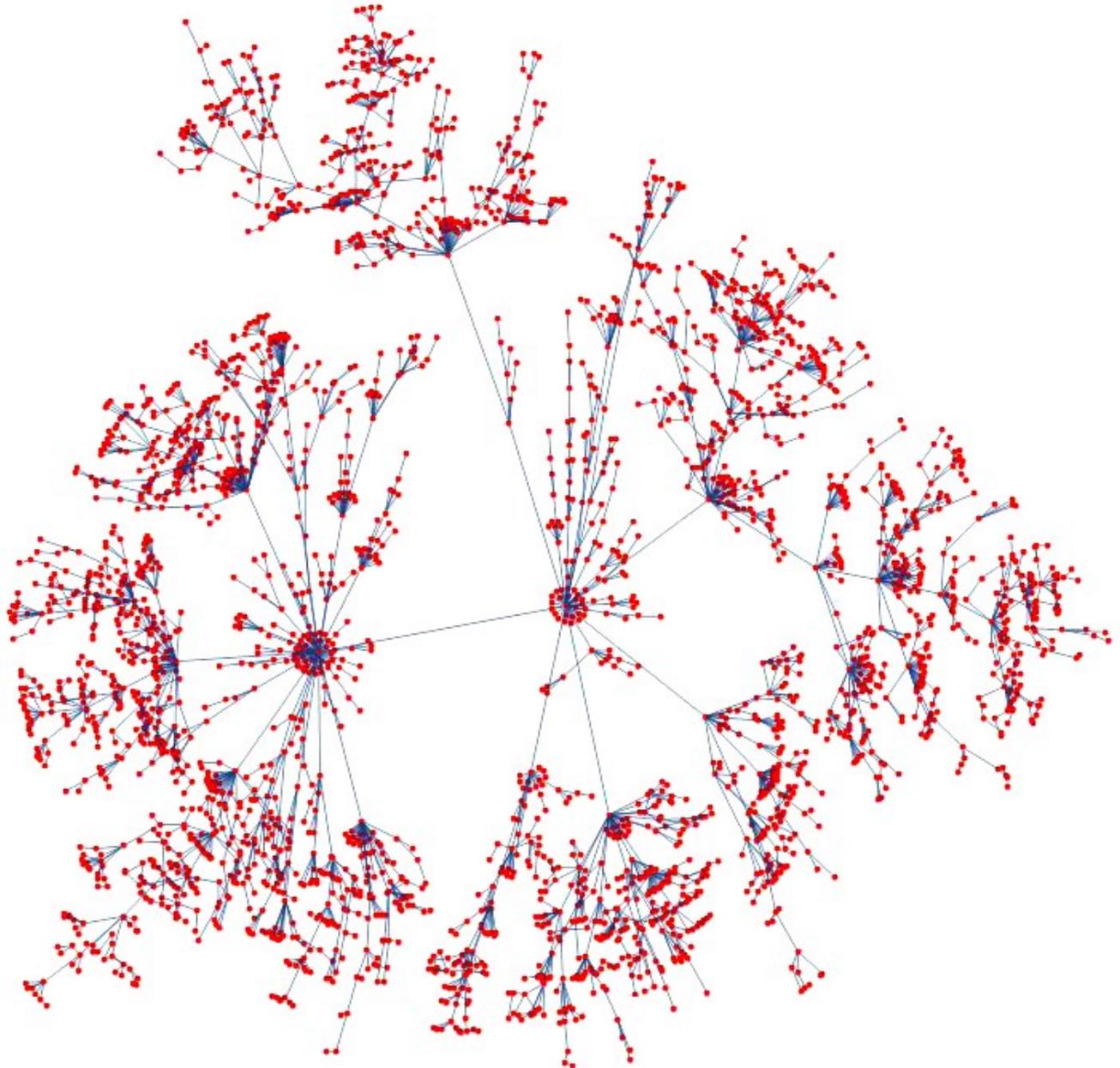


Annual Report 2012

Institute of Systems Sciences, Innovation and Sustainability Research





*ISIS / Institute of Systems Sciences,
Innovation & Sustainability Research*
University of Graz

Merangasse 18/I,
8010 Graz, AUSTRIA

Editorial

In our third annual report, we summarize our diverse activities in the year 2012, hoping that the report will encourage readers to find out more about the Institute of Systems Sciences, Innovation and Sustainability Research (ISIS). The year 2012 has been an enormously challenging year with the university setting up two crucial strategic documents: the Development plan 2013-2018 and the Targets and Performance Agreement 2013-2015. Through all of this, the institute has never lost focus on its central mission, to provide research, teaching and knowledge transfer of the highest international standard.

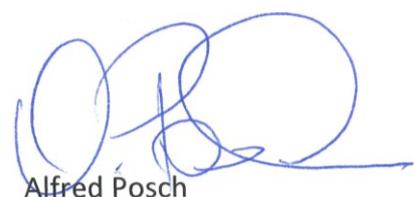
Since its foundation, ISIS has seen a continuous upward trend in its central performance indicators. This trend continued in 2012. The high standards in research and teaching have again been fully matched, documented by high number of publications (10 publications in international peer-reviewed journals, 26 other publications) and teaching activities, including 75 classes offered at ISIS in the study year 2011/12 and 41 master thesis supervised and finalized. In 2012, the institute was home to 13 doctoral students, 4 of them employed at ISIS, 4 of them employed in research projects, 2 as holders of the URBI-scholarship, and 2 as holders of the AIT scholarship within the Talent Development Programme in 2012. The high number of applications for external research funding paid back, so that we have again a positive outlook on third-party funded research projects for the upcoming years.

One of the major strengths of ISIS is its integration in academic networks, from local to international scale. At local level ISIS is one of the key-players within the Environmental and Global Change (EGC) network, which represents one out of 7 research core areas of the University of Graz. Another example is the Knowledge & Talent Development Programme "Innovation & Sustainability" initiated by the Austrian Institute of Technology. At international level ISIS is the coordinating institution of two international joint master's programmes ("Sustainable Development", "Industrial Ecology"), joining forces in teaching but also in research with well-respected universities at four different continents. Furthermore ISIS members are active in several international research networks, within the International Sustainable Development Research Society also in an executive function. As result of our international recognition we have the possibility to organize the Corporate Responsibility Research Conference 2013 in Graz, we are happy to host this important international event!

Last not least, ISIS strongly contributes to the management and administration of the Faculty of Environmental, Regional, and Educational Science. Besides numerous activities in different committees and boards, ISIS provides the faculty's Vice Dean for research, as well as the Dean for studies.

A handwritten signature in black ink, appearing to read "R. Baumgartner".

Rupert J. Baumgartner

A handwritten signature in blue ink, appearing to read "Alfred Posch".

Alfred Posch



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1 THE INSTITUTE

1.1 History

When in October 2007, the Faculty of Environmental and Regional Sciences and Education (URBi) was established at the University of Graz, this was also the starting point of the Institute of Systems Sciences, Innovation and Sustainability Research (ISIS). Alongside with the Wegener Centre for Environmental and Global Change (WegC), ISIS is now the focal institute in the field of Environmental Systems Sciences and also responsible for the corresponding bachelor and master programmes.

In the beginning, the ISIS team consisted of four academic and one administrative staff members of the former Institute of Innovation and Environmental Management. Additionally, the coordination office for the study programmes in Environmental Systems Sciences was appended to the ISIS. ISIS has always been intensely committed to internationally renowned



Figure 1: Sustainability Award 2008

research for sustainable development, and to providing international, research-driven, and multifaceted education. Thus, in 2008 the Austrian Federal Ministry of Science and Research and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management awarded ISIS with the **Austrian Sustainability Award** in the two categories of research and teaching/curricula.

In October 2009, ISIS was awarded as an **Austrian UNESCO decade project** (*UN-Decade of Education for Sustainable Development 2005-2014*). The criteria comprised the integration of three sustainability dimensions, and the relevance for education and everyday life, including participatory elements. The jury especially emphasized the institutional embeddedness and the broad variety of sustainability topics covered at ISIS. With this award, ISIS holds the UN-decade logo until 2014.

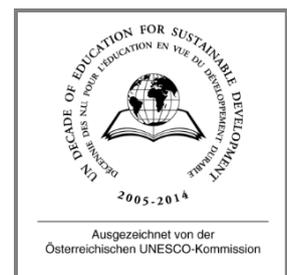


Figure 2: UNESCO

In 2009, the temporary professorship for systems sciences was filled by Prof. Claudia Binder; and one year later the temporary professorship for sustainability management was filled by Prof. Rupert Baumgartner. In 2011, Prof. Claudia Binder already left. In spring 2012 the temporary, §99 professorship for systems sciences was filled with Prof. Manfred Füllsack and Prof. Wilfried Winiwarter, 50 % each. In spring 2012 Prof. Baumgartner started a §98 professorship. As of December 2012, the ISIS consists of 5 professors (4 full time equivalent), 7 post-docs, 8 prae-docs (out of them 4 project staff), one lecturer, 2 administrative staff, and 10 student assistants.

1.2 Mission statement

The Institute of Systems Sciences, Innovation and Sustainability Research investigates the transition towards sustainability. Therefore, we study transition, innovation, and adaptation processes within human-environment systems, with a focus on firms and regions. We base our research on systems sciences, innovation and transition sciences as well as on sustainability science, and develop inter- and transdisciplinary methods to analyse and model human-environment systems, develop scenarios and transition pathways, and assess regulatory strategies.

ISIS is characterized by the disciplinary divergence of its members. Highly motivated researchers originating from diverse fields of natural, social and formal science collaborate along real-world problems.

ISIS is unique in several ways:

- Scientific work focuses on three central topics: systems sciences, innovation and transition sciences, and sustainability science.
- It is open to external collaboration with scientists from social as well as natural sciences.
- The transdisciplinary research focus facilitates high quality applied research and leads to strong collaborative ties with regional stakeholders and with business and industry.
- Research projects apply a mix of both qualitative and quantitative approaches.
- Offering one of the few curricula on Environmental Systems Sciences, ISIS grew into additionally coordinating two international joint master's programmes.
- ISIS is well embedded in international networks in both teaching and research.

ISIS is a part of the “URBi” Faculty of Environmental, Regional and Educational Sciences and features a broad interface within the faculty as well as beyond. Together with the “Wegener Center” ISIS plays a central role within the university’s research core area “Environment and Global Change”.



Figure 3: The ISIS-team

1.3 Faculty and Staff members

Professors



Univ.-Prof. Dr. Rupert J. Baumgartner

Phone: 3237 Email: rupert.baumgartner@uni-graz.at

Head of ISIS
Vice Dean at the URBi Faculty
Professor for Sustainability Management

Research Interests: Corporate Sustainability, CSR, Strategic Management, Life Cycle Analysis, Industrial Ecology, Management systems.



Univ.-Prof. Dr. Manfred Füllsack

Phone: 3235 Email: manfred.fuellsack@univie.ac.at

Professor for Systems Sciences, since February 2012.

Research Interests: Systems, Complexity, Networks, Games and Computational Theory, Work (History, Sociology, Economy, Philosophy), Computer-Based Modelling and Simulation.



Univ.-Prof. Dr. Wilfried Winiwarter

Phone: 7340 Email: wilfried.winiwarter@uni-graz.at

Professor for Systems Sciences, since February 2012.

Research Interests: Systems Analysis, Global Biogeochemical Cycles (Nitrogen Cycle), Interactions between Physical and Social Systems.



Ao.Univ.-Prof. Dr. Alfred Posch

Phone: 3234 Email: alfred.posch@uni-graz.at

Vice head of ISIS
Dean for studies at the URBi Faculty
Academic coordinator of the International Joint Master programme in Sustainable Development

Research Interests: Environmental and Innovation Management, Eco-Controlling, Industrial Ecology, Inter- and Transdisciplinary Learning for Sustainable Development.



Assoc. Univ.-Prof. Dr. Gerald Steiner

Phone: 7331 Email: gerald.steiner@uni-graz.at

Since October 2011 guest-professorship at Harvard University, U.S.A.

Research Interests: Systems Analysis, Transdisciplinary Problem Solving, Integration of Stakeholders within Scenarios Developments, Systemic Creative Problem Solving, Cross-Cultural Aspects of Entrepreneurship, Sustainable Product Development.

Prae-Docs and Post-Docs



Mag. Nina Braschel

Phone: 7344 Email: nina.braschel@uni-graz.at

Research Interests: Emissions Trading, Waste Management.



Dipl.Ing. Dr. Thomas Brudermann

Phone: 7336 Email: thomas.brudermann@uni-graz.at

Research Interests: Environmental Psychology, Social Dynamics and Crowd Psychology, Behavioural Economics and Neuroeconomics, Economic Psychology, Agent-based Modelling in Social Sciences, Sustainability-related bottom-up initiatives.



Mag. Sabrina Engert

Phone: 7332 Email: sabrina.engert@uni-graz.at

Research Interests: Sustainability Management, Corporate Social Responsibility, Strategic Management, Management Systems.

Since June 2012.



Dr. Ulrike Gelbmann

Phone: 7333 Email: ulrike.gelbmann@uni-graz.at

Research Interests: Strategic Sustainability Management, Corporate Social Responsibility, Stakeholder Management, Sustainability Reporting, Social Sustainability, Resilience, Waste Management.



Porfirio Guevara, MSc

Phone: 7345 Email: porfirio.guevara-chaves@uni-graz.at

Research Interests: Poverty and Education Analysis, Innovation, Economic Growth, International Trade, Environmental Economics, System Dynamics Modelling.



Dr. Maximilian Mrotzek

Phone: 7342 Email: maximilian.mrotzek@uni-graz.at

Research Interests: Resources, Catastrophes, Systems Sciences, System Dynamics.



Dr. Elke Perl-Vorbach

Email: elke.perl@uni-graz.at

Currently on maternity leave.



Dr. Romana Rauter

Phone: 3236 Email: romana.rauter@uni-graz.at

Research Interests: Sustainable Innovation, Innovation and Technology Management, Environmental Aspects of Operational Innovation Management, Transfer of Knowledge and Knowledge Management.

Since August 2012.



Mag. Kathrin Reinsberger

Phone: 7343 Email: kathrin.reinsberger@uni-graz.at

Research Interests: Environmental Economics, Climate and Energy Policy, System Dynamics, Energy Management, Renewable Energy, Energy Transition.



Dipl.Ing. Dr. Ulrike Seebacher

Phone: 7331 Email: ulrike.seebacher@uni-graz.at

Research Interests: Corporate Social Responsibility, Corporate Sustainability, Sustainable Regions, Sustainability Learning of Persons and Organisations, Sustainable Lifestyles.

Since October 2012.



Dr. Peter Perstel

Phone: 7347 Email: peter.perstel@uni-graz.at

Research Interests: Sustainable Materials, Material Libraries, Waste Management, Innovation Management and Creative Techniques.

Since October 2012.

Lecturer



Dr. Ralf Aschemann

Phone: 3232 Email: ralf.aschemann@uni-graz.at

Academic co-ordinator of the “Erasmus Mundus Master’s Programme in Industrial Ecology”; co-ordinator of transdisciplinary case-study teaching at ISIS; Erasmus advisor.

Research Interests: Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), Environmental Effects of Transport, Industrial Ecology, Higher Education and Environmental Assessment and Management, Health Impact Assessment (HIA).

Project staff



Morgane Fritz, MA

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Research Interests: Waste Management, Corporate Social Responsibility, Product/Service Development, Value Chain Management, Life Cycle Assessment.

Since February 2012.



Josef-Peter Schöggel, MSc

Phone: 1524 Email: josef.schoeggel@uni-graz.at

Research Interests: Design for Sustainability, Life Cycle Assessment, Corporate Social Responsibility, Sustainable Supply Chain Management.

Since April 2012.



Mag. Maria Hecher

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Until Dec. 2012.



Dipl.-Ing. Andrea Maria Schröck

andrea.schroeck@uni-graz.at

Since Dec. 2012

Administration



Sabina Grobbauer, MBA

Phone: 3238 Email: sabina.grobbauer@uni-graz.at



Mario Perner

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Scholarship holders



Mag. Martin Kislinger

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Martin Kislinger is working on diffusion process in the context of renewable energies (in particular photovoltaics).



Magdalena Pierer, MSc

Email: magdalena.pierer@uni-graz.at

Magdalena Pierer is analysing nitrogen footprints and nitrogen cycles in an comparative international study.



Mag. Vivianne Aggestam

Email: vivianne@aggestam.com

Vivianne Aggestam is working on the subject of demonstrating and evaluating the differences in the utilisation of infrastructure in large and small-scale dairy production supply chains.



Stefan Wagner, BA

Email: stefan.wagner@uni-graz.at

Stefan Wagner is analyzing the change-dynamics in the governance of regional electricity providers.



Dipl. Ing. Claudia Enzi

Email: claudia.enzi@ait.ac.at

Claudia Enzi is collecting and analyzing data on spatial energy-demand at the level of small-scale consumers to be used in emission inventories.

Student Assistants



Angelika Brandl
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Michaela Engert
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Since February 2012



Sandra Viczek
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Since February 2012.

2 RESEARCH PROJECTS AND ACTIVITIES

2.1 Research profile

Research at ISIS is based on **three scientific pillars**: systems sciences, innovation and transition research, and sustainability research. By combining these three science fields, we seek to enhance the ability of human-environment systems to deal with global change.

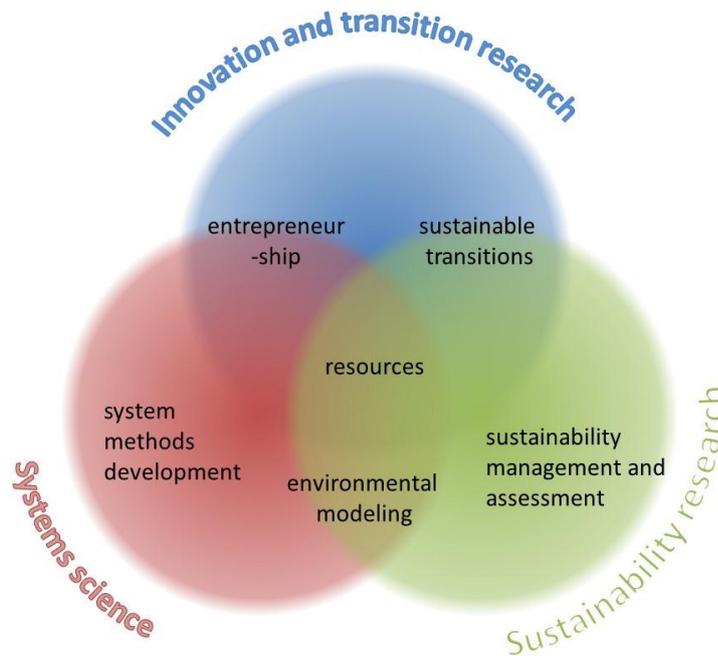


Figure 4: Science fields of ISIS

Systems sciences. Systems modelling (e.g., agent-based modelling or system dynamics), and environmental systems assessment provide a better understanding of different kinds of human environment systems and their adaptation processes to challenges of global change. We are engaged in system methods development, improving computer-based (multi-agent) simulations of systems, in particular of complex adaptive systems. Our investigations include environmental modelling, covering global biogeochemical cycles, like the nitrogen cycle. Special emphasis is put on the interaction between physical and social systems in order to develop concepts and strategies for sustainable development.

