

ANNUAL REPORT 2008  
Industrial Symbiosis System Boundaries (ISSB) – Consortium



RESEARCHERS OF THE CONSORTIUM

Subproject 1: *Conceptual Analysis of Industrial Symbiosis System Boundaries, Åbo Akademi University:*

Jouni Korhonen, Academy Fellow (in charge of Sub-project 1)

Kaisa Pihlatie, Research Manager

Juha-Pekka Snäkin, Researcher

Rupert Baumgartner, Visiting Professor

Subproject 2: *Modelling Industrial Symbiosis System Boundaries, Finnish Environment Institute (SYKE):*

Matti Melanen, Research Professor (in charge of Sub-project 2)

Laura Sokka, Researcher, PhD student

Ari Nissinen, Senior Researcher

Suvi Pakarinen, University Trainee

UPDATED SYNOPSIS OF THE PROJECT

Studies of environmental performance of industrial symbiosis (IS) systems usually concentrate on one or a limited number of factors. IS often uses a narrow approach to system boundaries considering just the impacts taking place within the arbitrarily defined symbiosis boundaries. These hypotheses are now verified through exploration-orientated literature and conceptual analyses. Tools potential for these kinds of assessments have been developed rapidly both in number and in capacity. However, the ISSB consortium observes that such tools are usually developed in a universal sense, i.e., not designed to the specific conditional and contextual factors of IS networks. Building upon the Life-Environment project 'The Eco-efficiency of Regions – Case Kymenlaakso (ECOREG)' 2002–2004, the highly industrialized Kymenlaakso Region in Finland is analysed with the questions: *How should the system boundaries be accounted for in the definition and development of industrial symbiosis systems? How can the environmental performance and sustainability of an IS be evaluated?* An IS from the region (an industrial system developed around the UPM Kymmene, Kymi paper mill) has been chosen for an in-depth case-study. As the main outcome of the project, a framework is developed through which the environmental performance and overall sustainability of IS networks can be assessed and analysed.

PUBLICATIONS AND PRESENTATIONS

Articles published and accepted in peer-reviewed international scientific journals

Korhonen, J. & Baumgartner, R. The industrial ecosystem balanced scorecard. *International Journal of Innovation and Sustainable Development*. Accepted on October 23, 2008.

Baumgartner, R. 2008. Corporate Sustainability Performance: methods and illustrative example. *International Journal of Sustainable Development and Planning* 3(2): 117-131.

Melanen, M. & Korhonen, J. 2008. The dimensions of industrial symbioses and their system boundaries. *Progress in Industrial Ecology – An International Journal* 5(5-6).

Sokka, L., Melanen, M. & Nissinen, A. 2008. How can the sustainability of industrial symbioses be measured? *Progress in Industrial Ecology – An International Journal* 5(5-6).

Mickwitz, P. & Melanen, M. The Role of Co-operation between Academia and Policymakers for the Development and Use of Sustainability Indicators – A Case from the Finnish Kymenlaakso Region. *Journal of Cleaner Production*. Accepted on December 8, 2008.

Manuscripts submitted to peer-reviewed international scientific journals

Baumgartner, R. Organizational culture and leadership: preconditions for the development of a sustainable corporation. Submitted to *Sustainable Development*.

Sokka, L., Pakarinen, S. & Melanen, M. 2008. Industrial Symbiosis Contributing to More Sustainable Energy Use – An Example from the Forest Industry in Kymenlaakso, Finland. Submitted to *Journal of Cleaner Production*.

Conference and poster presentations

A platform presentation 'Industrial ecosystem balanced scorecard' (Korhonen, J. & Baumgartner, R.) at *The 14th Annual International Sustainable Development Research Conference, Track 7*, India Habitat Center, New Delhi, India, September 21-23, 2008 (cf. Other activities / Conference arrangement below)

A platform presentation 'Industrial symbiosis for global climate change mitigation' (Melanen, M., Sokka, L. & Nissinen, A.) at *The 14th Annual International Sustainable Development Research Conference, Track 7*, India Habitat Center, New Delhi, India, September 21-23, 2008 (cf. Other activities / Conference arrangement below)

A platform presentation 'An example of co-operation between academics and regional authorities for developing sustainability indicators' (Melanen, M. & Mickwitz, P.) at *The 14th Annual International Sustainable Development Research Conference, Track 16*, India Habitat Center, New Delhi, India, September 21-23, 2008.

