



## Book of Abstracts

### Changing the Energy System to Renewable Energy Self-Sufficiency

An inter- and transdisciplinary approach

September 14<sup>th</sup>-16<sup>th</sup> 2011 in Freiburg (Germany)



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# RESS – Conference

## Changing the Energy System to Renewable Energy Self-Sufficiency

September 14<sup>th</sup>-16<sup>th</sup> 2011 in Freiburg

### Table of Contents

Welcome .....	1
About RESS .....	2
Program .....	3
Wednesday, 14 <sup>th</sup> September 2011 .....	3
Thursday, 15 <sup>th</sup> September 2011 .....	3
Friday, 16 <sup>th</sup> September 2011 .....	4
Paper and Poster Presentations - Overview .....	5
Keynote Speaker and further Contributors.....	12
Session I .....	14
Session I - Paper Presentations.....	15
Session I - Poster Presentations .....	24
Session II .....	36
Session II – Paper Presentations .....	37
Session II – Poster Presentations .....	41
Session III .....	44
Session III – Paper Presentations .....	45
Session III – Poster Presentations .....	52
Session IV / V.....	54
Session IV / V – Paper Presentations .....	55
Session IV / V – Poster Presentations .....	66
Session VI.....	70
Session VI – Paper Presentations.....	71



## Welcome

Dear Conference Participants,

It is our great pleasure and we feel privileged to welcome you to the conference organized by the team of the research project “Renewable Energy Regions. Socio-Ecology of Self-Sufficiency”. We are looking forward to many interesting paper presentations in five sessions, and also exciting posters presented in our poster gallery during these days. Furthermore, the keynote speakers will give us important stimuli for the discussion.

The motto of the conference “Changing the Energy System to Renewable Energy Self-Sufficiency – An inter- and transdisciplinary approach” reflects our wish to stimulate discussion within different disciplinary fields about the transformation of the energy system and to go beyond disciplinary boundaries and classical scientific knowledge generation for the facilitation of an inter- and transdisciplinary approach to Renewable Energy Self-Sufficiency (RESS). In the five sessions a large variety of concepts, approaches and solutions to the challenge of the transformation of the energy system will be discussed. The sessions will focus on the role of actors, the economic impact of renewable energies, renewable energy self-sufficiency and integrated sustainable land use systems, the role of citizens and energy conservation and innovative technological approaches toward RESS. The variety of themes will give all attendees the opportunity to learn from both the innovative work of their peers and the perspective based on different disciplines. In two Integrating Sessions the problems and results surrounding RESS will be brought together to develop a common perspective on the transformation of the energy system to RESS.

We hope you will enjoy the conference and wish you all stimulating and inspiring discussions!

**Chantal Ruppert-Winkel**  
(Conference Chair)

**Jürgen Hauber**  
(Conference Chair)

**Sophia Noz**  
(Conference Manager)

**Nadine Voigt**  
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**Ramchandra Bhandari**  
(Session Leader)

**Timo Böther**  
(Session Leader)

**Michael Kress**  
(Session Leader)

**Patric Schlager**  
(Session Leader)

**Järmo Stablo**  
(Session Leader)



## About RESS

The transformation of the present energy system to a sustainable energy system is discussed worldwide. Self-sufficiency attained with the help of electricity, heat, and fuel from Renewable Energy (RE) in combination with energy saving behaviors is seen as the one way to establish a sustainable energy system, if social and ecological aspects are taken into consideration. Many communities and regions in different countries have accepted these challenges and have created the objective of reaching energy self-sufficiency through the use of renewable energies. The change of the energy system to a more decentralized structure based on RE is characterized by different elements like new technological opportunities, greater citizen involvement, regional energy supply, the chance for added value created in a region, increased employment, as well as by political decision-making processes that are increasingly taking place in local governments. Therefore for the implementation of Renewable Energy Self-Sufficiency (RESS) to be successful, numerous ecological, economic, technical, and social factors have to be taken into consideration, making an interdisciplinary analysis indispensable. Moreover the integration of local and practical knowledge is essential in many cases (transdisciplinary approaches). However, what is lacking the most is a coherent approach to the topics from various fields.