Innovation and Transition research. Management of innovations at different levels is a significant challenge for the transition towards sustainable development. It is our goal to gain insight in innovation processes for new products, services, and technologies, but also in transition processes in society, organizations, and sectors, like the energy sector. Therefore, it is necessary to generate an understanding of logics and patterns of human decision making and action. On this basis, we can develop inter- and transdisciplinary concepts for supporting decisions that influence sustainability, and we can help initiate sustainability-oriented transition, innovation and adaptation processes in a variety of human-environment systems.

Sustainability research. Regions and corporations are important actors and entities for sustainable transitions. Thus, we investigate systems and processes for sustainability management and corporate social responsibility (CSR) initiatives at corporate level including the value chains and the regional level. Key aspects include developing environmental evaluation and controlling concepts and methods, strategic management, corporate sustainability management and strategies, lifecycle analysis, industrial ecology, integrated management systems, and management of resources (like waste or energy).

We are currently executing projects in the fields of regional and organizational energy systems, resources and waste, and sustainability management and assessment.

Regional and Organizational Energy Systems deals with the following questions: Which actors and what factors support or prevent the development of energy regions or the innovation and adoption of energy efficient technologies? How can these development processes be simulated? What policies support the creation of new and successful advancement of energy regions or the innovation and implementation of new technologies?

Resources and Waste considers the following questions: Which parameters lead to sustainable management of resources and waste? Which control mechanisms play a role? How can resource-waste systems be optimized from an environmental, social and economic point of view?

Sustainability Management and Assessment responds to the following questions: How can measures for the implementation of sustainable strategies in cooperation with stakeholders be developed and evaluated? How can sustainability aspects be integrated into corporate leadership? What management tools are appropriate for (corporate) sustainability management? How can sustainability performance of organizations be evaluated?

2.2 Research Projects

2.2.1 TERIM: Transition Dynamics in Energy Regions: An Integrated Model for Sustainable Policies

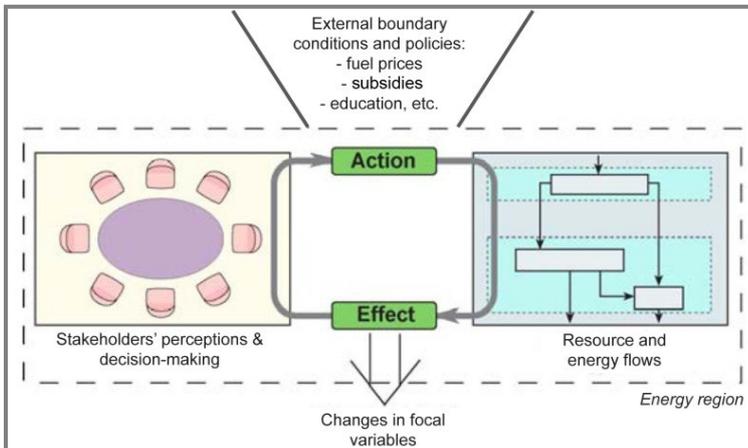


Figure 5: Conceptual framework of TERIM

Energy regions are regional initiatives, which usually envision energy self-sufficiency by using regional renewable energy sources and building a decentralized energy infrastructure. Studies on energy regions have mostly looked at the technical-operational characteristics and informed policy-makers on how to improve energy infrastructure.

However, they have missed out in providing and understanding the dynamics of the transition process, in particular the role of policies, social norms, and culture in stakeholders' decision-making and thus, on the transition process itself.

The main objectives of this project are (i) to simulate the transition dynamics of energy regions and (ii) to derive policy recommendations. Specifically, we will:

1. Analyse the transition dynamics in two Austrian energy regions, beginning from their establishment until today.
2. Develop an integrated simulation model for studying transition dynamics in energy regions including interrelations and feedbacks between the social system and the energy infrastructure, as well as the impact of policies on individual human behaviour and the transition process.
3. Derive policy recommendations for Austrian policy makers.

The conceptual approach combines elements of transition theory, policy design and improvement, and human-environmental systems research and modelling. One key element of our conceptual framework is the in-depth characterization of stakeholders' decision-making, where we will consider (i) the goals and interests of individuals; (ii) regional factors and local environmental conditions, as well as (iii) external factors.

Study regions: ökoEnergieLand Güssing
Energierregion Weiz-Gleisdorf



Project team at ISIS: Ao.Univ.-Prof. Dr. Alfred Posch, Dr. Maximilian Mrotzek

Project partner: University of Munich, University of Technology Delft,
European Centre for Renewable Energy Güssing,
Energierregion Weiz-Gleisdorf, Austria

Duration: 2011 – 2013

Funding: Austrian Climate and Energy Fund ("ACRP" Programme)

Website: <http://www.uni-graz.at/terim>

2.2.2 Farm-Clim: Farming for a better climate by improving nitrogen use efficiency and reduce greenhouse gas emission

FARM-CLIM assesses nitrogen (N) and greenhouse gas (GHG) fluxes in Austrian agriculture and proposes measures for improvement. Those measures will undergo an economic assessment. The IPCC default emission factor for soil nitrous oxide (N_2O) emissions will be reviewed and improved including the development of regional concepts to implement mitigation measures. IPCC reporting will be improved and uncertainties be reduced. FARM-CLIM covers the topic in a multi- and interdisciplinary approach including nationally and internationally highly recognised experts from science, reporting and commercial farming. The inclusion of the stakeholders' views at a very early project state will contribute significantly to closing the science-policy gap in the field of climate friendly farming. Specifically, the project aims to

- Optimize N use in Austrian agriculture
- Minimize N and GHG losses to the environment
- Identify intervention points in agriculture which are relevant for a general N and GHG strategy
- Develop a basis on which guidelines on recommendations for agricultural advisory services on potential optimization measures and their economic impact can be developed.
- Close the science-policy gap on the possibilities to optimize N use and minimize GHG losses

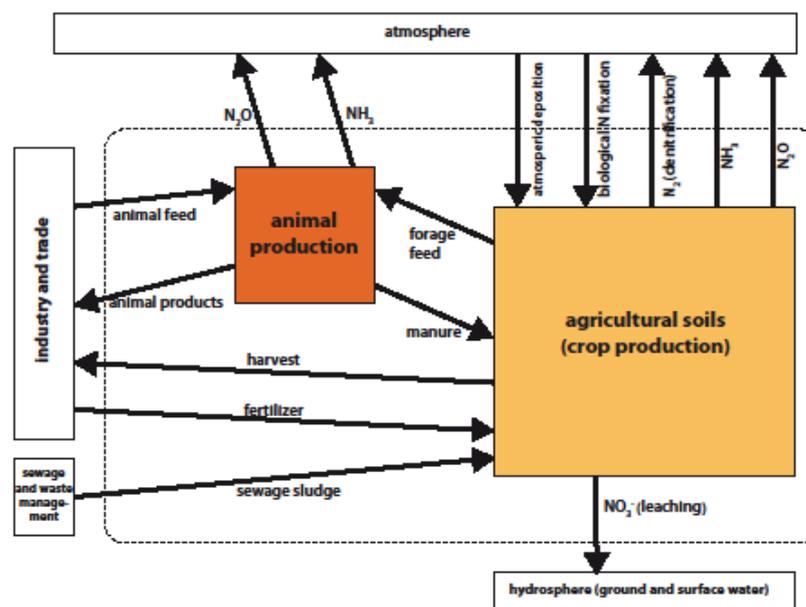


Figure 6: Nitrogen flows in the agricultural sector

Project team at ISIS: Univ.-Prof. Dr. Wilfried Winiwarter, Dipl.-Ing. Andrea Schröck
Project partners: University of Natural Resources and Life Sciences (BOKU, Vienna), Federal Environmental Agency (Umweltbundesamt, Vienna) Austrian Agency for Health and Food Safety (AGES, Vienna), Chamber of Agriculture (Lower Austria), Agricultural Research and Education Center (Raumberg-Gumpenstein)
Duration: 2012 – 2014
Funding: Austrian Climate Research Programme

2.2.3 Strategic Sustainability Thinking in Automotive Product Engineering

Sustainability issues are of rising relevance for the automotive industry due to legal requirements, stakeholder pressure and customer demands. Early phases of product development are of great importance not only for the reduction of costs but also for the improvement of a products' sustainability performance. This particularly holds true for innovative lightweight concepts, since they require the application of new materials and the development of new practices and processes, on which there is only insufficient data and experience concerning their sustainability aspects available in very early product development

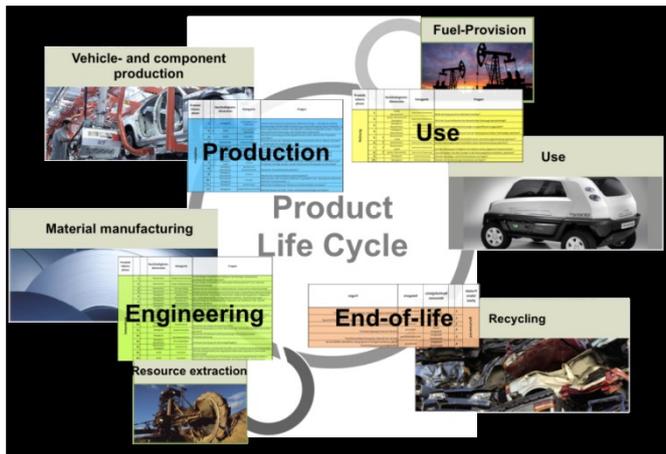


Figure 7: Product Life Cycle

(feasibility and/or concept phases). This lack of information and the high level of uncertainty in the product feasibility and concept phase hinder the application of traditional sustainability assessment tools, such as Life Cycle Assessment, which moreover only focuses on environmental aspects and leaves out economic and social aspects. The aim of this project was to fully integrate a sustainability perspective into the product development process by facilitating Life Cycle Thinking and sustainability awareness among

designers and engineers. A detailed analysis revealed that existing Eco-Design and Design for Sustainability tools were only partially applicable for this purpose, why a new tool, the Checklist for Sustainable Product Development was developed. It is based on the Framework for Strategic Sustainable Development methodology, and particularly focused on early phases of automotive development.

The Sustainability Checklist created in cooperation with the engineering department of MAGNA STEYR

- allows the qualitative assessment and valuation of sustainability aspects in early phases of automotive development with a focus on innovative technologies,
- facilitates the integration of awareness for sustainability into day-to-day business,
- triggers life cycle thinking among executives, designers and engineers, and
- supports decisions over different technologies based on the sustainability evaluation.

A test of the Checklist with nine technologies currently developed by MAGNA STEYR has proven it applicable for its particular purpose and has already led to improvements of the sustainability performance of several technologies.

Project team at ISIS: Univ.-Prof. Dr. Rupert Baumgartner (project leader);
Josef-Peter Schögl, MSc

Project partners: MAGNA STEYR Fahrzeugtechnik AG & Co KG, Dietmar Hofer

Funding: MAGNA STEYR Fahrzeugtechnik AG & Co KG

Duration: June 2011 – Feb. 2012

2.2.4 FoSentHE - Fostering Entrepreneurship in Higher Education

The increasing global integration and rise of global market have created a tremendous need to strengthen and build teaching programmes focused on enterprise and entrepreneurship. Indeed, the EU is determined to foster entrepreneurial mindsets among young people. At the 2006 Spring European Council, the Commission clearly stated that Member States should reinforce entrepreneurship education at all levels. The need to create a positive entrepreneurial climate and an appropriate framework facilitating entrepreneurship as well as to promote entrepreneurship education was also emphasised.

The objectives are as follows:

- System-based research on entrepreneurship and innovation under the umbrella of sustainability.
- Improvement of the teaching practice regarding entrepreneurship in higher education at large, as well as facilitating entrepreneurship fostering in practice.
- Creation of the new e-course curricula in entrepreneurship at all levels of higher education.

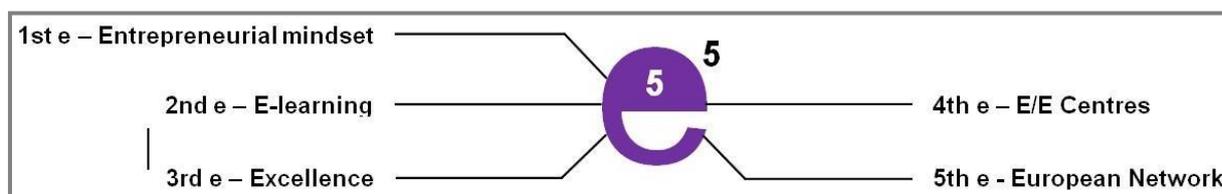


Figure 8: 5e5 outcome model

Project team at ISIS: Assoc. Prof. Dr. Gerald Steiner (project leader), Mag. Elvis Kenik

Project partners: University of Zagreb (grant holder)
 School of Business Administration, College of Management,
 Rishon Lezion
 University of Nice-Sophia Antipolis (UNSA)
 European Foundation for Management Development (EFMD)
 University of Maribor, Faculty of Economics and Business (FEB)
 Poznan University of Economics
 Juraj Dobrila University of Pula, Department for
 Economics and Tourism
 University in Split, Faculty of Economics

Duration: Feb. 2009 – Jan. 2012

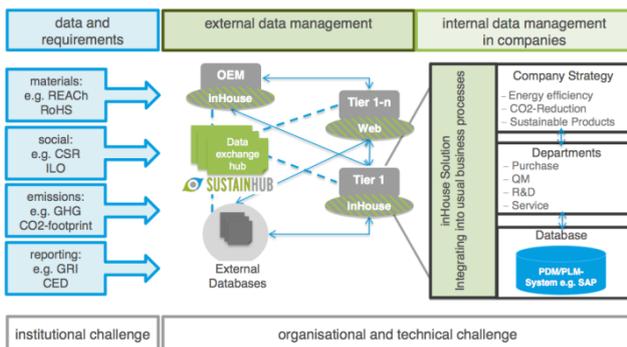
Funding: European Commission: Education, Audiovisual and Culture Executive Agency (EACEA)

Website: <http://www.uni-graz.at/fosenthe>; <http://web.fosenthe.efzg.hr/>

2.2.5 SustainHub

Sustainability Data Exchange Hub (SustainHub) is a research project with the goal of developing an integrated network solution for managing product compliance and sustainability data along global supply chains. The project is carried out by a research consortium of 15 partners from 6 European countries under the coordination of the Fraunhofer Institute for Manufacturing Engineering and Automation.

There is an increasing demand for eco-efficient products and services, provoked by public opinion, and being incorporated into legislation worldwide. Customer-driven requirements and company strategic goals go beyond the law and are becoming integral to company policies. For the global Electronics and Automotive industries, eco-efficient products are emerging as a critical competitive factor in the marketplace. Large original equipment manufacturers (OEMs) have internalized this trend and passed the requirements on to their suppliers. However, due to complicated and dynamic reporting requirements, suppliers are frequently overwhelmed. Lack of data and insufficient options for integration into internal processes have inhibited data transparency and compliance processes, what significantly impedes product innovation.



SustainHub is set to solve these problems. It will provide an efficient, integrated system for the generation, validation and transmission of sustainability data across the entire supply chains. SustainHub's data architecture is designed to meet all data exchange needs in a sustainable world, allowing for maximum traceability and transparency.

Figure 9: Sustain Hub Project

Initially, relevant sustainability aspects are defined and a new set of sustainability indicators for a holistic evaluation are created. Then the data requirements are defined and methods for the aggregation of the sustainability data along a supply chains are developed. In a third phase plausibility checks are carried out and measures for the integration into corporate decision making are identified.

Project team at ISIS: Univ.-Prof. Dr. Rupert Baumgartner
 Morgane Fritz, MA
 Josef-Peter Schöggel, MSc
 Mag. Sabrina Engert

Duration: Feb. 2012 – Jan. 2015

Funding: Seventh Framework Programme of the European Commission

Website: www.sustainhub-research.eu



2.2.6 Review of the CULT-LCA

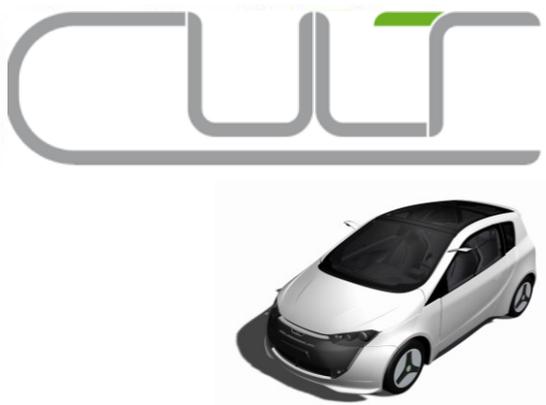


Figure 10: CULT Magna Steyr Fahrzeugtechnik AG & CO KG

“Magna Steyr Fahrzeugtechnik AG & Co KG”, an important Austrian automotive company, is currently working on a new vehicle concept that is dedicated to sustainability. This concept emphasizes (i) an innovative power unit - namely compressed natural gas - in order to reduce CO₂ emissions, and (ii) a light weight construction approach in order to reach a total vehicle’s weight of approximately 650 kg. The concept is abbreviated with CULT, which stands for “CarsUltraLight-Technologies”.

In order to assess CULT’s environmental effects along its whole life cycle, Magna Steyr conducted a life cycle assessment (LCA) according to ISO 14040 and 14044. For this LCA, the software “ProdTect” (Version 1.5) has been used, which deploys the widely used “ecoinvent“-database for the LCA’s life cycle impact assessment.

Magna Steyr commissioned ISIS to check that LCA in terms of completeness, plausibility, quality, and adequate scientific execution. Therefore, that check can be seen as “critical review“ according to ISO 14044.

To prepare the review, two audit sessions have been organized in the company’s premises and the ISIS team has been provided with various relevant documents including draft versions of the LCA report. The recommendations made by ISIS have been taken into account by Magna Steyr and led to an improvement of the CULT-LCA quality.