A platform presentation 'Industrial symbiosis contributing to more sustainable energy use – an example from forest industry in Kymenlaakso, Finland' (Sokka, L., Melanen, M., Pakarinen, S. & Nissinen, A.) at *Oils & Fuels for Sustainable Development AUZO 2008, Session on Cleaner Production*, Gdansk University of Technology, Poland, September 8-11, 2008.

A platform presentation 'Mainstreaming and coherence of climate policies' (Mickwitz, P., Kivimaa, P., Melanen, M. & Sokka, L.) at *Oils & Fuels for Sustainable Development AUZO 2008, Session on Cleaner Production*, Gdansk University of Technology, Poland, September 8-11, 2008.

A poster presentation 'Applying material flow analysis to an industrial symbiosis' (Sokka, L., Pakarinen, S., Melanen, M. & Nissinen, A.) at *The 6th Gordon Conference in Industrial Ecology*. New London, USA, August 17-22, 2008.

## OTHER ACTIVITIES

Conference arrangement

The ÅA team was the responsible organizer of *The 14th Annual International Sustainable Development Research Conference*, India Habitat Center, New Delhi, India, September 21-23, 2008.<sup>1</sup> The Delhi Conference attracted altogether over 300 participants. Jouni Korhonen was the Chairman of the conference and Kaisa Pihlatie was the Manager of the Board of the conference.

Organizing (Co-chairs Matti Melanen and Jouni Korhonen) Track 7 'Industrial Ecology for Climate Change Mitigation' at *The 14th Annual International Sustainable Development Research Conference*. Altogether 12 platform presentations were held in the track. The track arrangement was based on the thorough connection the ISSB consortium has with its many international networks and partners (e.g. *International Sustainable Development Research Society, ISDRS*<sup>2</sup>).

The ÅA team arranged the annual conference of the *Finnish Society for Industrial Ecology*<sup>3</sup> together with the Geological Survey of Finland. The conference was held on April 28-29, 2008 at Geological Survey of Finland in Otaniemi, Espoo. The theme of the conference was 'Material Flows and Climate Change'

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<sup>1</sup> Delhi Conference website and conference program: <http://www.14aisdr2008.com/>

<sup>2</sup> ISDRS website: <http://www.isdrs.org>

<sup>3</sup> Finnish Society for Industrial Ecology website: <http://www.teollinenekologia.fi>. The conference program can be found from [http://www.teollinenekologia.fi/documents/TE-GTK\\_seminaari\\_ohjelma\\_final\\_000.pdf](http://www.teollinenekologia.fi/documents/TE-GTK_seminaari_ohjelma_final_000.pdf)

and the program included keynotes e.g. from Prof. Frank Figge and Prof. Stefan Brinzeu and a professor panel discussion about current challenges in energy and climate change issues. The professor panel also gave a letter from President Tarja Halonen to Dr. Antero Honkasalo of the Ministry of the Environment for a title of a 'professor'. The conference had some 160 participants.

#### Editorial activities (peer-reviewed international scientific journals)

- Korhonen, J. Editor in Chief, *Progress in Industrial Ecology – An International Journal*. Six issues in 2008.
- Editing a Triple Special Issue on 'System Boundaries of Industrial Symbiosis' for *Progress in Industrial Ecology – An International Journal (PIE)*, Matti Melanen as Guest Editor. The triple special issue was based on the contributions made to the workshop (Track 10) entitled 'How Can Industrial Ecology Contribute to Regional Sustainability?' that the ISSB consortium organized as part of *The 13th Annual International Sustainable Development Research Conference of the International Sustainable Development Research Society*, held on June 10-12, 2007 in Västerås, Sweden. Altogether, 18 platform presentations were given at the workshop that was co-chaired by Jouni Korhonen and Matti Melanen. The contributions were debated during the workshop, the authors thus received direct feedback from their international peers. After the workshop, the authors submitted full papers for consideration in a special issue of *PIE*. The manuscripts were processed through the normal peer review process of the journal. The final outcome of the initiative materializes as a triple special issue of *PIE*: Vol. 5 (2008), Nos. 5 and 6 as Part 1 and Vol. 6 (2009), No. 1 as Part 2. The issue comprises 12 peer-reviewed article contributions and an editorial article by Matti Melanen and Jouni Korhonen.
- Participation as members (Matti Melanen and Jouni Korhonen) in the Guest Editorial Team, Special Issue on 'The Role of Academia In Regional Sustainability Initiatives', *Journal of Cleaner Production*, 2007-2008.