On these grounds the conference aims to attract scientists and academically interested practitioners from a wide variety of disciplines who are working towards comprehensive strategies to increase the proportion of renewable energies in energy systems or find new ways to save energy in energy systems; not necessarily limited to the creation of 100% renewable energy systems.

## Program

### Wednesday, 14<sup>th</sup> September 2011

Time	Event	Location
18:00-19:00	Registration	Peterhof: Room HS1
19:00-20:30	Evening event  <u>Lecture:</u> "Environmental problems, transdisciplinary research and managing sustainability transformations - the case of the energy system."  <b>Roland W. Scholz</b> , Institute for Environmental Decisions (IED), Swiss Federal Institute of Technology (ETH) Zürich	Haus zur lieben Hand: Conference Hall
20:30	Get-together	Peterhof: Historical vaulted cellar

### Thursday, 15<sup>th</sup> September 2011

Time	Event	Location/Note
09:00-10:00	Registration	Peterhof: Room HS1
10:00-11:00	<b>Opening remarks by Jürgen Rühle</b> , Vice Rector for Internationalization and Technology Transfer, University of Freiburg  <b>Welcome speech by Theresia Bauer</b> , Minister of Science, Research and the Arts, Baden-Wuerttemberg  <b>Introduction by Chantal Ruppert-Winkel</b> , Head of EE-Regionen, Centre for Renewable Energy, University of Freiburg	Haus zur lieben Hand: Conference Hall
11:00-13:00	<b>Integrating Session I</b>  <u>Statement I:</u> "Fundamental questions of RESS: Limits to growth, threats to sustainability and who makes the decisions?" <b>Timo Kaphengst</b> , Coordinator Biodiversity & Forest at Ecologic Institute Berlin  <u>Statement II:</u> "Which future renewable energy scenarios - local self-sufficiency, regional grid-like networks or centralized big plants with mega grid-like networks- are sustainable? The Goettingen approach of sustainability science."  <b>Peter Schmuck</b> , Interdisciplinary Center of Sustainable Development, University of Goettingen	Haus zur lieben Hand: Conference Hall



## RESS – Conference

### Changing the Energy System to Renewable Energy Self-Sufficiency

September 14<sup>th</sup>-16<sup>th</sup> 2011 in Freiburg

Time	Event	Location/Note
13:00-14:15	Lunch - Poster Gallery	Peterhof: Historical vaulted cellar
14:15-16:00	Session I Peterhof: Room HS4 <span style="margin-left: 100px;">Session IV / V Peterhof: Room HS2</span> <span style="margin-left: 100px;">Sesion VI Peterhof: Room HS3</span>	(30min/paper incl. 10 min discussion)
16:00-16:30	Coffee break - Poster Gallery	Peterhof: Historical vaulted cellar
16:30-18:15	Session I Peterhof: RoomHS4 <span style="margin-left: 50px;">Session II Peterhof: Room HS1</span> <span style="margin-left: 50px;">Session III Peterhof: Room HS3</span> <span style="margin-left: 50px;">Session IV / V Peterhof: Room HS2</span>	(30min/paper incl. 10 min discussion)
19:30	Dinner - Welcome from Christine v. Weizsäcker	Haus zur lieben Hand: Casino

### Friday, 16<sup>th</sup> September 2011

Time	Event	Location/Note
9:00-9:15	Good morning coffee and summary of previous day	Peterhof: Historical vaulted cellar
9:15-11:00	Session I Peterhof: Room HS4 <span style="margin-left: 100px;">Session III Peterhof: Room HS3</span> <span style="margin-left: 100px;">Session IV / V Peterhof: Room HS2</span>	(30min/paper incl. 10 min discussion)
11:00-11:30	Coffee break - Poster Gallery	Peterhof: Historical vaulted cellar
11:30-12:45	Integrating Session II	Haus zur lieben Hand: Conference Hall
12:45-13:00	Closing and get-together	Haus zur lieben Hand: Conference Hall
14:30-21:30	Excursion to Schönau and Dinner (optional)	Schönau