Project team at ISIS: Univ.-Prof. Dr. Rupert Baumgartner & Dr. Ralf Aschemann

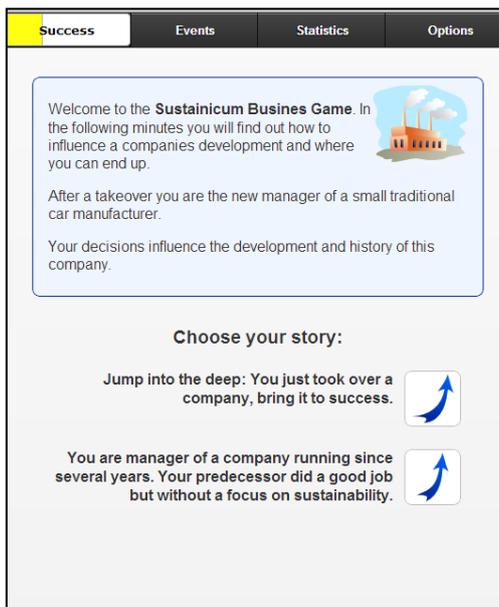
Project partner: Magna Steyr Fahrzeugtechnik AG & Co KG, Graz

Funding: Magna Steyr Fahrzeugtechnik AG & Co KG, Graz

Duration: June - September 2012

2.2.7 SUSTAINICUM Business Game

The Microtraining SUSTAINICUM Business Game is developed within the frame of the SUSTAINICUM project of three Austrian universities (University of Natural Resources and Life Sciences, Vienna, University of Graz, Graz University of Technology), which aims to introduce topics in university teaching that are relevant to sustainability.



The SUSTAINICUM Business Game (www.sustainabilitymanager.at) is a strategy game which is based on the simulation data of the Sustainability Manager, a browser-based sustainable business simulation game. The game is developed by the Institute of Systems Sciences, Innovation and Sustainability Research in cooperation with the Attractive! att15 GmbH. The applied technology Attractive! Boyscout is a modern JavaScript-Game-Framework for decision-oriented Web & Mobile games. The target of the SUSTAINICUM Business Game is to manage a company in the automotive industry in a sustainable way. In doing so, the game simulates the impacts of the different decisions and reflects the key data of economic success, environmental impacts and social engagement.

Figure 11: SUSTAINICUM Business Game

Application and main Objectives

1. Identification of the complexities and connections in a company
2. Support of long-term and sustainability-oriented thinking
3. Recognition of the connection and importance of the three dimensions of sustainable development (economic, ecological and social)
4. Practice-oriented application of sustainable decisions in a company
5. Investment in sustainable development is important for a company's success
6. Decision making process: Realization of the impacts on the company without living with the consequences in real world

Project team at ISIS: Univ.-Prof. Dr.Rupert J. Baumgartner, Mag. Sabrina Engert, Mag. Martina Hölzl, Anita Orthofer

Project partner: Attractive! att15 GmbH

Duration: Oct. 2012 – Feb. 2013

Website: <http://www.att15.com/sustainicum;>
<http://www.att15.com/sustainicum/?locale=en>

2.2.8 SUSTAINICUM Microtraining Sustainable Lifestyle

The Microtraining Sustainable Lifestyle is developed within the frame of the SUSTAINICUM project of three Austrian universities (University of Natural Resources and Life Sciences, Vienna, University of Graz, Graz University of Technology), which aims to introduce topics in university teaching that are relevant to sustainability.

Microtraining is a way to provide people information in a short time, and to support informal and peer-to-peer learning. The microtraining concept is based upon the microtraining method developed in the Leonardo da Vinci program (see <http://www.microtraining.eu/en>).

The Sustainable Lifestyle Microtraining concept assumes that with the help of the microtraining material teachers or students themselves can act as micro trainers and support personal change in a group setting. According to the main environmental relief potential in everyday life the three areas of food, mobility and energy were selected for preparing the SUSTAINICUM Microtraining Sustainable Lifestyle documents. Experiences of previous projects and training concepts were taken into account.

Over a period of 3 months up to one term, short inputs stimulate reflection on the own lifestyle, promote exchange with other peers and starts change processes. The sessions (15 - 20 minutes) can be integrated into all courses, irrespective whether the main topic refers to sustainability.

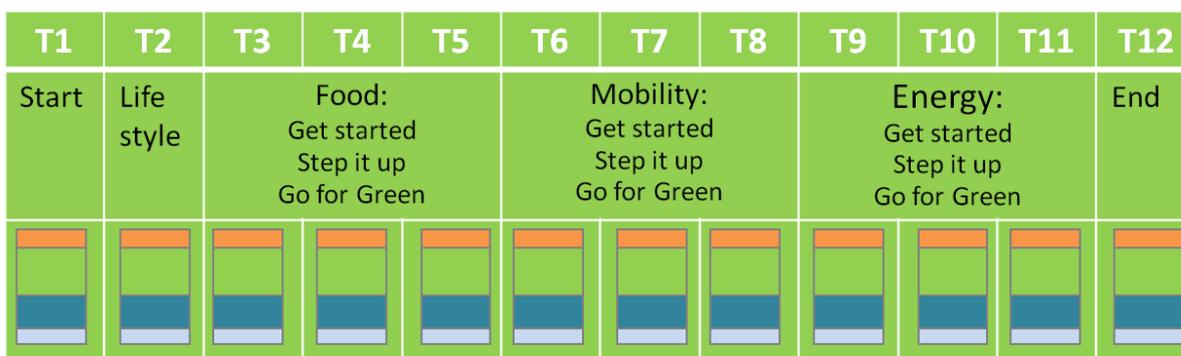


Figure 12: Design of the SUSTAINICUM Microtraining Sustainable Lifestyle

For each topics three successive sessions are provided, each of them following this structure:

- 'Get started': is about raising awareness and assessing the status quo, with short input of 'facts & figures'.
- 'Step it Up': Based on the individual context possible steps of change are defined.
- 'Go for Green': Supported by the peer-to-peer exchange, the participants work out their personal goals till the end of the microtraining cycle.

Project team at ISIS: Dr. Ulrike Seebacher
Project partner: Department of Geography and Regional Science, University of Graz
Duration: October – November 2012
Funding: BMWF – Austrian Federal Ministry for Science and Research
Website: www.sustainicum.at

2.2.9 Interactive electronic textbook (eBook) for systems sciences

The rise of tablet computers and smartphones is accompanied by new possibilities for students as well as professors. It allows to provide eBooks and especially electronic textbooks with interactive elements. Besides the incorporation of audio and video material, educational examples like dynamic models and simulations can be made accessible out of the text, giving the students the possibility to better understand and comprehend the teaching subject.

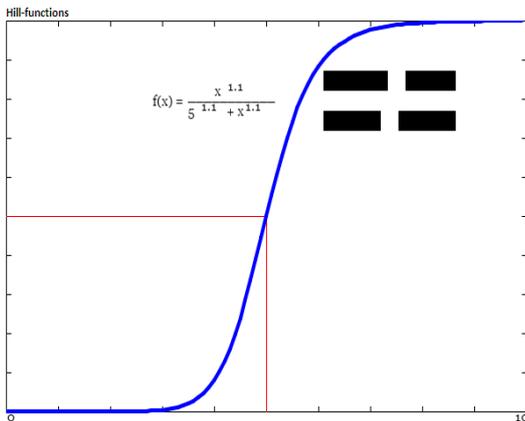


Figure 13: Interactive E-Textbook

For these reasons, Manfred Füllsack, Professor for Systems Sciences at ISIS Graz, aims to create an interactive electronic textbook for systems sciences based on software applications for tablet computers. The project is already in progress, a first version of the interactive textbook is expected to be available by the end of 2013.

The aims of the project are:

- To allow active learning with the help of significant examples where dynamics are not presented statically as graphics, but simulated directly via software applications.
- To give students the possibility to learn and try out the characteristic behaviour of specific impacts (for example the consequences of changing parameters) on their own, but at the same time under guidance of the text.
- To test eBooks on their applicability for the special requirements of textbooks generally and to find a convenient, cross-platform and non-proprietary presentation method.

Project team at ISIS: Univ.-Prof. Dr. Manfred Füllsack
Project partner: Univ.-Doz. Dr. Martin Ebner (cooperation partner)
Duration: September 2012 – Dezember 2013
Funding: Land Steiermark

2.2.10 Boost Erasmus Mundus, europeAn higher educaTion and Employability through video Sharing community (tuBEMATES)



Figure 14: TuBeMates

“tuBEMATES” is an Erasmus Mundus 3 project, aimed at enhancing both the visibility and attractiveness of European Higher Education. In order to pave the way for the new 'Erasmus 4 All' programme, tuBEMATES intends to create a community where students can share impressions and expectations on Erasmus Mundus experiences through self-produced video-clips and trailers. Moreover, employers and representatives from the business sector will be involved.

The project’s concept considers two important aspects: (1) According to recent publications about perceptions of foreign students, fewer Asian graduates choose European universities for their postgraduate studies to improve their career

opportunities and to enrich intercultural understanding with EU countries; (2) the new programme “Erasmus 4 All” focuses, inter alia, more on including firms as partners.

Students as the project’s main target groups will be the main actors. Through the development of a video sharing community, Erasmus mundus students will be supported in capitalizing mobility experiences and increasing employability chances. Additionally, best practices and success stories will be disseminated.

Project team at ISIS:

Dr. Ralf Aschemann

Project partner:

University of Barcelona; Università degli Studi Guglielmo Marconi (Italy); University of Poitiers (France); Aoyama Gakuin University (Japan); Thammasat University (Thailand); Hanoi University of Science and Technology (Vietnam)

Duration:

September 2012 - October 2014

Funding:

European Commission



2.3 PhD - projects

2.3.1 European Union Emissions Trading Scheme and potential effects on waste management

The increasing threat of climate change demands a clear commitment with respect to greenhouse gas emission reduction at an international, European and national level. Thus, specific policy measures and incentives need to be created in all relevant areas. The probably most famous climate political commitment up to now is the Kyoto Protocol. It called for greenhouse gas emission (GHG) reductions of 8 % for the European Union (EU) and 13 % for Austria (these targets are with respect to the base year 1990), and was phased out by the end of 2012. Although there is no follow-up agreement to the Kyoto Protocol, in 2007 the EU has developed an approach for a climate and energy policy. The aim for Europe is to become an energy-efficient, low carbon economy by reaching the “20-20-20” targets. Even though the Kyoto Protocol expires by the end of 2012, the climate political instrument of Emission Trading, to be more precise, the Emissions Trading Scheme of the EU (EU ETS) is still in action. As present, since the waste management sector is not included in that regulation system, the present PhD thesis analyses, calculates and emphasises on a possible inclusion of the Austrian waste management sector in the EU ETS. Taking the current situation as a starting point, various possibilities for including the domestic waste sector in the EU emissions trading system are examined, and their relative impact on specific stakeholders and on the sector in general are assessed.

The objective of the PhD thesis is to generate specific knowledge and insight regarding a possible inclusion of the Austrian waste sector in the EU ETS. In addition, it is hoped that such knowledge will improve our ability to assess and identify future potential in terms of waste sector economics. While the analysis focuses on the Austrian waste sector, potential impact in terms of the overall European context is also considered. Results and implications are thus mostly relevant for those active in the Austrian waste sector. The intention is to provide decision makers and waste sector participants with the relevant support and guideline principles as they navigate Austrian climate policy.

This PhD thesis is partly funded by Altstoff Recycling Austria AG and Saubermacher Dienstleistungs AG. Therefore special thanks to both companies for their constructive ideas and support.

PhD student at ISIS: Mag. Nina Braschel

Duration: 2010 –2013

2.3.2 Corporate Sustainability Strategies: An Analysis of the Austrian and German Automotive Industry

Sustainable development in the context of corporate sustainability strategies is a frequently discussed issue. There is an on-going discussion relating to corporations and their commitment to sustainable development. In the centre of this discussion, stakeholder debate if the corporations whether are tracking the intention to be “good citizens” or the improvement of the corporations image and therefore the profitability. Furthermore the topics efficiency and innovation capacity play a prominent role in considering ecological and social aspects in the automotive industry. In the past, numerous journal articles dealing with the question, “why are corporations choosing to commit or not commit to sustainability aspects and activities”? The connection between corporate sustainability and the corporation’s performance is often discussed in the context of strategic management and the implementation process of sustainability in the corporation’s strategy. Nowadays, a significant amount of corporations assume responsibility and implement the concept of corporate sustainability in their corporate strategy. In doing so, they focus on different models and tools. Corporations are responding to external pressure by creating tailor-made sustainability strategies which may not necessarily cater to the balance between the sustainability strategy, competitive strategy, and the normative justification of the corporation. In addition corporations often separate social and environmental issues from traditional strategic issues and therefore they interrupt the positive contribution to economic performance.

The main research question of the dissertation is: Which corporate sustainability strategies can be identified in the automotive industry and how are these strategies communicated?

The objective of the dissertation is to identify the most important sustainability aspects in the automotive industry regarding their strategic focus, organizational culture and self-expression. Due to the increasing discussions within the automotive industry relating to ecological aspects, environmental performance and legislative processes, the importance of research about corporate behaviour, action and communication is rising. This represents a relevant factor in fostering the sustainability management of the automotive industry. In doing so, it is important to identify the long-term objectives and strategies within the different corporations as well as in the whole sector.

PhD student at ISIS: Mag. Sabrina Engert

Duration: 2012 – 2015



2.3.3 Corporate Sustainability in Styrian start-up enterprises: Motives and Implementation strategies

The sustainability discourse is continuously gaining importance in today's business activities with regard to the increasing perception of sustainability and especially environmental issues by society, policy and research, hence by the company's stakeholders. Therefore different concepts dealing with the topic of sustainable development at corporate level have been developed in the past. At the same time the practical application of those concepts differs from company to company tremendously regarding the degree of integration of sustainability measures into the business processes. This study analyzes actions undertaken by Styrian start-up enterprises on the field of sustainability and therefore uses the Corporate Sustainability approach. Start-up businesses have to deal with a bunch of limitations that often complicate progressive steps on the field of sustainability and make it harder for them to commit to sustainable activities. Moreover financial options and human resources are much more restricted in Start-up businesses than in large multinational companies, which makes it even harder for them to achieve sustainable advance. But then, start-up companies don't possess an established organizational culture, which enables a lot of space for new mindsets, like for example the integration of sustainability principles into the business right from the start. According to these the challenges integrating sustainability measures in the corporate strategy is even more thrilling.

The main research questions of the dissertation are:

What are the implications of a Corporate Sustainability Strategy for start-up enterprises? And how should a strategic concept of implementing sustainable actions systematically in start-up enterprises be defined?

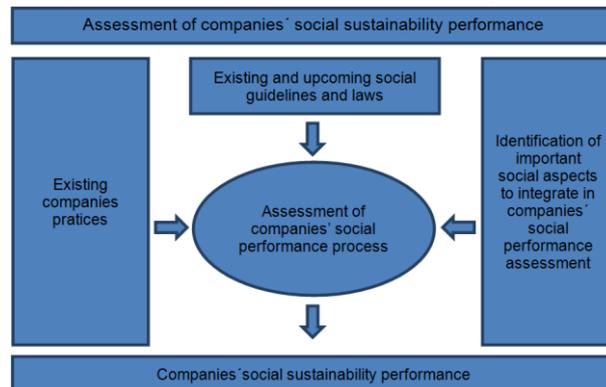
The objective of the dissertation is to demonstrate the different circumstances for the implementation of sustainability measures in start-up companies compared to established companies. Due to these different conditions this work should focus on the one hand on the incentives and motives of start-up companies following a Corporate Sustainability strategy and on the other hand on the barriers hindering the implementation of a sustainability strategy in start-up companies. Finally an adequate Corporate Sustainability concept should be designed to meet the requirements especially of Start-ups.

PhD student at ISIS: Mag. Martina Hölzl

Duration: 2013 – 2016

2.3.4 Assessment of social sustainability aspects to measure companies' sustainable performance along the supply chain – A focus on the Electronics and Automotive industries

The topic of this thesis is integrated into a European project called “SustainHub”. This project focuses on compliance and sustainability data exchange within the Supply Chain in the Electronic and Automotive industries for SMEs and large groups. For more than twenty years now, abundant papers have been published in the field of sustainable development. The



literature shows a diversity of references, especially on the environmental and economic aspects of sustainable development, but there is a lack of knowledge as regards the social dimension. Indeed, as mentioned in the study of Seuring S. and Müller M. (2008), out of 191 papers on the three dimensions of sustainable development (economic, social, environmental), only 10.5% (20 papers) addressed the social dimension.

Figure 15: Assessment of companies' social sustainability performance

Moreover, companies from these sectors produce goods that are used in all developed countries and increasingly in developing countries (cars, mobile phones, computers...). Finally, workers are expected to work in a stressful work environment due to a competitiveness race between companies, especially in the electronics industry, where some major social problems are stress and suicide (cf. Foxconn, France Telecom). As a consequence, measuring the awareness of society and companies on social practices in these sectors shall also be of great relevance. The research question of the dissertation is: How to identify social relevant aspects and measure the performance of companies as regards social sustainability?

The objectives are:

1. Bring new knowledge to the social sustainability field of research with a focus and use-cases on companies practices to complete the existing theoretical approaches
2. Help forecast the gap between the existing practices and the future requests on social sustainability through regulations, social pressure, etc... (identification of future challenges)
3. Help companies take into consideration and integrate social aspects in their organization and in their supply chain (providing statistics, guidelines, best practices, indicators) according to their size (SMEs/large groups)
4. Evaluate the customers' sensitivity to the social performance of companies in these sectors (Online/On-site survey)
5. Give a definition of social sustainability including the role of companies (micro-level perspective).

PhD student at ISIS: Morgane Fritz, MA

Duration: 2012 – 2015

2.3.5 The impacts of food choice on the environmental nitrogen pollution in Austria

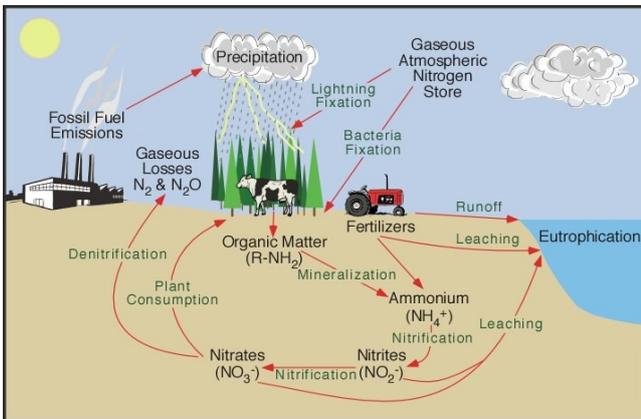


Figure 16: The Nitrogen cycle. (Source: <http://www.physicalgeography.net>)

Nitrogen is crucial for life on our planet, primarily as component of proteins and as an essential nutrient providing the basis for our food production. Whereas it constitutes the major part of the earth's atmosphere in its molecular form N₂, it is only reactive nitrogen (Nr – i.e. all biologically, chemically, and radiatively active nitrogen compounds, such as for example NH₃, NO_x, N₂O, NO₃) that can be used and is needed by most organisms.

