tons of animal bones are used to produce high value collagen
6. Children took part to the ECOREG effort by valuing paper waste to new products
7. Modern management tools were transferred to local managers (sustainable strategy devised using a modified version of the Balanced Scorecard).

8. New jobs created: 40.
9. Win-win partnership connected public and private entities and large quantities of domestic waste were recycled (at a rate of 35% - when the reported rate for Romania is only 1%)

CONCLUSION

The ECOREG Project illustrated the vast potential of the industrial symbiosis paradigm. Vast quantities of resources could be reinserted in the economic value-chain, innovative technical initiatives can add value to waste, existing unused equipment, production capacities, transport facilities, can start a new life, saving important investment resources, reducing the need for virgin resources, making the industry more environmentally friendly and improving the life quality.

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