## Paper and Poster Presentations - Overview

Session I - Paper			
Day / Room/ Time	Author	Institution, Country	Title
<b>15.09.2011</b>  <b>Peterhof HS4</b>  <b>14:15-16:00</b>	Späth, Philipp  Coauthor: Rohracher, Harald	University of Freiburg, Germany	How to understand the social dynamics of RESS-initiatives? Towards an analytical framework
	Trutnevyte, Evelina  Coauthors: Stauffacher, Michael; Scholz, Roland W.	Swiss Federal Institute of Technology (ETH) Zürich, Switzerland	Initiating energy system change with an analytically supported envisioning process
	Gabillet, Pauline	Laboratoire Techniques, Territoires et Sociétés (LATTS), France	Local actors, institutional relations and energy transition: the case of a local French operator
<b>15.09.2011</b>  <b>Peterhof HS4</b>  <b>16:30-18:15</b>	Bedenik, Katja  Coauthor: Binder, Claudia R.	Institute for Systems Science, Innovation & Sustainability Research (ISIS), University of Graz, Austria	The role of actors in transitions towards energy self-sufficient regions: the case of Güssing, Austria
	Sheng, Chunhong	Freie Universität Berlin, Germany	China's Local Pilot city's Exploration of Renewable Energy-Baoding: Green Power Valley of China
	Hauber, Jürgen	Centre for Renewable Energy, University of Freiburg, Germany	Where do Bioenergy Value Chains come from? Organizing efforts to shape value chains to reach RESS
<b>16.09.2011</b>  <b>Peterhof HS4</b>  <b>9:15-11:00</b>	Stryi-Hipp, Gerhard	Fraunhofer Institute for Solar Energy Systems (ISE), Germany	The role of Smart Cities by transforming the energy system
	Mans, Ulrich  Coauthor: Meerow, Sara	University of Amsterdam, Netherlands	Green City and Green Economy - Linking Politics with Business

	Jerneck, Max	Lund University, Sweden	Industrial Policy as Climate Policy: the Importance of Promoting Domestic Components Manufacturing for the Diffusion of Renewable Energy
<b>Poster related to Session I</b>			
	Düspohl, Meike Coauthor: Döll, Petra	Institute of Physical Geography Goethe University Frankfurt, Germany	Participatory methods for supporting an accelerated development and implementation of renewable energy sources
	Gailing, Ludger	Leibniz-Institute for Regional Development and Structural Planning (IRS), Germany	Regional energy transition processes: Physical realities, Power, and People
	Ibendorf, Jens	University of Göttingen, Germany	Sustainable use of bioenergy: bridging climate protection, nature conservation and society. An inter- and transdisciplinary approach in Lower Saxony, Germany
	Søgaard Jørgensen, Michael Coauthors: Lauridsen, E. H; Jørgensen, U.	Department of Management Engineering, Technical University of Denmark	Developing knowledge and strategies for enabling and governing transitions to a low carbon society
	Kunze, Conrad	Technical University of Cottbus, Germany	Towards a theory of “autarkic energy-regions”
	Laborgne, Pia	IWAR, Technical University of Darmstadt, Germany	Local Approaches to Urban Energy Transformations. A case study in Berlin
	Mahzouni, Arian	Department of Urban Planning and Environment, Royal Institute of Technology (KTH), Stockholm, Sweden	Building niche network for transforming energy systems towards sustainability: The case of Freiamt rural district in the Black Forest Region
	Müller, Kathrin	Competence Network Distributed Energy Technologies (deENet), Kassel, Germany	Municipalities as the Protagonists of the Energy Transition-Project 100% Renewable Energy Regions