As humans today artificially create amounts of reactive nitrogen (e.g. as fertilizer for food production) that far exceed natural terrestrial creation, the natural nitrogen cycle is altered. Excess nitrogen ultimately accumulates in the environment, causing significant effects on humans and ecosystems. These effects include eutrophication, soil acidification, nitrate pollution of groundwater, formation of particles hazardous to health, ozone formation and climate change. Thus, the use of nitrogen has both “good and bad” effects.

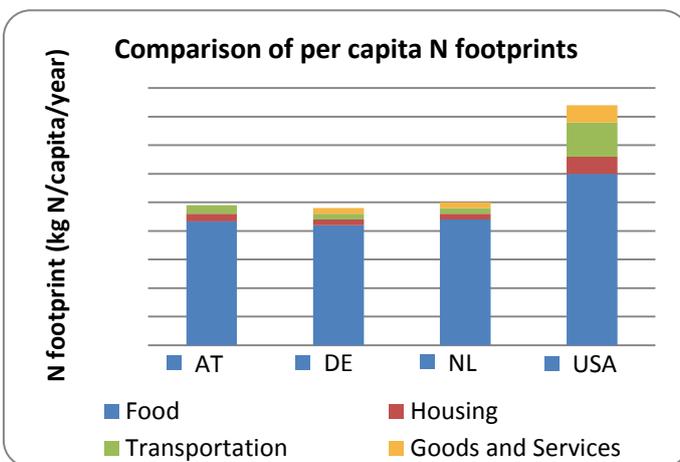


Figure 17: Comparison of per capita N footprints

(cost-)effectiveness as potential policy measures. They shall serve an integrated policy approach that considers various interactions and interlinkages.

Thus, the dissertation is intended to raise awareness among the public and policymakers for the relationship between food consumption and nitrogen and its effects in Austria. In that sense, the dissertation might also contribute to an Austrian national nitrogen budget to be established in the future. Finally, the project shall yield recommendations regarding possible points for improvement and policy measures and their effectiveness. The PhD project under the supervision of Prof. Wilfried Winiwarter is funded by a doctorate scholarship from the URBi-Faculty.

PhD student at ISIS: Magdalena Pierer, MSc
Duration: 2012 – 2015

2.3.6 Dynamic Complexity, Efficiency, and Coordination Failures in Education Systems

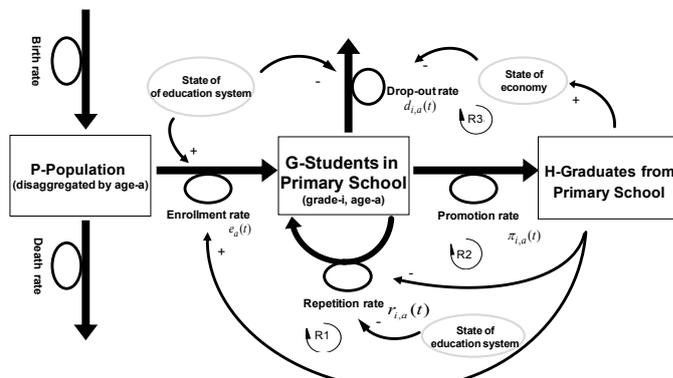


Figure 18: Overview of the Model

aggregate human capital and their effects on the efficiency and vulnerability of primary education system. The core of the model will contain a continuous-time stock-flow structure resembling a cohort chain where a flow of students enter the education system and progress throughout a number of intermediate stages, and then finish either by graduating or dropping out of school (Figure 18). With this, it is expected to generate new insights of the determinants of primary education attainment with specific application to the case of Nicaragua and an explanation of its historical performance. For the present study I will surface the dynamics of the pattern shown by the system under study and explore the development process detailing the impact of exogenous shocks on its pattern evolution. System Dynamics methodology will be used as the main research method (Sterman, 2000). It is a planning tool that considers the interaction over time of key variables interacting within the system under analysis. The model to be developed seeks to capture main (nonlinear) decision rules used by different stakeholders that determine their behavior and the effect on the selected variables. The central idea is to examine the implications of various exogenous changes that impact the productivity of one or more parts of the education process through:

- A systemic perspective for the analysis of human systems that explicitly includes the nonlinear and dynamic complexities of socio-economic and environmental factors influencing the development of education systems, in particularly those in developing countries. A fundamental aspect of our model definition and causal hypothesis will be the existence of positive feedbacks from endogenous aggregate characteristics in which the members of one generation, namely parents, induce decisions in the next generation.
- An innovative tool to evaluate the performance of education systems over time. This is-sue is of particular relevance for some countries, such as those in Latin America and Africa, which despite significant improvements in their education institutions and macroe-conomic environments have failed to experience sustained improvements in their primary school outcomes.
- The use of computer simulation of feasible policy actions (or exogenous shocks) that might be effective in changing the performance of an education system can provide very useful information to understand factors such as resilience, pattern formation, and sys-tem attractors.

PhD student at ISIS: Porfirio Guevara, MSc
Duration: 2010 - 2014

2.3.7 Restructuring the Austrian Energy System – Potential, Indicators, Dynamics

The shortage of non-renewable resources has been the main focus of concern within the last decades. Especially the “oil crisis” in the 1970’s demonstrated the relevance of a sustainable usage of non-renewable energy sources such as oil, coal or gas. The current dependence of fossil fuels leads to economic and political uncertainties such as increasing energy prices and causes a steady and irreversible climate change due to permanently increasing CO₂ emissions. Despite these facts, global energy production is still highly depended on mainly fossil fuel based energy sources. Furthermore, the steady rise in population and the economic growth lead to an increasing consumption of energy and doesn’t make it easier to initiate the turnaround.

Although Austria has a high potential of natural energy sources such as water or wood and Austrian government aims for the reinforced usage of these renewable energies, the dependency on fossil fuels and also the emissions of greenhouse gases are rising constantly. As many other European countries, Austria faces the challenge to find a pathway away from existing centralized and mainly fossil fuel based energy sources towards more decentralized energy production systems based on domestic renewable energy sources. In addition to the intensified exertion of renewable energy sources, decentralized production of it will play an important role to ensure a sustainable energy management for Austria in the future.

The main research aim of this project is to understand and describe the transition process of decentralized renewable energy production in Austria. Based on the multi-level perspective of socio-technical transition (Geels, 2002) the objectives are:

- to investigate which organizational settings can support the enhancement and development of on-site renewables.
- to understand and describe the transition process (key-agents and key-parameters).
- to define framework conditions to foster a rapid adoption.

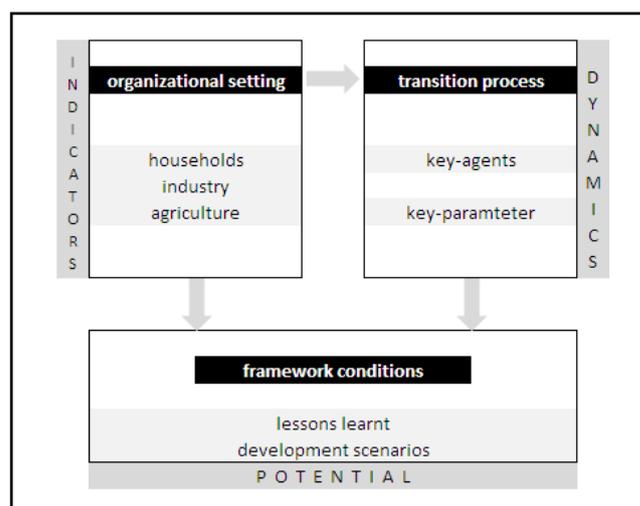


Figure 19: Thesis Framework

In order to define framework conditions in a highly effective and cost-efficient way, they need to be adjusted to the respective needs of (potential) participators at different levels. Here we distinguish between three major groups of adopters: households, industry and agriculture.

2.3.8 Measuring and improving sustainability in global supply chains: an example from the electronics and automotive industries

Has sustainability already found consideration in many different areas of business operations, from product, design, to post-consumer product management, so is its consideration in supply chain management operations still lacking behind. The field of Sustainable Supply Chain Management (SSCM) intends to fill this gap. From a company's profit-oriented point of view, SSCM makes sense, since it has the potential to decrease costs due to efficiency improvements. It also avoids non-compliance with increasingly stringent regulations and legislations, such as REACH, RoHS or the End of Life Vehicle Directive in the automotive industry. From an environmental and social perspective the life cycle phase, ranging from raw material extraction, through manufacturing processes to the final delivery to the customer, is of particular concern. The depletion and the pollution of the environment and massive violations with labor and human rights are just some challenges that have to be overcome. This particularly holds true for complex and resource extensive sectors such as the automotive and electronics industries. An efficient management of natural and human resources at all stages in this process, as well as the application of measures to collectively minimize the negative impacts on these two dimensions of sustainability is a necessary and promising approach.

The objective of this project is:

This dissertation addresses unsolved problems in SSCM with the intention to rectify them. Firstly a new set of comprehensive and aggregable indicators for sustainability assessment in automotive and electronics supply chains will be developed. Secondly, the question "Can a sustainable supply chain be profitable?" is to be answered in detail. This will be done by investigating the benefits, challenges and success factors of sustainable supply chain management and by analyzing the interdependencies between sustainability and financial indicators.

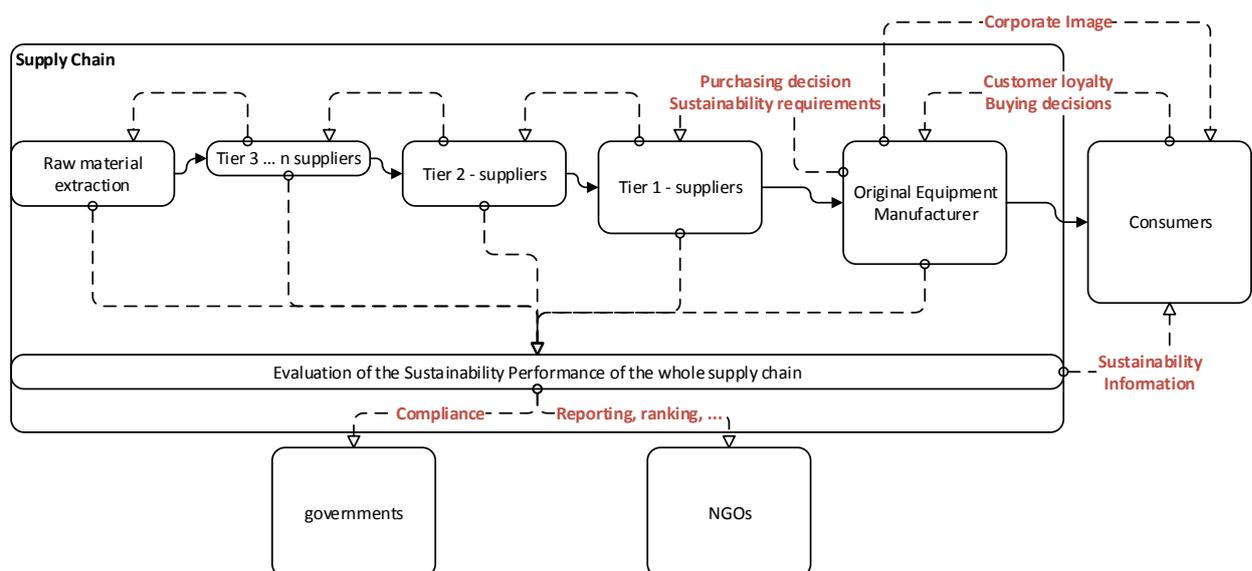


Figure 20: Sustainability related interdependencies in a supply chain

PhD student at ISIS: Josef-Peter Schögggl, MSc
Duration: 2012 - 2015

2.3.9 A Nitrogen budget for Austria's agricultural sector

Bio-available nitrogen is an important nutrient in the agriculture. It stimulates plant growth and therefore it is added to fields as fertilizer. Further distribution of nitrogen to the environment is uncontrolled and almost impossible to avoid. Due to excess nitrogen, unintended biogenic processes are promoted and environmentally adverse substances (ammonia, nitrogen oxide or nitrous oxide) are released to the atmosphere, or (nitrate) to the ground water. Furthermore, nitrogen release may trigger eutrophication or reduce biodiversity in the ecosystems.

The objective of this dissertation is to optimize application efficiency of bioavailable nitrogen in agriculture and to minimize losses and impacts on the environment. Concrete investigative questions are:

- What are the intervention points in the Austrian agricultural nitrogen cycle?
- Which measures for optimizing the nitrogen cycle are possible?
- How can future scenarios for the application of nitrogen in the agriculture be developed, concerning the intervention points as mentioned above?

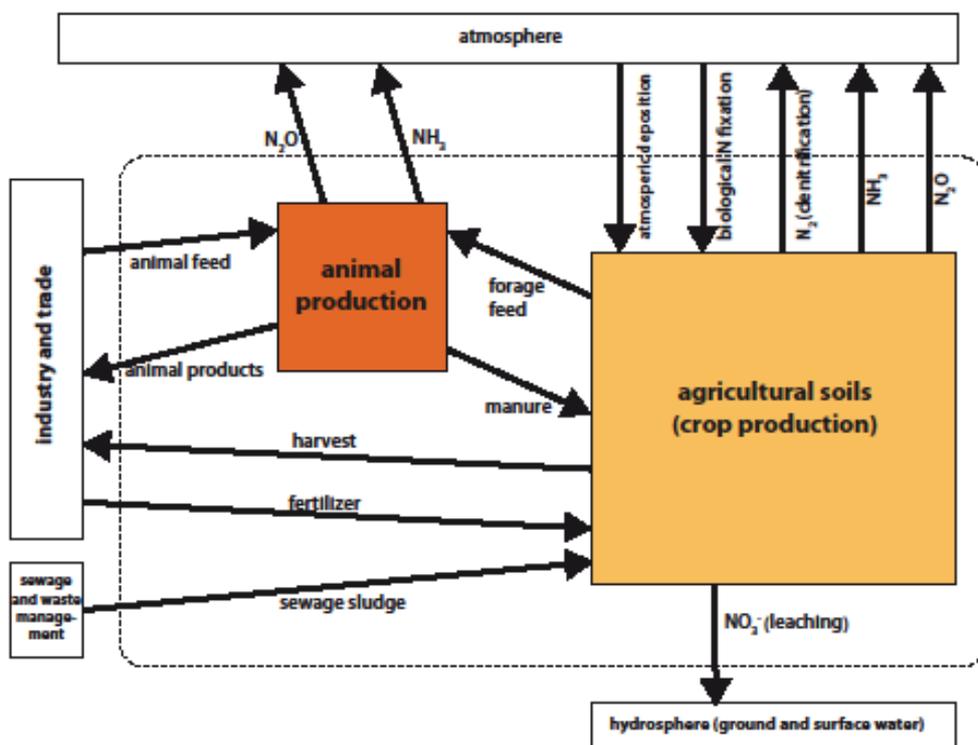


Figure 21: Nitrogen in- and output flows in the agricultural sector

Contributing to the national project "Farming for a better climate by improving nitrogen use efficiency and reduce greenhouse gas emission" (Farm-Clim), specified tasks within the PhD thesis will be developed together with the project partners.

PhD student at ISIS: Dipl. Ing. Andrea Schröck

Duration: 2013 - 2015

2.3.10 Scenarios for future greenhouse gas emissions in Austria

Future emissions and concentrations in Austria will be assessed with the help of the RCPs (Representative Concentration Pathways) and the SSPs (Shared Socioeconomic Pathways) of the future 5th Assessment Report of the IPCC. One of the main drivers at the beginning of the research project is the search for crossovers between the international scenarios and the national policies. This has to be seen as the main knowledge gap in this area as the Austrian's emission scenarios of the Austrian Environmental Agency are based on different methods and calculations than the RCPs.

The main objective of the dissertation is the analysis of future GHG in Austria in order to answer the main research question "What are the main influences on future emissions in Austria till the end of the century?". The background for this analysis are the RCP and SSP scenarios, and the main drivers for climate change and a raise in radiative forcing in Austria should be identified and qualified. The connection and similarities between the RCPs and Austria's climate policy shall be identified and, if possible, combined with adapted storylines specifically for Austria. Furthermore, it should be possible to use this method to create a framework which can be used by different single nations to assess their emissions and concentrations.

The preliminary conceptual framework of the dissertation project derives from the before mentioned representative concentration pathways scenarios by the IPCC. These scenarios will be adapted for a national purpose in Austria. Figure 22 gives an overview of the preliminary research framework:

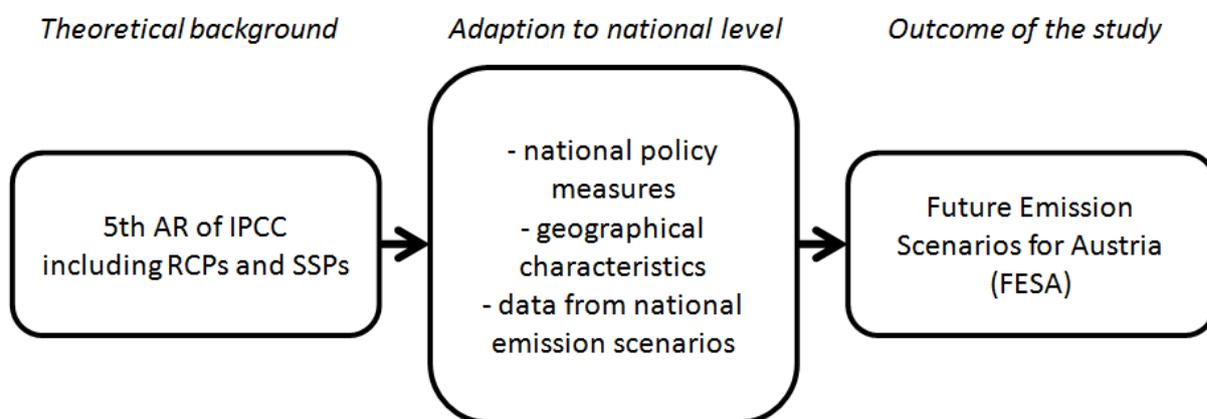


Figure 22: Preliminary conceptual framework for the dissertation project

PhD student at ISIS: Mag. Thomas Winkler, MSc

Duration: 2013 - 2016

2.3.11 Renewable Energy Diffusion in Austria

Due to its high technological potential and the rapidly decreasing costs, photovoltaics is a worldwide increasingly promising cornerstone of renewable energy production. In several European countries, e.g. in Germany, the PV penetration is far higher than in Austria. In Germany, recently citizen solar power plants have gained strong attraction. Within citizen solar power plants (“Bürgerkraftwerke”) residents jointly invest in a local PV plant and may use the electricity locally or feed it into the grid. In Austria, applications for PV investment subsidies at the household level exceeded the limited budgets for PV within minutes after opening the calls in recent years. Similar experiences were made with the subsidised feed-in tariffs for PV plants, where a long waiting list has emerged. Obviously, this is evidence that the current subsidy regime is successful in stimulating the market uptake of PV in Austria and that there is still huge potential. However, it can be assumed that the current subsidy regime only reaches the tip of the iceberg: Individuals with strong pro-environmental values, highly interested in and fascinated by innovative energy technologies, and with good access to trustworthy information sources in their social and professional network. Thus, an unchanged continuation of the current subsidy regime might reach its limit as soon as demand within this small group of early adopters is saturated.