#### Referee activities (peer-reviewed international scientific journals)

- Jouni Korhonen:
  - reviewer of about 50 scientific articles in *Progress in Industrial Ecology* (Editor-in-Chief), *Journal of Cleaner Production* (Associate Editor), *Business Strategy and the Environment*, *Sustainable Development*, *Corporate Social Responsibility and Environmental Management* and the *International Journal of Innovation and Sustainable Development* (Member of the editorial board)
- Matti Melanen:
  - two reviews for *Journal of Cleaner Production*, one review for *Progress in Industrial Ecology* (Member of the editorial board)
- Laura Sokka:
  - two reviews for *Resources, Conservation and Recycling*, two reviews for *Waste Management*, one review for *Journal of Environmental Management*
- Ari Nissinen:
  - one review for *Progress in Industrial Ecology*

#### Website of the project

A website (in English) for the ISSB project was maintained: [www.environment.fi/syke](http://www.environment.fi/syke) (> Research > Production and Consumption > Themes and projects ... > Industrial symbiosis system boundaries)<sup>4</sup>

#### PROGRESS MADE IN RELATION TO THE PROJECT PLAN

The ÅA team has made important progress in its international industrial symbiosis scientific research. ÅA team has followed the research plan. For example, we have successfully organised, coordinated and led our international research and partner networks (which were evaluated with the grade 5, the highest possible grade, in the research plan's international peer review process by the Academy of Finland) to gather for *The 14th Annual International Sustainable Development Research Conference*, September 21-23, New

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<sup>4</sup> ISSB project website <http://www.environment.fi/default.asp?contentid=254826&lan=en&clan=en>

Delhi, India. Jouni Korhonen was the Chairman of this conference including over 300 participants, Asko Numminen, the Ambassador of Finland, and Abdul Kalam, the former President of India, among others. Kaisa Pihlatie was the Manager of the Board of the conference. Together, Jouni Korhonen and Matti Melanen organized a special track (workshop) on 'Industrial Ecology for Climate Change Mitigation'. As a result of the conference, for example, several special issues in international scientific peer review journals are in preparation. The participants of this large and diverse international event, benefiting from collaboration and interaction between developing country scientists and scientists in developed countries, serve as authors, reviewers, editorial board members and guest editors in these special issues. In other words, our international scientific research conference is also 'output orientated'.

In 2007-2008, the ÅA team also enjoyed a three-month research visit in Turku by Dr. Rupert Baumgartner from University of Leoben, Austria. Dr. Baumgartner has since made important contributions to our team and to the consortium in general. For example, he has achieved a board member position in the *International Sustainable Development Research Society (ISDRS)* of which Jouni Korhonen is the Chairman and Kaisa Pihlatie the Coordinator of the Board. Dr. Baumgartner is also a member of the editorial board of *Progress in Industrial Ecology*. We have now collaborated for a TEKES (National Technology and Innovation Agency) research project application coordinated by SYKE. Further, we have just received news that our joint article (Korhonen and Baumgartner) has been accepted (Oct. 23, 2008) for publication in the *International Journal of Innovation and Sustainable Development* after an international peer review process with revisions accomplished according to the comments and critique received.

However, the most important result of the ÅA team is the cooperation project with the SYKE partner (coordinator of the ISSB consortium) to publish a triple special issue in *Progress in Industrial Ecology* on 'System Boundaries of Industrial Symbiosis' (the very theme of the ISSB proposal). In a consortium, cooperation is what it is all about! This large international special issue of a peer reviewed journal comprised so much accepted and high quality scientific material that it had to be made not into a double, but into a triple special issue with special permission from Inderscience Publishers. The publisher agreed to our quest. It is important to note that the named international networks of the ISSB consortium participated closely and directly to the publication of this work. We gathered at *The 13th Annual International Sustainable Development Research Conference*, Västerås, Sweden in June of 2007, debated and discussed and then followed through with the international peer review and advisory process to eventually arrive at this important publication of 12 international peer reviewed articles.

The SYKE sub-project, *Modelling Industrial Symbiosis System Boundaries*, also proceeded according to the ISSB project plan. The "Kymi Eco-Industrial Park" – a system developed around the UPM Kymmene, Kymi paper mill – was chosen as an in-depth case-study industrial symbiosis and a written co-operation agreement was signed by UPM Kymmene and SYKE. The basic data needed in modelling the case symbiosis was compiled and the first modelling results were published in international peer-reviewed scientific journals and in conferences. Moreover, the historical evolution of the case symbiosis will be analysed and the usability of life-cycle information in the communication to stakeholders will be considered. Two scientific article manuscripts (Sokka *et al.*) and an MSc thesis (Suvi Pakarinen, by a grant received from the Fortum Foundation) are under preparation.

Helsinki, January 15, 2009

Jouni Korhonen and Matti Melanen