Neubert, Florian P.	Technical University of Dresden, Germany	The amount of biomass derived from short rotation coppice (SRC) in Germany is growing continually
Schönberger, Philipp	Wuppertal Institute for Climate, Environment and Energy, Research Group 2: Energy, Transport and Climate Policy, Germany	Municipal Renewable Energy Governance: Opportunities, Good-Practice Examples and Success Conditions
Techert, Holger	Cologne Institute for Economic Research, Germany	Effects of fiscal stimulus packages on the development of renewable energies
Wassermann, Sandra  Coauthors: Kast, Thomas; Klann, Uwe; Nienhaus, Kristina; Reeg, Matthias; Nils, Roloff; Weimer-Jehle, Wolfgang	University of Stuttgart, Germany	Market integration of renewable: analysis of actors' goals, strategies and options

<b>Session II - Paper</b>			
<b>Day / Room/ Time</b>	<b>Author</b>	<b>Institution, Country</b>	<b>Title</b>
<b>15.09.2011</b> <b>Peterhof HS1</b> <b>16:30-18:15</b>	Ulrich, Philip  Coauthors: Distelkamp, Martin; Lehr, Ulrike	Institute of Economic Structures Research (GWS) mbH Osnabrück, Germany	Employment effects of renewable energy expansion on a regional level – first results of a model-based approach for Germany
	Funcke, Simon	Centre for Renewable Energy, University of Freiburg, Germany	Municipal added value through solar power systems in the city of Freiburg
	Offermann, Ruth  Coauthors: Seidenberger, Thilo; Thrän, Daniela	German Biomass Research Centre (DBFZ) gGmbH, Germany  Helmholtz Centre for Environmental Research UFZ	Bioenergy Regions: Monitoring of techno-economic aspects of regional bioenergy production and use

<b>16.09.2011</b> <b>Peterhof HS2</b> <b>9:15-11:00</b>	Braune, Ines  Coauthor: Schmuck, Peter	Berlin Institute of Technology, Germany	A holistic evaluation of energy scenarios with multi criteria decision analysis – Results from an interdisciplinary and transdisciplinary case study in a small village in Brandenburg
<b>Poster related to Session II</b>			
Cole, Nancy J.		University of Freiburg, Germany	Start-up Company Development - Analysis of a Waste-to-Energy System in Northern California
Eberhardt, Gerd  Coauthor: Grundmann, Philipp		Leibniz Institute for Agricultural Engineering Potsdam-Bornim e. V. (ATB) Potsdam, Germany	An Analytical Framework for Assessing the Performance and Adaptiveness of Bioenergy Supply Chains
Maaß, Oliver  Coauthor: Busch, Henner		Leibniz Institute for Agricultural Engineering Potsdam-Bornim e. V. (ATB) Potsdam, Germany	Added Value of Analyzing Value Nets for Bioenergy Production and Fertilizers from Waste Water Residues

<b>Session III - Paper</b>			
<b>Day / Room/ Time</b>	<b>Author</b>	<b>Institution, Country</b>	<b>Title</b>
<b>15.09.2011</b> <b>Peterhof HS3</b> <b>16:30-18:15</b>	Wächter, Petra  Coauthor: Ornetzeder, Michael	Institute of Technology Assessment of the Austrian Academy of Sciences, Vienna, Austria	Spatial planning, regional energy and sustainable development: How are they interlinked?
	Foster, Piper	Sopris Foundation Aspen, Colorado, USA	Integrated Spatial Energy Planning; A method to unite land use planning and renewable energy development
	Terrapon-Pfaff, Julia C.	Wuppertal Institute for Climate, Environment and Energy, University of Trier, Germany/ Belgium	Linking energy- and land-use systems: Risks and opportunities of using agricultural residues for energy generation in Tanzania

<b>16.09.2011</b> <b>Peterhof HS3</b> <b>9:15-11:00</b>	Jergentz, Stefan Coauthor: Elsässer, David	Institute for Environmental Science, Koblenz-Landau University, Germany	The REE-Mix spatial decision support system: Assessing the potentials for regional renewable energy supply
	Schlager, Patric Coauthors: Schmieder, Klaus Krismann, Alfons;	Institute for Landscape and Plant Ecology, University of Hohenheim, Germany  Institute for Landscape ecology and Nature Conservation, Germany	Estimating the biomass potential from agricultural production of Lüchow-Dannenberg (Germany) – a GIS based approach
	Pick, Daniel Coauthor: Dieterich, Martin	Centre for Renewable Energy, University of Freiburg, Germany  Institute of Landscape and Plant Ecology, University of Hohenheim, Germany	Potential survey of the economically applicable share of green waste for biogas production on the example of four municipalities
<b>Poster related to Session III</b>			
Skodra, Julita	Technical University Berlin, Germany	Sustainable Land Use Systems: How to Support and Manage Transition to Renewable Energy Production	
Sprenger, Torsten	University of Göttingen, Germany	A new “Transition forestry movement” or good old sustainability – How to deal with potential conflicting land use in times of regional bio-energy initiatives?	