The main objective of this dissertation is to construct a dynamical system model to predict renewable energy adoption and market diffusion in Austria, aiming at an improved understanding of the decision making process for investments within and between the following three levels. The dissertation focuses mainly on photovoltaics and compares the process of innovation diffusion to other renewable energy sources, including wind, water, biomass and geothermal energy:

1. Households: How to push forward a highly decentralized energy generation e.g., with PV plants (up to 5 kWp) on the roofs of residential homes?
2. Industry: What further side conditions (peculiarities in decision making, limitations for action, etc.) need to be considered for fostering renewable energies in the business sector (manufacturing industry)?
3. Other kinds of organizations: What kind of support is needed to establish e.g., citizen solar power plants or similar concepts in a high number in Austria?

Starting from innovation theory - especially market diffusion and adoption theories - the dissertation will lead to a comprehensive understanding of the factors (including psychological, social and cultural factors) that are decisive whether an individual or an organization becomes a potential adopter at all and under which conditions. The expected outcome will include policy recommendations, such as a policy mix of economic incentives, regulations and other policy interventions and business models that foster a rapid adoption of renewable energy technologies in the Austrian energy sector.

PhD student at ISIS: Mag. Martin Kislinger

Duration: 2012 - 2015

2.4 Research cooperations and networks

2.4.1 EGC – Environment and Global Change

The University of Graz has defined seven research core areas, four of them with inter-university-cooperation. One of the latter is the research core area „Environment and Global Change“. Within this core area, global and regional climate and environmental changes are investigated and monitored. Further, the role of humans as co-initiator, co-concerned, and co-designer of this change as well as the question of search for possible ways for a transformation towards a sustainable development and innovation are central themes of EGC. Researchers from climate and environmental physics, environmental chemistry, hydrogeology, environmental biology, environmental economics, sociology, geography and regional sciences, systems sciences and sustainability research, environmental ethics and law collaborate interdisciplinary.

There are five main research areas:

- GlobEOS (Global Earth Observation and Stewardship)
- RegIMOS (Regional and Local Integrated Modelling System and Studies)
- EnviSYS (Changing Ecosystems and Earth-external Environmental Systems)
- GreenPROTEC (Green Processes and Technologies)
- RegiKNOWS (Regional Changes and Knowledge Transfer for Sustainability)



Figure 23: EGC Logo

2.4.2 ITdNet - International Transdisciplinarity Net

The ITdNet as a network on teaching and practicing transdisciplinary research has the aim to foster existing, and initiate new, boundary organizations between science and society. To this end, the network shares knowledge and experiences, organizes meetings and workshops, writes jointly scientific articles and initiates joint research projects.

Its programme is of true interdisciplinary nature, integrating knowledge from different disciplines, systems, interests and modes of thought with a set of specifically designed and internationally recognized methods. Going well beyond everyday research activities, the network follows a transdisciplinary approach integrating practice and research from the very beginning. As such, it contributes to closer relations between science and practice, assisting transition processes towards sustainable development. Prof. Claudia Binder, Prof. Alfred Posch and Prof. Gerald Steiner are board members of the ITdNet.

2.4.3 AIT Knowledge & Talent Development Programme: Innovation & Sustainability

The Foresight & Policy Development Department of the Austrian Institute of Technology (AIT) established the Knowledge & Talent Development Programme “Innovation & Sustainability” in order to meet the „grand societal challenges“, which are characterized by increasing dynamics and complexity of the involved and interacting systems. In the field of “Sustainable innovation oriented Infrastructure Policy” (SIIP) the Foresight & Policy Development Department cooperates with the Institute of Systems Science, Innovation & Sustainability Research, University of Graz and the Institute of Transportation, Vienna University of Technology.

This programme provides selected master and PhD students with an excellent scientific environment that allows the flexibility to pursue in-depth research in a broad variety of critical areas related to sustainable innovation oriented infrastructure policy. PhD and master student are not only scientifically mentored by AIT- and ISIS-scholars; they are also financially supported with scholarships.

In October 2012, a network meeting took place in the Vienna Techgate, with the outcome of a further institutionalization of the cooperation between ISIS, AIT and the other network members. ISIS succeeded to start one PhD-project (Vivianne Aggestam) and two Master-project (Claudia Enzi and Thomas Wagner), in 2012. An additional PhD-project is prepared to start early 2013.



Figure 24: Structure of Knowledge & Talent Development Programme



Figure 25: Network meeting 2012

2.4.4 ISDRS – International Sustainable Development Research Society

The International Sustainable Development Research Society (www.isdrs.org) was formally founded in 2006 and builds upon a 17 year history of the International Sustainable Development Research Conferences. The vision is to establish a forum where diverse research communities can come together creating a transparent dialogue on key problems, issues, initiatives, policies and strategies needed to make progress on sustainable development a reality. It aims to foster and communicate the importance of sustainable development in a global society, to promote collaboration and dialogue of a high quality and building bridges between different research communities and between research and its applications in society. In 2010 the 16th annual International Sustainable Development Research Conference was held in Hong Kong (China), in 2011 the 17th annual conference was held in New York (USA), and in 2012 the 18th annual conference was held in Hull (UK). The 19th annual conference will take place in Stellenbosch (South Africa) in Mid-2013.

Prof. Rupert Baumgartner is board member and executive secretary of the ISDR-Society.

2.4.5 ISIE – International Society for Industrial Ecology

ISIE (www.is4ie.org/) was founded in 2001 and promotes industrial ecology as a way of finding innovative solutions to complex environmental problems. Its mission is to promote the use of industrial ecology in research, education, policy, community development, and industrial practices. It facilitates communication among scientists, engineers, policymakers, and managers interested in better integrating environmental concerns with economic activities.

2.4.6 Institute of Social Ecology, Vienna

A teaching cooperation was set up between ISIS and the Institute of Social Ecology (SEC), Vienna campus of the University of Klagenfurt. This cooperation takes advantage of the flexibility of the respective curricula, allowing students to choose blocks of courses from the respective other institution as part of their own training. The arrangement allows ISIS students to spend a semester in Vienna, or SEC students to come to Graz. Also the joint supervision of master's theses is welcomed explicitly. Contact persons are Prof. Fridolin Krausmann and Mirjam Weber for SEC, and Prof. Wilfried Winiwarter for ISIS.

2.4.7 Chulalongkorn University Bangkok

In May 2010, ISIS set up a Memorandum of Understanding with the Chulalongkorn University Bangkok (Thailand), Environmental Research Institute in the field of environmental research. Dr. Ralf Aschemann is the contact person at ISIS.



2.5 Seminars hosted by ISIS – “ISIS Science Talk”

The ISIS Science Talk is a platform where external experts give a talk on core research topics of ISIS (systems sciences, innovation and sustainability research). The talks are given in English three times per semester and usually take place Wednesday at noon. This event is open for the entire URBi Faculty and friends of the institute.

The following talks were held in 2012:

- Dr. Markus Knoflacher (Austrian Institute of Technology / AIT): What can evolution tell us about sustainable development? 21 Nov 2012.
- Dr. Yoshiki Yamagata (NIES / National Institute for Environmental Studies, Japan): Land-use – Transport – Energy modelling for designing resilient urban systems. 30 Oct 2012.
- Dr. Tina Kaiser (IIASA) The role of microbial community dynamics for modelling carbon and nitrogen cycles in the soil. 09 May 2012.

Up-to date information and the whole list of speakers can be found at: <http://isis.uni-graz.at/en/forschen/science-talk>.

2.6 Events hosted by the ESS-Coordination Office

During the winter semester of 2012 the Coordination-Office for environmental system sciences hosted two major events for our students. The aim of the events was to give students a chance to get in touch with practice. This is in line with the ISIS' attempt to get students of environmental system sciences (ESS) closer to potential employers and give them a better understanding of the current requirements of the labor market.



Figure 26: ESS Students meet ESS Alumni

The first event on the 30th of October 2012 was organized in cooperation with AVL-List GmbH and focused on the topic of “applied system sciences”. AVL is the world's largest privately owned and independent company for the development of powertrain systems. It focuses on internal combustion engines as well as instrumentation and test systems.

Furthermore the company is one of Graz's largest employers. During the event AVL introduced their business unit called “System Development” and provided the students a better understanding of the current market situation and AVL'S customer requirements. The AVL representatives highlighted the importance of system thinking within their service and production processes and gave students the opportunity to ask questions. Another highlight of the evening was the presentation of Mr. Stiegler's master thesis (alumni of ESS) that focused on applied system sciences in the AVL. Moreover AVL gave students the opportunity to apply for further master theses and internships, which we highly appreciate.

About one hundred persons attended the second event on 10th of October that was called: “How to find your dream job – hints on internships and job applications”. In cooperation with the ESS Alumni Club and the Career Center (University of Graz) the Coordination-Office invited twelve ESS alumni from different fields of practice and research to share their experiences regarding job interviews, current demand in the labor market and their jobs. At the beginning of the evening the Career Center introduced the students to the event's topic and provided them with useful information on how to find a good job or internship. Next the students were allocated in small groups so they could have a nice, familiar and yet serious discussion with the ESS alumni. Finally the participants had the opportunity to get to know each other a bit better while having a nice buffet that was sponsored by the ESS Alumni Club. We would like to thank all participants, especially the ESS Alumni from Ecofinance, PwC, Magna, Saubermacher, Joanneum Research, FFG, bfk Schaffer, TU Graz, Career Center, Uni Graz and Umweltbildungszentrum Graz.

Due to the extremely positive feedback from the persons involved and the great number of participants the Coordination-Office considers these two events as a great success. Besides this, the number of ESS alumni has been growing constantly over the last years and it is therefore of necessity to promote the brand of environmental system sciences in order to attract potential employers to our students and ease their way towards a good career. Hence the Coordination-Office will continue hosting such events next semester and we hope that they will contribute to our students' success in the labor market.

3 PUBLICATIONS AND OTHER RESEARCH OUTPUT

ISIS in total	2010	2011	2012
Publications			
Publications in scientific journals	14	7	10
Scientific monographs	3	1	0
Editorships of scientific monographs	1	2	1
Book Chapters	8	5	12
Contributions to conference proceedings	22	14	9
Posters presented at scientific conferences	3	3	4
Other scientific publications	1	5	4
Projects			
Internally funded projects	1	1	1
Third-party funded projects	19	20	11
Cooperation projects	1	1	1
Functions			
Functions in external scientific committees	3	5	6
Functions in external appointment and habilitation committees	1	1	0
Functions in international journals (inc. individual reviews 2012)	27	29	10
Scientific reports	2	5	8
Networking			
Presentations at scientific conferences	22	10	30
Awards	2	0	2
Organization of scientific conferences	7	5	10
Visiting scientists (Incoming Mobility)	6	2	1
Travel activities (Outgoing Mobility)	16	7	7
Transfer – Science to professionals			
Publications – science to professionals	0	2	1
Publications in journals – science to professionals	0	1	0
Presentations – science to professionals	3	6	4
Organization of conferences for professionals	3	0	0
Training and further education – science to professionals	1	1	1
Transfer – Science to public			
Press releases	0	1	7
Publications for non-scientific audience	2	0	1
Presentations for non-scientific audience	5	6	16
Organized conferences for non-scientific audience	0	0	0
Training and further education	0	13	1

3.1 Publications

3.1.1 Publications in scientific journals

- Dominguez Rué, Emma; Mrotzek, Maximilian: *Shakespearean tragedies dynamics: identifying a generic structure in Shakespeare's four major tragedies*, in: International Journal of General Systems 41,7 (2012), 667 - 681.
- Fischer, Günter; Winiwarter, Wilfried; Cao, Gui Ying; Ermolieva, Tania; Hizsnyik, Eva; Klimont, Zbigniew; Wiberg, David; Zheng, X.Y.: *Implications of population growth and urbanization on agricultural risks in China*, in: Population and Environment (2012).
- Füllsack, Manfred: *Common Goods emerging? On Job and Time Sharing with the help of ICT*, in: International Journal for Digital Society 3,1 (2012), 600 - 608.
- Füllsack, Manfred: *Communication emerging? On simulating Structural Coupling in Multiple Contingency*, in: Constructivist Foundation 8 (2012).
- Füllsack, Manfred: *Information, Meaning and Eigenforms: In the Light of Sociology, Agent-Based Modeling and AI*, in: Information 2012,3 (2012), 331 - 343.
- Füllsack, Manfred: *Observing productivity. What it might mean to be productive when viewed through the lens of Complexity Theory*, in: Journal of Philosophical Economics 2012,5 (2012).
- Globocnik, Dietfried: *Geschäftsmodelle innovieren - Designprozess und Rahmenbedingungen zur Entwicklung neuer Geschäftsmodelle*, in: WING-Business 4 (2012), 23 - 27.
- Höglund-Isaksson, Lena; Winiwarter, Wilfried; Purohit, Pallav; Rafaj, Peter; Schöpp, Wolfgang; Klimont, Zbigniew: *EU Low Carbon Roadmap 2050: Potentials and costs for mitigation of non-CO2 greenhouse gases*, in: Energy Strategy Reviews (2012).
- Smith, Keith A.; Mosier, Arvin R.; Crutzen, Paul J.; Winiwarter, Wilfried: *The role of N2O derived from crop-based biofuels, and from agriculture in general, in Earth's climate*, in: Royal Society of London. Proceedings. Series B. Biological Sciences (2012).
- Wagner, Fabian; Amann, Markus; Borken-Kleefeld, Jens; Cofala, Janusz; Höglund-Isaksson, Lena; Purohit, Pallav; Rafaj, Peter; Schöpp, Wolfgang; Winiwarter, Wilfried: *Sectoral marginal abatement cost curves: implications for mitigation pledges and air pollution co-benefits for Annex I*, in: Sustainability Science (2012).

3.1.2 Editorships of scientific monographs

- Puxbaum, Hans; Winiwarter, Wilfried (Ed.): *Advances of Atmospheric Aerosol Research in Austria*. Wien: OeAW 2012.

3.1.3 Book chapters

- Füllsack, Manfred: *Complexity and its observer. Does complexity increase in the course of evolution*, in: Dunshirn, Alfred / Nemeth, Elisabeth / Unterthurner, Gerhard (Ed.): Crossing Borders. Thinking (across) Boundaries. 2012, 379 - 392.
- Füllsack, Manfred: *Noise als Notwendigkeit - Überlegungen zur Produktivität des Unproduktiven*, in: Stephan J. Berger, Paul Ferstl, Stefan Wedrac (Ed.): Nofree lunch. Frankfurt/M: Peter Lang 2012, 97 - 114.
- Gelbmann, Ulrike; Baumgartner, Rupert J.: *Strategische Implementierung von CSR in Unternehmen*, in: Schneider, A., Schmidpeter, R. (Ed.): Corporate Social Responsibility: Verantwortungsvolle Unternehmensführung in Theorie und Praxis. Springer Berlin Heidelberg, Springer Berlin Heidelberg, 2012, 285 - 298.

- Gelbmann, Ulrike-Maria: *Das Verwertungsparadoxon: Die neue Komplexität in der Abfallwirtschaft*, in: Lorber, Karl et al. (Ed.): DepoTech 2012 Abfallwirtschaft, Abfalltechnik, Deponietechnik und Altlasten. 2012, 205 - 210.
- Gerzabek, Martin; Winiwarter, Verena; Baumgarten, Andreas; Blum, Winfried E.H.; Butterbach-Bahl, Klaus; Cushman, Gregory; Englisch, Michael; Feller, Christian; Fiebig, Markus; Frossard, Emmanuel; Haberl, Helmut; Huber, Sigbert; Kandeler, Ellen; Katzensteiner, Klaus; Kaul, Hans-Peter; Krausmann, Fridolin; Langthaler, Ernst; Showers, Kate B.; Spiegel, Heide; Winiwarter, Wilfried: *Productive soils, global environmental cycles and energy crops*, in: Verena Winiwarter und Martin H. Gerzabek (Ed.): The challenge of sustaining soils: Natural and social ramifications of biomass production in a changing world. OeAW 2012 (Interdisciplinary perspectives, 1).
- Posch, Alfred: *Die Zukunft der Fortbewegung. Visionen für die urbane Mobilität*, in: Bechmann, Ulrike & Friedl, Christian (Ed.): Mobilitäten - Beiträge von Vortragenden der Montagsakademie 2011/12. Graz: Grazer Universitätsverlag 2012, 11 - 23.
- Posch, Alfred: *Zwischenbetriebliches Recycling aus entscheidungstheoretischer Perspektive*, in: Von Hauff, Michael; Isenmann, Ralf; Müller-Christ, Georg (Ed.): Industrial Ecology Management. Wiesbaden: Gabler 2012, 205 - 218.
- Puxbaum, Hans; Winiwarter, Wilfried: *Introduction*, in: H. Puxbaum, W. Winiwarter (Ed.): Advances of Atmospheric Aerosol Research in Austria. Wien: OeAW 2012, 1 - 3.
- Seebacher, Ulrike: *Nachhaltig handeln – Kompetenzen für zukunftsfähige Lebensstile*, in: Sascha Ferz (Ed.): Gesellschaftliche Verantwortung als soziale Kompetenz. Graz: Uni-Press Graz Verlag GmbH 2012, 29 - 44.
- Winiwarter, Verena; Gerzabek, Martin; Baumgarten, Andreas; Blum, Winfried; Butterbach-Bahl, Klaus; Cushman, Gregory; Englisch, Michael; Feller, Christian; Fiebig, Markus; Frossard, Emmanuel; Haberl, Helmut; Huber, Sigbert; Kandeler, Ellen; Katzensteiner, Klaus; Kaul, Hans-Peter; Krausmann, Fridolin; Langthaler, Ernst; Showers, Kate B.; Spiegel, Heide; Winiwarter, Wilfried: *Endangered soils: A long-term view of the natural and social ramifications of biomass production in agriculture and forestry*, in: Verena Winiwarter und Martin H. Gerzabek (Ed.): The challenge of sustaining soils: Natural and social ramifications of biomass production in a changing world. OeAW 2012 (Interdisciplinary perspectives, 1).
- Winiwarter, Wilfried: *Inventorying PM emissions*, in: H. Puxbaum, W. Winiwarter (Ed.): Advances of Atmospheric Aerosol Research in Austria. Wien: OeAW 2012, 4 - 15.
- Winiwarter, Wilfried: *Outlook*, in: H. Puxbaum, W. Winiwarter (Ed.): Advances of Atmospheric Aerosol Research in Austria. Wien: OeAW 2012, 136 - 139.

3.1.4 Contributions to conference proceedings

- Baumgartner, Rupert J.: *Organizational culture – an essential factor for sustainable industry management*, in: The 18th Greening of Industry Network Conference. Greening of Industry Network 2012.
- Braschel, Nina: *Greenhouse Gas Emission Inventories in Company Environmental Reporting*, in: The American Academy of Sciences (Ed.): Paper Abstracts. Self-publisher 2012.
- Brudermann, Thomas: *Mass Psychology Revisited – Insights from Social Psychology, Neuroscience and Simulation*, in: Ulrich Weidmann et al. (Ed.): Proceedings of the 6th International Conference on Pedestrian and Evacuation Dynamics. Self-publisher 2012.
- Brudermann, Thomas; Orthofer, Anita; Posch, Alfred; Reinsberger, Kathrin: *Adopting Photovoltaics in Agriculture: The Case of Maschinenring Hartbergerland*, in: International

Sustainable Development Research Society (Ed.): Proceedings of the 8th Annual Sustainable Development Research Conference. Self-publisher 2012.

- Globocnik, Dietfried; Salomo, Sören: Managing autonomous innovative behavior of employees – the relationship between work environment design, self-efficacy and innovation project initiative (IPI), in: EURAM (Ed.): Proceeding of the 12th Annual Conference of the EURAM. 2012.
- Marko, Wolfgang; Müller, Christiana; Rauter, Romana; Vorbach, Stefan: *Business Model Innovation and Knowledge Transfer*, in: EURAM (Ed.): Proceedings - available online. Self-publisher 2012.
- Mrotzek, Maximilian; Baumgartner, Rupert J.; Brudermann, Thomas: *Silver dynamics: an integrated system dynamics forecast model for silver*, in: MEI Conferences (Ed.): MEI Conference proceedings CD - Precious Metals '12. Self-publisher 2012.
- Posch, Alfred: *Transdisciplinary case-study teaching on sustainable innovations*, in: University of Hull (Ed.): Proceedings of the 18th Annual International Sustainable Development Research Conference. Self-publisher 2012.
- Reinsberger, Kathrin: A concept to achieve energy autarky in Austria: indicators, potential, dynamics, in: ISDRS Society (Ed.): N.N. Self-publisher 2012.
- Stiegler, Alexander; Maletz, Michael; Mrotzek, Maximilian; Weck, Thomas: Generierung eines multiperspektiven Systemmodells in der automobilen Antriebsstrangentwicklung – Herausforderungen und Erfahrungen, in: Gesellschaft für Systems Engineering e.V. (Ed.): Tagungsband. Self-publisher 2012.

3.1.5 Posters presented at scientific conferences

- Amon, Barbara; Zechmeister-Boltenstern, Sophie; Winiwarter, Wilfried; Kantelhardt, Jochen: *Farming for a better climate by improving nitrogen use efficiency and reducing greenhouse gas emissions (FarmClim)*, for: 13. Österreichischen Klimatag, 2012.
- Amon, Barbara; Zechmeister-Boltenstern, Sophie; Winiwarter, Wilfried; Kantelhardt, Jochen: *Farming for a better climate by improving nitrogen use efficiency and reducing greenhouse gas emissions (FarmClim)*, for: EmiLi 2012, International Symposium on Emissions of Gas and Dust from Livestock, 2012.
- Brachel, Nina: Greenhouse gas emission inventories in company environmental reporting, for: 6th International Conference on Environmental Science and Technology, 2012.
- Winiwarter, Wilfried; Amann, Markus; Bodirsky, Benjamin; Bouwman, Lex; Brentrup, Frank; Cionni, Irene; De Vries, Wim; Dentener, Frank; Erisman, Jan Willem; Fischer, Günther; Fowler, David; Havlik, Petr; Klimont, Zbigniew; Leip, Adrian; Maas, Rob; Obersteiner, Michael; Palliere, Christian; Pierer, Magdalena; Rao, Shilpa; Riahi, Keywan; Simpson, David; Smith, Steven; Sutton, Mark; Zheng, Junyu: *Developing multi-purpose global nitrogen projections*, for: IIASA 40th Anniversary Conference “Worlds within reach – from science to policy”, 2012.

3.1.6 Other scientific publications

- Gelbmann, Ulrike: *Handlungsfeld 2: Innovationspotenzial v. CSR systematisch fördern/nutzen*. Inputpapier für Österreichischen Nationalen Aktionsplan CSR, der von der Autorin in Kooperation mit Prof. Dr. Bernhard Ungericht beraten wurde, 2012.



Gelbmann, Ulrike: *Handlungsfeld 4: CSR „mainstreamen“*. Inputpapier für Österreichischen Nationalen Aktionsplan CSR, der von der Autorin in Kooperation mit Prof. Dr. Bernhard Ungericht beraten wurde, 2012.

Guevara Chaves, Porfirio: *A Case Study of Crime and Judicial Supply Chain Dynamics with System Dynamics* (unpublished working paper).

Guevara Chaves, Porfirio: *A Dynamic Nonlinear Model for Education Systems: The Case of Primary Education in Nicaragua* (unpublished working paper).

3.2 Functions

3.2.1 External scientific functions

Baumgartner, Rupert J.: *Evaluation of Research Output*, National Research Foundation (South Africa), 18.09.2012.

Posch, Alfred: Kenyan smallholders' organization capability and participation in the tea supply chain: potentials and barriers of cooperative-outgrowers schemes, Alessandro Vasta, Utrecht, Utrecht University (Netherlands), 02.2012.

Posch, Alfred: Plastic Shopping Bags: An Analysis of Policy Instruments for Plastic Bag Reduction, by Rachel Miller, Utrecht, Utrecht University (Netherlands), 08.2012.

Posch, Alfred: Dutch & South African Sustainability Reporting - An Insight into Sustainability Reporting Methods and Frameworks in Dutch & South African Companies, by Mike Acton, Utrecht, Utrecht University (Netherlands), 08.2012.

Posch, Alfred: *Ernst Mach Stipendium*, ICM - Zentrum für Internationale Kooperation & Mobilität | Centre for International Cooperation & Mobility (Austria), 2012.

Winiwarter, Wilfried: *Gutachten Dissertation Magdalena Kistler*, TU Wien (Austria) 2012.

3.2.2 Functions in external scientific committees

Baumgartner, Rupert J.: *International Sustainable Development Research Society*, Board Member and Executive Secretary, since 01.07.2006.

Baumgartner, Rupert J.: *Saubermacher Umweltpreis* (Austria), Jury Member, 27.06.2012.

Perstel, Peter: *ICOGRADE (Canada)*, Executive Committee, 01.10.2012-1.10.2014.

Posch, Alfred: *ITdNet (European Union)*, membership, since 2002.

Steiner, Gerald: *European Rural Development Focus Group on alpine regions* (European Union), Membership, since 01.01.2001.

Winiwarter, Wilfried: Clean Air Commission of the Austrian Academy of Sciences (Austria), Membership, 14.06.2012-31.12.2012.

3.2.3 Functions in international journals

Aschemann, Ralf: *Journal of Environmental Assessment Policy and Management*, Member Editorial Board, since 01.01.2009.

Aschemann, Ralf: *Journal of Environmental Research*, Member Editorial Board, since 01.07.2009.

Baumgartner, Rupert J.: *Journal of Cleaner Production*, Editor, since 01.11.2008.

Baumgartner, Rupert J.: *Progress in Industrial Ecology: an international journal*, Member Editorial Board, 01.08.2007-31.01.2012.

Baumgartner, Rupert J.: *Sustainable Development*, Member Editorial Board, since 01.10.2008.

Füllsack, Manfred: *Basic Income Studies*, Member Editorial Board, since 01.01.20012.

Füllsack, Manfred: *Systems*, Editor, since 2012.

Winiwarter, Wilfried: *Aerosol and Air Quality Research*, Member Editorial Board, since 01.09.2012.

Winiwarter, Wilfried: *Greenhouse Gas Measurement & Management*, Member Editorial Board, since 01.01.2011.

Winiwarter, Wilfried: *Systems. Connecting matter, life, culture and technology*, Member Editorial Board, since 01.10.2012.

Reviews were undertaken for following journals:

- Atmospheric Environment
- Biogeosciences
- Corporate Social Responsibility and Environmental Management
- Ecological Indicators
- Environmental Impact Assessment Review
- International Journal of Sustainability in Higher Education (Print Edition)
- International Journal of Sustainable Development and World Ecology
- Journal of Aerosol Science
- Journal of Cleaner Production
- Journal of Environmental Assessment Policy and Management
- Österreichische Zeitschrift für Soziologie
- Poiesis & Praxis - International Journal of Ethics of Science and Technology Assessment
- Sustainable Accounting, Management and Policy Journal

3.3 Networking

3.3.1 Presentations at scientific conferences

Aschemann, Ralf: *Erasmus Mundus Master's Programme in Industrial Ecology*, main contribution (keynote), for: ÖAD-Tagung zu Erasmus Mundus und Tempus, 12.01.2012.

Aschemann, Ralf: *The implementation and effectiveness of the EU SEA Directive*, contribution (presenter), for: IAIA-Konferenz 2012, 31.05.2012.

Aschemann, Ralf: *A Good Practice: An Erasmus Mundus Joint Programme with EU and non-EU Partners*, main contribution (keynote), for: ECCE-MUNDUS Seminar on Joint Programmes in Life Sciences, Österr. Akadem. Austauschdienst (OEAD) (Austria), Vienna, 04.12.2012.

Baumgartner, Rupert J.: *Ressourceneffizienz und Nachhaltigkeit in der Industrie*, main contribution (keynote), for: Logistikwerkstatt Graz: Ressourceneffizienz in der technischen Logistik, TU Graz (Austria), TU Graz, 22.06.2012.

Baumgartner, Rupert J.: A checklist for sustainable product development: the example of innovative lightweight technologies in automotive product engineering, contribution (presenter), for: 18th Annual International Sustainable Development Research Conference, (ISDRS), Hull (UK), 24.06.2012.

Baumgartner, Rupert J.; Schögl, Josef: Sustainability performance and business strategies for sustainability: How sustainable is sustainable business management?, contribution (presenter), for: International Sustainability Conference 2012, Basel, 30.08.2012.

Baumgartner, Rupert J.: *Social sustainable development – a relevant factor for the automotive industry?*, contribution (presenter), for: Corporate Responsibility Research Conference 2012, Bordeaux (France), 13.09.2012.



- Baumgartner, Rupert J.: *Organizational culture – an essential factor for sustainable industry management*, contribution (presenter), for: The 18th Greening of Industry Network Conference, Linköping (Sweden), 22.10.2012
- Bleek, Albert; Winiwarter, Wilfried: *The Expert Panel on Nitrogen Budgets (EPNB)*, contribution (presenter), for: Joint TFRN EPMAN / EPNB and Agriculture and Nature Panel meeting, Berlin, 28.09.2012.
- Braschel, Nina: *Prospects and barriers regarding inclusion of the waste sector in the EU ETS*, contribution (presenter), for: 2nd Annual European Postgraduate Sustainable Development Symposium, TU Graz (Austria), 16.02.2012.
- Brudermann, Thomas: *Mass Psychology Revisited – Insights from Social Psychology, Neuroscience and Simulation*, main contribution (keynote), for: 6th International Conference on Pedestrian and Evacuation Dynamics (PED 2012), ETH Zürich, 06.06.2012.
- Engert, Sabrina; Gelbmann, Ulrike: *Developing the Idea of a National CSR Innovation System*, contribution (presenter), for: CRR Conference 2013, Management School Bordeaux (France), 14.09.2012.
- Füllsack, Manfred: *Communication and Eigenform*, contribution (presenter), for: EMCSR-2012 European Meeting on Cybernetics and Systems Research, University of Vienna, 12.04.2012.
- Füllsack, Manfred: *Der Zweck zweckfreier Kunst – systemtheoretisch*, main contribution (keynote), University of Applied Arts Vienna/ Department Digital Art, 15.04.2012.
- Füllsack, Manfred: *Nichts als Arbeit mit der Arbeit*, main contribution (keynote), for: Arbeit an sich, University Hildesheim, 03.05.2012.
- Füllsack, Manfred: *Emergence and Downward Causation*, contribution (presenter), for: Neighborhood Technologies. Media and Mathematics of Dynamic Networks, Berlin, 31.08.2012.
- Füllsack, Manfred: *The Growth-Paradox. Experiments with computational evolution of Anticipatory Systems*, contribution (presenter), for: Temporalities observed with social theory of self-referential systems: Luhmann in action, Dubrovnik, International University Centre of post-graduate studies (IUC), 18.09.2012.
- Füllsack, Manfred: *Diversität und komplexe adaptive Systeme*, contribution (presenter), for: Fakultätstag der URBI-Graz, Graz, 22.11.2012.
- Füllsack, Manfred: *In-form-ation and beyond*, main contribution (keynote), for: OCG - Austrian Computer Society (Austria), Vienna, 29.11.2012.
- Gelbmann, Ulrike: *Das Verwertungsparadoxon. Die neue Komplexität der Abfallwirtschaft*, contribution (presenter), for: Depotech 2012, Leoben, 09.11.2012.
- Gelbmann, Ulrike: *Geplante Obsoleszenz/Podiumsdiskussion*, contribution (presenter), for: Tagung Geplante Obsoleszenz, ARGE Abfallvermeidung (Austria), 10.12.2012.
- Globocnik, Dietfried: *Managing autonomous innovative behavior of employees*, contribution (presenter), for: 12th Annual Conference of the European Academy of Management, EURAM (Belgium), Rotterdam, 08.06.2012.
- Klimont, Zbigniew; Winiwarter, Wilfried: *GAINS scenarios for 2050*, contribution (presenter), for: Workshop on global nitrogen scenarios in the 21st century, Laxenburg, 11.10.2012.
- Mrotzek, Maximilian: „That’s the way we do things around here“: Why do actions in business and society often fail to have the intended impact?, contribution (presenter), for: University of Lleida (Spain), 26.09.2012.
- Mrotzek, Maximilian: *Silver dynamics: an integrated system dynamics forecast model for silver*, contribution (presenter), for: Precious Metals '12, Vineyard Hotel, Cape Town, 12.11.2012.

- Posch, Alfred: *Transdisciplinary case-study teaching on sustainable innovations*, contribution (presenter), for: 18th Annual International Sustainable Development Research Conference, University of Hull (United Kingdom), Hull, UK, 25.06.2012.
- Puxbaum, Hans; Winiwarter, Wilfried: *Präsentation des Kompendiums "Advances of Atmospheric Aerosol Research in Austria"*, contribution (presenter), for: 50 Jahre KRL Kommission für Reinhaltung der Luft der Österreichischen Akademie der Wissenschaften 1962 – 2012, Vienna, 04.12.2012.
- Reinsberger, Kathrin: *A concept to achieve energy autarky in Austria: indicators, potential, dynamics*, contribution (presenter), for: ISDRC 18 - University of Hull, Hull/UK, 24.06.2012.
- Schögl, Josef Peter: *Identification of environmental and social supply chain indicators in the electronics and automotive industry*, contribution (presenter), for: International Sustainability Conference 2012, Basel, 30.08.2012.
- Winiwarter, Wilfried: *Environmental Nitrogen cycles – a systems approach*, contribution (presenter), for: AIT Brown bag meeting, AIT Austrian Institute of Technology (Austria), Vienna, 16.03.2012.
- Winiwarter, Wilfried: *Die Vielfältigkeit von Stickstoff in der Umwelt – Nutzen, schädliche Wirkungen und Minderungsmöglichkeiten*, contribution (presenter), for: URBI-Fakultätstag, University of Graz, Graz, 22.11.2012.

3.3.2 Organization of scientific conferences

- Baumgartner, Rupert J.: Member scientific committee of the Conference Sustainability, Technology and Education 2012, Perth (Australia).
- Baumgartner, Rupert J.: Track Chair at the 18th Annual International Sustainable Development Research Conference, (ISDRS), Hull (UK), June 2012.
- Baumgartner, Rupert J.: Track Chair Corporate Responsibility Conference, Bordeaux (France), Sept. 2012.
- Baumgartner, Rupert J.: Member of the International Scientific Advisory Committee and Track Chair International Sustainability Conference, Basel (Switzerland), Aug. 2012.
- Füllsack, Manfred: European Meeting of Cybernetics and Systems Research EMCSR-2012, Panel chair, University of Vienna, 12.04.2012 - 17.04.2012.
- Füllsack, Manfred: Simulation komplexer Systeme. Forschen in der Von Neumann Galaxie, Organisator, Wien, 22.03.2012 - 21.06.2012.
- Posch, Alfred: Member of the International Scientific Advisory Committee of the International Sustainability Conference, Basel, Aug. 2012.
- Posch, Alfred: Track chair at the 18th Annual International Sustainable Development Research conference, (ISDRS), Hull (UK), June 2012.

3.3.3 Other scientific performance

- Aschemann, Ralf: Chair bei den sessions "Stakeholder engagement in SEA" sowie "European SEA case study experiences" (IAIA-Konferenz in Portugal, Porto), 28.05.2012 - 01.06.2012.
- Aschemann, Ralf: Organizational Committee der MIND "summer school" und "orientation week" 2012, 19.08.2012 - 23.08.2012.
- Braschel, Nina: 6th International Conference on Environmental Science and Technology, 25.06.2012 - 29.06.2012.



- Posch, Alfred: Academic representative and coordinator for the International Joint Masters programme "Sustainable Development".
- Steiner, Gerald: Member of the Scientific Board of the "Regional Center of Expertise" (RCE) at the University of Graz, since 2007.