Session IV / V - Paper			
Day / Room/ Time	Author	Institution, Country	Title
<b>15.09.2011</b>  <b>Peterhof HS2</b>  <b>14:15-16:00</b>	<u><b>Opening speech:</b></u>  Schweizer-Ries, Petra	Saarland University, Germany	The Role of citizens in Renewable Energy Communities - Social Acceptance of Renewable Energies and Sufficiency
	Kress, Michael	Institute for Ecological Economy Research, Heidelberg, Germany	Acceptance, Demand and Participation – Attitudes and behavior patterns in communities with the goal of renewable energy self-sufficiency
	Bobsien, Armin	fesa e.V. Freiburg, Germany	Local and regional energy-self sufficiency as local government initiative or as a citizen initiative – A comparative analysis
<b>15.09.2011</b>  <b>Peterhof HS2</b>  <b>16:30-18:15</b>	Stablo, Järmo  Coauthor: Ruppert- Winkel, Chantal	Centre for Renewable Energy, University of Freiburg, Germany	Reduction of energy demand to achieve the goal of local Renewable Energy Self- Sufficiency (RESS) – Reconstruction of the integration processes based on a qualitative case study
	Villalobos Montoya, Claudia  Coauthor: Schweizer-Ries, Petra	Saarland University, Germany	A Transdisciplinary Approach for Energy Sustainability - Lessons learnt from a Spanish town
	Wüste, André  Coauthor: Schmuck, Peter	Interdisciplinary Centre of Sustainable Development, University of Göttingen, Germany	Bioenergy villages and regions in Germany: An interview study with initiators of communal bioenergy projects on the success factors for restructuring the energy supply of the community
<b>16.09.2011</b>  <b>Peterhof HS2</b>  <b>9:15-11:00</b>	Yeom, Kwanghee	Environmental Policy Research Centre (FFU), Freie Universität Berlin, Germany	Social Conflicts resulting from Renewable Energy Promotion and Strategy to minimize conflicts – focusing on the concept of participatory governance

	Rupp, Johannes	Institute for Future Studies and Technology Assessment (IZT), Germany	Shared Ownership as a Success factor for local and regional Renewable Energy Projects
<b>Poster related to Session IV / V</b>			
	Cote, Mauricio	University of Freiburg, Germany	Uncertainty assessment for renewable electricity in sustainable energy systems
	Curtius, Hans C. Coauthor: Kuenzel, Karoline	Renewables Energies Institute for Economy and the Environment (IWÖ-HSG), University of St. Gallen, Switzerland	Social acceptance of smart grids: Empirical evidence from a Cross-European Country study
	Gigli, Michaela Coauthors: Prochnow Anna; Schweizer-Ries, Petra	Fraunhofer Institute for Systems and Innovation Research (ISI), Karlsruhe, Germany	Investigating Energy Sustainable Transformations at the Individual Level

<b>Session VI - Paper</b>			
<b>Day / Room/ Time</b>	<b>Author</b>	<b>Institution, Country</b>	<b>Title</b>
<b>15.09.2011</b> <b>Peterhof HS3</b> <b>14:15 – 16:00</b>	Shelby, Ryan Coauthors: Perez, Yael; Agogino, Alice	University of California, Berkeley, USA	Co -Design Methodology for the Development of Sustainable and Renewable Energy Systems for Underserved Communities: A case study with the Pinoleville Pomo Nation
	Ortiz, Willington Coauthors: Dienst, Carmen;	Wuppertal Institute for Climate Environment and Energy, Germany	Local socio-economic structures: Critical factor for introducing modern energy services for off-grid communities
	Terraon-Pfaff Julia C.	University of Trier, Germany	
	Lemaire, Xavier	Warwick Business School, University of Warwick, UK	Rural Electrification and the Massive-scale Diffusion of Small Photovoltaic Systems in Developing Countries