3.4 Transfer: science to professionals

- Braschel, Nina: *Klimaschutz und die Relevanz der österreichischen Abfallwirtschaft*, Beirat CSR-Dialog: Vortragsreihe für AbfallberaterInnen in Österreich, ARA Altstoff Recycling Austria AG, 09.2012 - 10.2012.
- Gelbmann, Ulrike: *1. Stakeholder Workshop NAP-CSR*, 16.04.2012.
- Gelbmann, Ulrike: *CSR-Mitteilung der EU und CSR-Aktionsplan – Was ist zu tun? oder „Die Situation ist hoffnungslos, aber nicht ernst“ – Der NAP CSR aus konstruktivistischer Sicht*, for: Wirtschaftskammer OÖ (Austria), Stift Reichersberg am Inn (Austria), 12.10.2012.
- Gelbmann, Ulrike-Maria: Teilnahme Podiumsdiskussion Eröffnung Saubermacher DLAG Forschungsanlage, 13.04.2012.
- Reinsberger, Kathrin: *Reduktionspotenzial und Sektoraufteilung bei den Treibhausgasen* (Studie im Rahmen des Klimaschutzgesetzes), 2012.
- Winiwarter, Wilfried: *Inventur der Feinstaubemissionen Österreichs*, for: Workshop UMWELTZONE REGION GRAZ auf Einladung des Bürgermeisters der Stadt Graz, Mag. Siegfried Nagl, 13.06.2012.

3.5 Transfer: science to public

- Aschemann, Ralf: *Das Studium der Umweltsystemwissenschaften*, for: Tag der offenen Tür Uni Graz, Graz (Austria), 12.04.2012.
- Aschemann, Ralf: Interview zum Erasmus Mundus Master's Programme in Industrial Ecology (MIND) für das Webradio der KFU, Webradio KFU, Internet, 13.03.2012.
- Aschemann, Ralf: Nacht der langen Forschung (Uni Graz), Mitbetreuung der ISIS-Aktivitäten, 27.04.2012.
- Aschemann, Ralf: Summer school (GUSS) - Vortrag "*Sustainability - A perspective on the Americas*", 20.07.2012.
- Brudermann, Thomas in: Katrin Blawat: *Die verborgenen Gesetze der Massenhysterie*, P.M. Magazin 03/2012.
- Brudermann, Thomas: *Ein oder zwei Dinge, die Sie über Volkszorn wissen sollten*. Hessischer Rundfunk, Rundfunk, 17.09.2012.
- Brudermann, Thomas: *Warum umweltfreundlich denken, nichts mit umweltfreundlich handeln zu tun hat: Erkenntnisse aus der Psychologie*. for: Lange Nacht der Forschung am 27. April an der Uni Graz.
- Fink, Julian: *PwC Transparenz-Barometer: Nachhaltigkeitskommunikation am Prüfstand*, 2012.
- Füllsack, Manfred: *Arbeit und Arbeitszwang*, für: Arbeit und Arbeitszwang, ÖH-Wien (Austria), 26.11.2012.
- Füllsack, Manfred: *Interview zum Thema Arbeit*, TV-Sender 3Sat "Kulturzeit", 25.05.2012.
- Füllsack, Manfred: *Interview zur Beschäftigungssituation in den Wissenschaften*, Der Standard, Printmedium, 07.03.2012.
- Gelbmann, Ulrike-Maria; Hasler, Arnulf in: *Abfallwirtschaftskonzept für Großereignisse*, APA Science, 08.08.2012.

- Gelbmann, Ulrike-Maria; Hasler, Arnulf in: *Fingerfood statt Gulasch: Grazer entwickeln Abfallkonzept für Events*, Der Standard, 08.08.2012.
- Gelbmann, Ulrike-Maria; Hasler, Arnulf in: *Grazer Studenten entwickeln Abfallkonzept für Events*, Kleine Zeitung, 08.08.2012.
- Gelbmann, Ulrike-Maria; Hasler, Arnulf in: *Sauber feiern: Uni-Abfallkonzept für Events*, ORF Steiermark, 08.08.2012.
- Gelbmann, Ulrike: *Radiokolleg Abfall als Ressource I*, OE1, Rundfunk, 10.09.2012 - 13.09.2012.
- Gelbmann, Ulrike: *Wir leben über unsere Verhältnisse* - Expertinneninterview von Katharina Schmidt, Wiener Zeitung, Printmedium, 16.06.2012.
- Mrotzek, Maximilian: *Das "Beer Game"*, für: Lange Nacht der Forschung, Bundesministerium für Wirtschaft, Familie und Jugend (Austria), Graz (Austria), 27.04.2012.
- Mrotzek, Maximilian: *Eine Einführung in die Systemwissenschaften*, für: SummerCampUs der Universität Graz, Universität Graz (Austria), Graz (Austria), 05.09.2012.
- Mrotzek, Maximilian: *Umweltsystemwissenschaften*, for: Tag der offenen Tür der Universität Graz, Universität Graz (Austria), 12.04.2012.
- Neuberger, Manfred; Popp, Marianne; Puxbaum, Hans; Scheider, Alexandra; Winiwarter, Wilfried: *Pressegespräch zum Thema „50 Jahre Kommission für Reinhaltung der Luft der ÖAW“*, 2012.
- Posch, Alfred: Mitglied des wissenschaftlichen Leitungskomitees der Montagsakademie, University of Graz (Austria), ab 2012.
- Posch, Alfred: *Sektionsleiter des URBi-Clubs*, URBi Club (Austria), ab 2012.
- Winiwarter, Wilfried: *„Das elementare Lebensmittel. Ressource Luft“*, Ö1 Radiokolleg, Rundfunk, 27.11.2012 - 29.11.2012.
- Winiwarter, Wilfried: *Optimierter Einsatz von Stickstoff im Blickpunkt*, derStandard.at, Internet, 22.10.2012.
- Winiwarter, Wilfried: *Wie man sich krank atmet*, Wienerzeitung.at, Internet, 05.12.2012.



3.6 ISIS-Reports

From 2012 ISIS is going to issue a report series of its own, called “ISIS Reports”. The series is meant to support the dissemination of ISIS’ scientific output and targets to include high quality publications only. All suggestions for publication undergo an internal review.

The ISIS Report series is edited by Wilfried Winiwarter, Ulrike Gelbmann, and Rupert Baumgartner. Topics cover all of ISIS’ research fields and publication contents range from research reports to excellent master’s or PhD theses, but may also include collections of smaller individual papers as of conferences (conference proceedings) or from extraordinary reports of a teaching project. The language of publication is either German or English.

The individual reports appear at irregular intervals, with a minimum of two issues per year. The series bears an ISSN number and is issued in the form of hard copies and mainly as a pdf online on our ISIS website. The first ISIS report appeared in October, four more are currently being prepared:

ISIS reports #1: Hold, F. (2012). Informelle Abfallwirtschaft in Österreich – Chancen, Risiken und Praxis. In: W. Winiwarter, U. Gelbmann, and R. J. Baumgartner (Series Eds.), ISSN 2305-2511, ISIS, Graz, Austria.

3.7 The ISIS Website

In November 2012 the ISIS launched its new website in course of an university-wide re-organisation of websites of all organisational units. The new website can be accessed <http://isis.uni-graz.at> (English version: <http://isis.uni-graz.at/en/>). The old webpage was removed from the server and the old URL *uni-graz.at/isis* is no longer existent.

While central information items like contact information, opening hours, news as well as important links can be found already on the start page, the rest of the new website is organised in four categories:

- *Institute*: This category includes a mission statement, venue information including trip advisor and public transport planning tool, the annual reports since 2010 as well as further up-to date information.
- *Studying*: This category involves information for both current and potential future students of ISIS study programmes: Environmental Systems Sciences, Joint Degree Sustainable Development, Master Industrial Ecology (MIND) and the recently founded doctoral school. A list of master theses and links to the alumni clubs can also be found there.
- *Research*: This section gives an overview on ISIS research aims and activities, ongoing projects, recent publications as well as existing co-operations with national and international partners. There is also a sub-category dedicated to the ISIS science talk, which is forum for invited (international) guests to present their research.
- *People*: Finally, one category is dedicated to introduce people who work (or worked) at ISIS, including their research interests and publications. Open positions are also announced there.

We would like to thank Max Mrotzek and Thomas Bruderermann, who jointly implemented the new webpage, and Uli Seebacher, Birgit Propst and one unknown intern from the IT department for their support.



Helpful Links



Coordination Office for Environmental Systems Sciences

Related initiatives



Environmental and Global Change, EGC Graz



Education for Sustainable Development

Institute of Systems Sciences, Innovation and Sustainability Research



News

[All News](#)



15.01.2013
ISIS Science Talk – 23 January 2013 at noon...
The next "Science Talk" will be given by Dr. Wolfram Tertschnig (Federal Ministry of Agriculture,...

[\[more\]](#)



11.01.2013
CALL FOR ABSTRACTS – CRRC 2013
Deadline for abstract submission: 29. March 2013

[\[more\]](#)

Contact

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Institute Secretary

Sabina Grobbauer, MBA
E-Mail: sabina.grobbauer@uni-graz.at
Opening Hours: Mo, Mi, Do
9:00 - 11:30 Uhr, Di 14:00 - 15:00 Uhr, Mi 14:00 - 16:00 Uhr

Opening hours during vacations: 9.30-11.30 Uhr

Figure 27: Screenshot ISIS webpage

Getting to ISIS via Public Transport

You might use the route planner offered by Austrian Federal Railways in order to plan your trip to ISIS

Von	<input type="text"/>
Nach	Graz, Merangasse 18
Datum	16.01.2013
Uhrzeit	15:25 <input checked="" type="radio"/> Abfahrt <input type="radio"/> Ankunft
Verbindung suchen	

Figure 28: Trip advisor for getting to ISIS via public transport

3.8 Awards

Presenting awards of institute members and/or students of the ISIS is one of the new sections within our ISIS Report. Throughout the last year several members of the institute got an award for their success, both in professional but also in private fields of interest.

Mr. Josef-Peter Schöggel, Msc., received the “Saubermacher Umweltpreis 2012” for his diploma thesis with the title “A checklist for sustainable product development: The example of innovative lightweight technologies in automotive engineering”. Within his thesis Mr. Schöggel developed the mentioned checklist with the aim to fully integrate a sustainability perspective into the product development process by facilitating Life Cycle Thinking and sustainability awareness among designers and engineer. See all laureates at: <http://www.saubermacher.at/web/at/aktuelles-1761-hans-roth-umweltpreis-2012-vergeben/>

Finally in December 2012 Dr. Romana Rauter received an advancement award from the “Dr. Maria Schaumayer Stiftung” for her PhD-thesis finished in 2011. This foundation is supporting the career of young women who are actively engaged in academia, business or politics. For further information concerning the foundation please visit the website at: http://www.alphafrauen.org/de/menu_main/schaumayerstiftung.

4 TEACHING

4.1 Study Programmes

4.1.1 Environmental Systems Sciences

In teaching, ISIS is the focal institute for the bachelor and master study programmes in **Environmental Systems Sciences** with its four subject foci: business administration (respectively sustainability oriented management), economics, geography, and NAWI-Tech.



Figure 29: ESS Logo

NAWI-Tech is the newest of all subject foci and was established in 2012. This unique study programme is provided by University Graz (KFUG) and Graz University of Technology (TUG) in their joint activity Natural Sciences. This study (USW Nawi-Tech) replaces somehow the former subject foci physics and chemistry and is focussing predominantly on the aspects of natural sciences in the discussion of sustainability (for further information please see: <http://www.nawigraz.at/>).

The main idea of these study programmes is to generate interdisciplinary trained academics that are able to handle complex problems that are related to environmental protection and/or to the broader concept of sustainable development of different systems. Here, the capability to apply formal methods of systems sciences, in-depth knowledge in the respective subject focus and profound competences for working in interdisciplinary teams are the most important cornerstones of the profile of graduates in Environmental Systems Sciences.

The roots of the study programmes in Environmental Systems Sciences go back to 1991 when the first individual diploma studies were developed. Continuously increasing interests by students and high dedication of some professors finally led to the implementation of regular bachelor and master study programmes in October 2003 which are still unique in its conception in Europe. Now, about 1,300 students are enrolled in the bachelor and master programmes in Environmental Systems Sciences; the bachelor programmes comprise 180 ECTS credit points which equals a study period of six semesters, and the consecutive master programmes 120 ECTS credit points, or four semesters.



Figure 30: Teaching at ISIS

ISIS is responsible for the education in formal methods of systems sciences, mathematics and statistics, interdisciplinary education for basics in human-environment systems, parts of the subject focus business administration at bachelor level, the subject focus sustainability-oriented management at master level, and last but not least the interdisciplinary practical courses. The latter is a special and unique course type where an interdisciplinary team of teachers and students with different subject foci work together on a complex real-world problem for sustainable development of a certain system. Besides interdisciplinarity, also

transdisciplinarity is part of the teaching concept, aiming at the integration of stakeholders from outside the University in order to initiate a mutual learning process between academics and practitioners.

Comprehensive information on Environmental Systems Sciences can be found at www.uni-graz.at/usw or www.umweltsystemwissenschaften.at.

4.1.2 International Joint Master's Programme in Sustainable Development

In 2008, a curriculum for the International Joint Master's Programme in Sustainable Development was designed and approved by six partner universities, with the University of Graz (Austria) as co-ordinating university, Ca' Foscari University of Venice (Italy), Leipzig University (Germany), and Utrecht University (The Netherlands) are degree-awarding consortium members, and Basel University (Switzerland) and Hiroshima University (Japan) are associated mobility partners.



Figure 31: Joint Master Programme

In this master's programme sustainability issues are approached from an international as well as inter- and transdisciplinary perspective. The focus is set on applying the competences to the question of sustainable development and the needs and possibilities of societal transformation. It combines the strengths and specializations in teaching and top research of six partner universities, thereby offering the students a programme recognized in the countries of the consortium partners and the possibility of going on to PhD-studies as well as increasing the employability in the private, public and semi-public sector.

Admission to this Master's Programme is granted to persons who have completed at least the equivalent of a Bachelor's or Diploma degree, and can demonstrate their research skills, their basic knowledge of the natural and/or social sciences, and a general insight in the subject of sustainable development and intervention strategies. The Master's Programme comprises 120 ECTS credits corresponding to a period of study of at least four semesters or two years. 60 ECTS credits have to be earned at the home university. Students are required to complete at least 30 ECTS credits at one of the partner universities. Besides the academic coordination, ISIS offers courses for the first semester in basics in Sustainable Development, for the third integration semester, and one specialization track (second semester) in Sustainable Business Management. Master theses are generally supervised by two teachers of two different partner universities.

Comprehensive information on the International Joint Master's Programme in Sustainable Development can be found at www.jointdegree.eu/sd.

4.1.3 Erasmus Mundus Master's Programme in Industrial Ecology (MIND)

The European Commission's "Education, Audiovisual and Culture Executive Agency" (EACEA) selected the new Erasmus Mundus Master's Programme in Industrial Ecology (MIND) in July 2010. Beside the International Joint Master's Programme in Sustainable Development, this is the second Joint Master Programme, where ISIS is the coordinating institute.

MIND is a two-year programme with 120 ECTS, intending to train students

- to conduct industrial ecology analyses of complex sustainability problems,
- to design industrial ecology solutions for these problems, and
- to develop implementation strategies for those solutions identified.

The MIND consortium consists of the University of Graz as co-ordinator: Univ.-Prof. Dr. Claudia Binder acts as programme director, Dr. Ralf Aschemann as academic co-ordinator and the Office for International Relations is in charge of the administrative co-ordination. Partners in the MIND consortium are Leiden University and Delft University of Technology; Chalmers University of Technology Gothenburg; Asian Institute of Technology (Thailand); Rochester Institute of Technology (USA) and Waseda University (Japan).

In the first study year, the three EU universities offer basic modules on industrial ecology. In the second study year, all consortium universities offer a specialization module in industrial ecology (third semester), cf. the figure below.

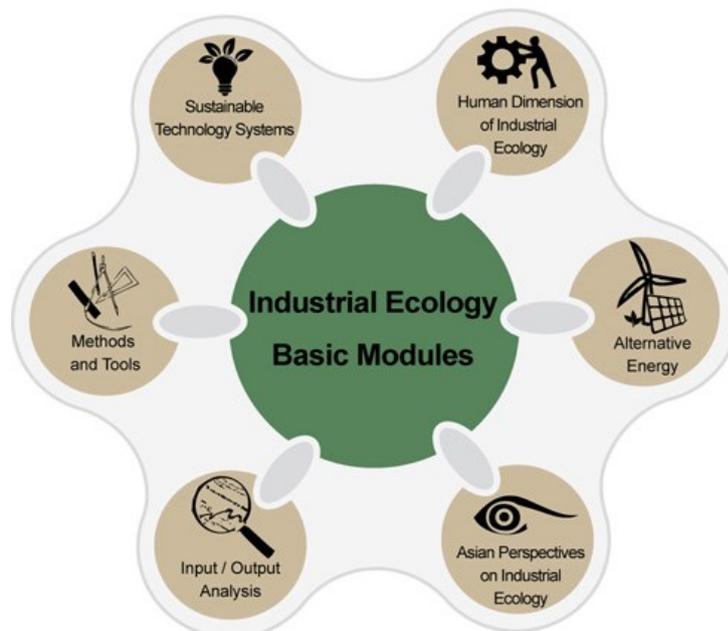


Figure 32: Structure of the MIND programme

It is intended to run MIND at least for five consecutive editions, i.e. study years 2011/12 to 2016/17. For the same period, the EACEA will support MIND by granting scholarships for students and scholars and by contributing to the running administrative costs.

With winter term 2012/13, MIND started its second edition: 18 students began their master programme at the different institutes being part in this Erasmus Mundus programme. In

August 2012 the students joined the MIND orientation week and the summer school, which took place in Hömö (Sweden).



Figure 33: MIND academics and students in Hömö / Sweden (August 2012)

Meanwhile, the scholarship holders for the third MIND edition - starting with winter term 2013/14 - are going to be selected.

Comprehensive information on MIND can be found at www.emmind.eu.

4.1.4 **Doctoral School for Environmental Systems Sciences**

In October 2011 the new Doctoral School for Environmental Systems Sciences was founded. The main goal is to provide high-quality education for our PhD-students in the field of environmental systems sciences. The study programme is based either on the curriculum for interdisciplinary environmental systems sciences or on the curriculum for environmental systems sciences focused on natural science.

The main differences to the previous doctoral programme are in two aspects:

- First, each PhD-Student has in addition to a supervisor a mentoring person who supports the candidate throughout the development of the thesis.
- The second difference is that the thesis has to be cumulative based on three peer-reviewed journal publications instead of writing a monograph.

This new form complies with international scientific standards and ensures that the valuable results achieved by our PhD-students are presented to an international auditorium.

Details about the doctoral school, especially the admission process can be found on our website at <http://isis.uni-graz.at/en/study-programs/doctoral-school/>.

4.2 Course list

Winter term 2011/2012			
Type	Courses	Lecturer	Contact hours
OL	Orientierungslehveranstaltung USW	Baumgartner R, Huber A, Krenn Heinz, Propst G, Steininger K, Sulzer W	1
VU	Integral- und Differentialrechnungen für Umweltsystemwissenschaften	Hötzl E, Keeling S, Peichl G, Perko R, Schwaiger J	4
VU	Vektorrechnung für USW	Schwaiger J	3
PS	Proseminar zu Statistik für Umweltsystemwissenschaften	Ambros R, Feit T, Hötzl E, Perko R	1
VO	Mensch und Umwelt: Geosphäre	Lazar R, Lieb G, Strasser U, Sulzer W	2
VO	Mensch und Umwelt: Anthroposphäre	Posch A, Steininger K	2
VO	Interdisziplinäre Arbeitsmethoden	Aschemann R	2
VO	Systemwissenschaften 1	Desch G, Mrotzek M, Propst G	2
VO	Vorlesung zu Statistik für Umweltsystemwissenschaften	Feit T	2
VU	Systemwissenschaften 3	Gobiet A, Granigg W, Huber A	2
VO	Systemintegration und Systembewertung	Winiwarter W	2
SE	Seminar zu Systemintegration und Systembewertung	Füllsack M, Grossmann W, Mrotzek M	2
SE	Seminar zu Systemmodellierung	Schmickl T	2
PS	Social competences for inter- and transdisciplinary problem-solving	Aschemann R	2
AG	IP – Regionales Lernen als Perspektive für nachhaltige Gemeindeentwicklung	Hasler A, Mager M, Ober M	4
AG	IP – Energierevolution (Energieoptimierte Lebensweise und globaler Strukturwandel)	Ahamer G, Kumpfmüller K, Weiss W	4
AG	IP – Elektromagnetische Felder und Neuronen	Friedl K, Propst G, Wodlei F	4
AG	IP – Potenziale und Indikatoren für eine nachhaltige Unternehmensentwicklung	Grasenick K, Kupsa S, Raith D, Vorbach S	6
AG	IP – Zeitbombe Phosphor (scientific writing)	Gössler W, Kreuzeder A, Mrotzek M	6
AG	IP – Praxisnahe Umweltzertifizierung	Baumgartner R, Bodi-Fernandez O, Friesenbichler M, Globocnik D	6

AG	IP – Supermarkt oder Bio-Kistl – was sagt der Hausverstand	Aschemann R, Karner S, Suschek-Berger J	4
AG	IP – Temporärer Wohnraum Graz und Umgebung	Aschemann R, Handler R, Tisch A	4
VO	Umweltorientiertes Innovations- und Technologiemanagement	Rauter R, Vorbach S	2
VO	Management nachhaltiger Entwicklung	Baumgartner R	2
PS	Nachhaltigkeitsberichterstattung	Resel K	2
PS	CSR/Stakeholdermanagement	Von der Hellen C	2
KS	Sustainable Innovation	Rohracher H	2
KS	Value Chain Management	Aschemann R	2
KS	Waste and Recycling	Gelbmann U, Schmidt G	2
KS	Environmental Decision Making	Brudermann T	2
AG	Research Project Sustainability Management	Brudermann T, Posch A	4
SE	Seminar zur Forschungsmethodik	Baumgartner R, Posch A	2
SE	Masterseminar	Baumgartner R, Posch A	2
SE	Agent-Based Modeling of Socio-Ecological Systems; A practical Introduction (I)	Knöri C	2
PV	PhD Privatissimum	Baumgartner R, Posch A	2

Summer term 2012			
Type	Courses	Lecturer	Contact hours
VU	Integral- und Differentialrechnungen für Umweltsystemwissenschaften	Batzel J, Peichl G, Tomaschek J	4
VU	Vektorrechnung für USW	Fripertinger H, Prager W, Schwaiger J, Tomaschek J	3
PS	Proseminar zu Statistik für Umweltsystemwissenschaften	Feit T, Perko R	1
VO	Systemwissenschaften 2	Desch G, Füllsack M, Propst G	2
UE	Übungen zu Systemwissenschaften	Baur I, Gebetsroither E, Gobiet A, Mrotzek M, Winiwarter W	2
VO	Systemmodellierung	Desch G, Füllsack M, Propst G	2
VO	Mensch und Umwelt: Biosphäre und Ökosysteme	Depisch B, Raspotnig G, Tschernatsch M	2
SE	Seminar zu Systemintegration und Systembewertung	Mrotzek M, Winiwarter W	2

SE	Seminar zu Systemmodellierung	Füllsack M, Schmickl T	2
AG	IP – Mobilitätsmanagement	Dullnig K, Reiter K, Seebacher U	4
AG	IP – Einkaufszentren als Orte für nachhaltige Entwicklung	Gruber R, Hasler A, Poppmeier C, Seebacher U, Walzl M	6
PS	Angewandte Systemwissenschaften	Gobiet A, Granigg W, Wäckerle M	2
AG	IP- Zukunftsfähiges Österreich in einer globalisierten Welt	Bachhiesl U, Kozina C, Kumpfmüller K	4
AG	IP – Versiegelung vs Entsigelung	Aschemann R, Bednar- Friedl B, Kulmer V, Lazar R, Rainer E, Sulzer W	6
AG	IP – Umweltschutz in steirischen Unternehmen	Aschemann R, Braschel N, Reinsberger K	6
AG	IP – Nachhaltige Gestaltung von Events am Fallbeispiel AIRPOWER	Gelbmann U, Hasler A, Mayer M	4
AG	IP – Planspiel Murkraftwerk	Aschemann R, Friedrich A, Gobiet A, Schweitzer S	4
AG	IP – Energierevolution (Energieoptimierte Lebensweise und globaler Strukturwandel)	Ahamer G, Kumpfmüller K, Weiss W	4
VU	Systemwissenschaften 3	Granigg W	2
PS	Umwelt- und Nachhaltigkeitsmanagementsysteme	Baumgartner R	2
PS	Nachhaltigkeitsberichterstattung	Resel K	2
PS	CSR-/Stakeholdermanagement	Seebacher U	2
PS	Ausgewählte Themen des Innovations- und Nachhaltigkeitsmanagement (Energiemanagement im Unternehmen)	Rosbacher A	2
KS	Strategic Sustainability Management	Gelbmann U	2
KS	Sustainability Entrepreneurship	Pölzl M, Weber B	2
KS	Eco-Controlling	Baumgartner R	2
KS	Product and Service Development	Van Heyningen J	2
KS	Sustainable Innovation	Rohracher H	2
KS	Value Chain Management	Aschemann R	2
KS	Waste and Recycling	Gelbmann U, Klampfl- Pernold H	2
KS	Environment Decision Making	Brudermann T	2
KS	Integrated Management Systems	Del Rocio Sanchez Ortiz M	2
AG	Research Project Innovation Management	Brudermann R, Posch A	4
KS	Environmental and Technology Assessment	Aschemann R	2
SE	Seminar zur Forschungsmethodik	Baumgartner R, Posch A	2
SE	Masterseminar	Baumgartner R, Füllsack M, Posch A, Winiwarter W	2
SE	Agent-Based Modeling of Socio-Ecological Systems; Design concepts and model analysis (advanced)	Knöri C	2

SE	Sustainability and Environmental Management	Posch A	2
DQ	PhD Doktoratskolloquium	Baumgartner R, Füllsack M, Posch A, Winiwarter W	2
SE	DissertantInnenseminar	Baumgartner R, Füllsack M, Posch A, Winiwarter W	2

4.3 Completed master theses

- Adler, Stephanie: *The integration of the waste management into the European Emission Trading Scheme - an empirical analysis of opportunities and barriers*, (Posch, Alfred).
- Adlmann-Himmelreich, Katrin: *Social Sustainable Development – Can „The Natural Step“-Framework according to Karl-Henrik Robért support companies in this endeavour?*, (Baumgartner, Rupert J.).
- Akhavan, Roya: *Analysing The Transition Of A Regional Energy System Using Energy Flow Analysis – The Case Of The Austrian “ökoEnergieLand”*, (Binder, Claudia; Mrotzek, Maximilian).
- Bachmann, Clemens: *Supply perspectives for the European energy system by use of solar energy*, (Grossmann, Wolf).
- Berger, Thomas: *Additive Manufacturing Processes – Potential impacts and effects in different areas analyzed by methods of systems sciences*, (Grossmann, Wolf).
- Bischof, Katrin Anna: *Has power from the desert a future? - Solar power from African deserts - challenges and strategies*, (Grossmann, Wolf).
- Brunner, Stefan: *Opportunities and Constraints for Sustainable Waste Management in Cameroon with Reference to the Region around Kumbo*, (Baumgartner, Rupert).
- Baschek, Carmen Ingrid: *Methods and procedures for risk analysis in clinical Risk Management. An example of risk analysis in the hospital of KABEG Wolfsberg*, (Vorbach, Stefan).
- Engert, Sabrina: *Sustainable Tourism and the impacts of the FIFA World Cup 2010*, (Gelbmann, Ulrike; Baumgartner, Rupert J.).
- Fessler, Robert: *Mobile information and communication technologies between claim and reality - An analysis of the innovation behavior of Austrian companies*, (Posch, Alfred).
- Fladerer, Michaela: *Analysis of Austrian CSR-Studies and –initiatives*, (Posch, Alfred).
- Galler, Lisa-Maria: *Analysis of Strengths and Weaknesses of Environmental Management Activities: The Example of an Industrial Company*, (Baumgartner, Rupert J.).
- Harlander, Nathalie: *Pan-American cooperation in the field of solar energy*, (Grossmann, Wolf).
- Hold, Florian: *Informal Waste Management in Austria - Opportunities, Risks and Practice*, (Gelbmann, Ulrike; Baumgartner, Rupert J.).
- Hözl, Martina: *Photovoltaics in the Basque Country - Innovation potential with special focus on citizen solar power plants*, (Rohracher, Harald).
- Kehrer, Markus: *Analysis of the benefits of quality management systems according to ISO 9001*, (Vorbach, Stefan).
- Koch, Katharina: *Market analysis on the use of microalgae as a feed additive for swine and poultry*, (Bauer, Ulrich).
- Kolbitsch, Martin: *Implementation of an environmental management system according to ISO 14001 within the company Durst Phototechnik Digital Technology GmbH*, (Vorbach, Stefan).

- Konrad, Georg: Conceptualization of the launch of an innovative product, shown for "disinfection system for rain water stabilization", (Vorbach, Stefan).
- Krammer, Stefan: *Modelling the technical and organisational framework of multi-user solar plants*, (Winiwarter, Wilfried; Mrotzek, Maximilian).
- Krenn, Antonella: *Consequences of the WEEE Directive 2012/19/EU and the future importance of photovoltaic module recycling*, (Gelbmann, Ulrike).
- Lettner, Elmar: *Open Innovation in the paper industry*, (Posch, Alfred).
- Lind, Roman: *Analysis of specific activities of the organisation "Maschinenring" in the field of waste management and wastewater management*, (Vorbach, Stefan).
- Maierhofer, Barbara: *An Analysis of the Market and the Profitability for a new product as Part of the Innovation Process*, (Bauer, Ulrich).
- Mayer, Paul: *Innovationmarketing for Sustainable Products on the Case of Fairtrade*, (Baumgartner, Rupert J.).
- Missethon, Markus: *Concept for an environmental report – Data preparation in relevant areas for a company in the food processing sector*, (Gelbmann, Ulrike).
- Okorn, Stanislav: *Cultural framework, religion and economics with emphasis on common land*, (Sturn, Richard).
- Pichler, Tamara Angela: *Environmental oriented investment decision behavior*, (Posch, Alfred).
- Provasnek, Anna Katharina: *Measures for a company's recovery from environmental crises*, (Gelbmann, Ulrike).
- Rauter, Barbara: *Biologic waste treatment in Styria and its contribution to climate protection*, (Posch, Alfred).
- Schöggel, Josef Peter: *A Checklist for Sustainable Product Development: The Example of Innovative Lightweight Technologies in Automotive Engineering*, (Baumgartner, Rupert J.; Holländer, Robert).
- Schuetz, Andrea: *ISO Certification Quality and environmental management system in a forwarding company*, (Vorbach, Stefan).
- Schury, Christoph: *Combination of Life-Cycle Costing and Life-Cycle Analysis using the example of a photovoltaic facility*, (Posch, Alfred).
- Schuster, Nicole: *The recovery paradox in waste management*, (Gelbmann, Ulrike).
- Schwarz, Therese Elisabeth: *Implementation of Innovation – User's Acceptance and Behaviour in the Field of Electrocars*, (Baumgartner, Rupert J.).
- Sturm, Ines: *Evaluation of the Environmental Performance of a Mechanical Engineering Company on the Basis of the Sustainable Process Index*, (Narodoslawsky, Michael).
- Tanzer, Bernhard: *Methods and their ability to develop services and product-service-systems*, (Vorbach, Stefan; Von der Hellen, Corinne).
- Teubl, Silvia: *Evaluation of Models for Dermal Exposure Assessment in Farming Systems in Developing Countries*, (Binder, Claudia).
- Wimmer, Ina: *The innovation system of the Austrian waste industry*, (Gelbmann, Ulrike).
- Winterleitner, Katrin: *Measuring the supply and waste related energy flows in the electronic industry - Using the example of the AT&S*, (Baumgartner, Rupert J.).
- Wurm, Nadja: *Requirements for polymeric materials in solar thermal systems*, (Vorbach, Stefan).

4.4 Completed dissertation

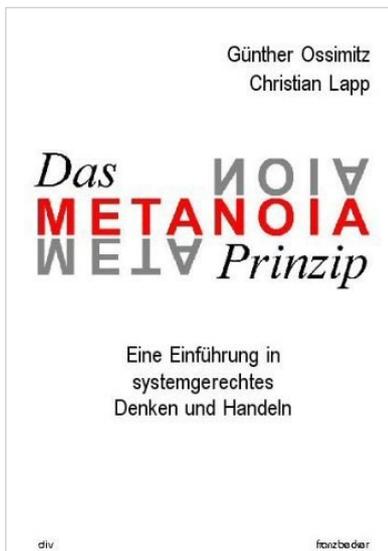
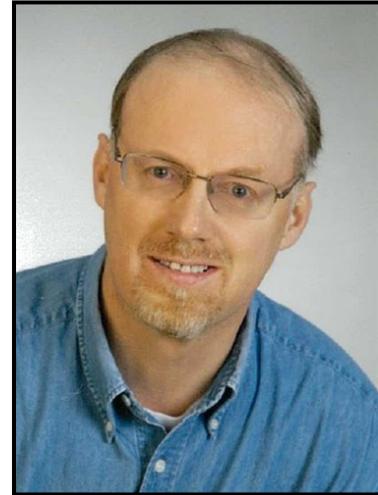
- Klier, Holger: *Implementing a Corporate Climate Change Strategy: An Empirical Study of the Process of Inducing Greenhouse Gas Emission Reductions across Subsidiaries within a Multinational Corporation*, (Vorbach, Stefan; Baumgartner, Rupert J.).

5 ADMINISTRATION

- Aschemann, Ralf: *Academic coordinator of the Erasmus Mundus Master programme in Industrial Ecology (MIND).*
- Aschemann, Ralf: *Erasmus coordinator at ISIS.*
- Aschemann, Ralf: *Internal coordination of the interdisciplinary practical training (IPs).*
- Aschemann, Ralf: *Substitute member of the faculty committee, 01.10.2011-30.9.2013.*
- Aschemann, Ralf: *Organizer of the ISIS-Science Seminar Series, coordination of a research or education programme, since 2012.*
- Baumgartner, Rupert J.: *Head of ISIS, since October 2011.*
- Baumgartner, Rupert J.: *Vice Dean of the URBi faculty, since Nov. 2012.*
- Baumgartner, Rupert J.: *Head of the doctoral school of Environmental Systems Sciences, coordinator, since October 2011.*
- Baumgartner, Rupert J.: *Member of the CuKo USW, since 2012.*
- Baumgartner, Rupert J.: *Member of the Habil-Commision Andrea Steiner*
- Gelbmann, Ulrike: *Member of the faculty committee, since 2012.*
- Posch, Alfred: *Vice head of ISIS, since September 2009.*
- Posch, Alfred: *Dean for studies at the Faculty of Environmental, Regional and Educational Sciences.*
- Posch, Alfred: *Member of the strategic council of the "Akademie für Neue Medien und Wissenstransfer", strategic advisor, since 2009.*
- Posch, Alfred: *Member of the awarding committee of the "Buchbinderpreises", internal coordination, since 2009.*
- Posch, Alfred: *Respondent of the faculty committee, strategic advisor, since 2009.*
- Posch, Alfred: *Respondent of the CuKo USW, strategic advisor, since 2009.*
- Winiwarter, Wilfried: *Member of the Habil-Commision Andrea Steiner*

6 OBITUARY: AO-UNIV.-PROF. MAG. DR. GÜNTHER OSSIMITZ (1958-2013)

In early January 2013 our esteemed colleague Ao-Univ.-Prof. Mag. Dr. Günther Ossimitz, from the Institute of Mathematics at the University of Klagenfurt, passed away. Günther was an outstanding scholar and teacher in the field of systems sciences. As early as 1990, he published the first book in German on system dynamics modeling, entitled *Materialien zur Systemdynamik*. In 2001 he did his habilitation in didactics of mathematics, where he wrote about the development of system thinking (skills). Later on he did several well-recognized empirical studies dealing with stock-flow thinking.



Günther also had a significant impact at the University of Graz as regards the content being taught in systems science. Over the years he developed the scriptum for Qualitative Systems Sciences, which he published as a book in 2006 under the title *Das Metanoia Prinzip*. There he gives a scientifically oriented introduction towards system thinking using hands-on examples.

Günther advised several Master theses and PhD theses in Systems Sciences and System Dynamics modeling over the years. For him, advising a thesis was not a duty but rather a passion, as he truly enjoyed close interaction and discussions with his students. It was important for him to transmit them his knowledge, but even more important was to help them become criRutical (systems) thinkers themselves. His attitude to life can be expressed by this motto: "Knowledge is the only treasure that increases on sharing". Günther loved sharing this treasure with us.

We thank Günther for what he did for systems sciences at the University of Graz and we won't forget him.