## Keynote Speaker and further Contributors

**Timo Kaphengst** is Senior Fellow with Ecologic Institute, where he serves as the biodiversity and forest coordinator. Focusing on environmental economics, he addresses international and European biodiversity policies, impacts of land use and land use change as well as biomass use for energy generation. He is a member of the scientific advisory board of two current projects on Social Ecological Research (SÖF): Biofuel as Social Fuel and Renewable Energy Regions. Timo Kaphengst studied landscape ecology and nature conservation at the Ernst-Moritz-Arndt-University of Greifswald (Germany). Here, he also developed his interest in theoretical and applied aspects of environmental ethics.

**Prof. Dr. Peter Schmuck** is co-founder of the Interdisciplinary Centre of Sustainable Development at University Goettingen, where he is actually active in four inter- and transdisciplinary action research projects directed at sustainable development in the energy sector. In these projects he is leading and managing the research process and moderating the planning process with practitioners transforming their communities. Among the finished projects of his group is the first bioenergy village in Germany, which resulted in a transfer of the idea to dozens of further German villages. Peter Schmuck studied psychology and pedagogics at Humboldt University Berlin. He is teaching at Universities in Berlin and Innsbruck on the interface between positive psychology and sustainability science. His publications are on the field between cognitive and personality psychology on the one hand and sustainability science including ethics at the other.

**Prof. Dr. Roland Scholz** holds the Chair of Environmental Sciences: Natural and Social Science Interface at the Swiss Federal Institute of Technology (ETH Zurich, Switzerland). Since 2002, he is the speaker of the International Transdisciplinarity Network on Case Study Teaching (ITdNet). Roland Scholz specialized in decision sciences and systems analysis, cognitive and organizational psychology, and environmental modeling, evaluation and risk assessment. His current research field is environmental decision making in human-environment interactions and the theory, methodology and practice of transdisciplinary sustainable transition processes.

**Prof. Dr. Petra Schweizer- Ries** is apl. Professor at the Saarland University in the field of Sustainability Science. She leads the environmental psychologist research group “Forschungsgruppe Umweltpsychology” working on different social aspects of energy distribution and introduction in isolated rural and grid-connected communities in Europe. Her

current activities and interests among others are research on sustainable energy communities, theoretical generations and development of research methods in Sustainability Science and the development of participative evaluation methodologies. She works with her team on several European and German research projects concerned with acceptance of renewable energies in context of social scientific issues, energy sustainability in buildings and communities, energy consumption management and participation processes during the introduction of innovative energy systems.

**Dr. Christine von Weizsäcker** is a biologist, researcher and political activist. With many publications, she contributed to the scientific and public debate on technology assessment and created the term "error-friendliness" as one of the criteria for technology assessment. Since the Earth Summit in Rio in 1992 she actively participated in many of the negotiations of Multilateral Environmental Agreements, such as the Framework Convention on Climate Change and the Convention on Biological Diversity and their Protocols. Among many other functions she is board member of the Federation of German Scientists (VDW) and the German Society for Human Ecology (DGH), President of the NGOs "Ecoropa" and "Women in Europe for a Common Future, WECF)", Board Member of the German Consumer Testing Group and the Advisory Committee on Consumer and Food Policy of the German Ministry for Food, Agriculture and Consumer Affairs.



**Dr. Angela Luechtrath** is a graphic facilitator and provides the illustrations of the sessions for the RESS-Conference. She did her doctorate degree in forest- and environmental policy and works as facilitator and mediator. In this context she discovered the power of visualization. Images make abstract facts readily accessible and memorable. Thus, graphic facilitation is the perfect tool to transfer ideas, theoretical concepts, discussions and statements to your audience. It is ideal for the illustration of papers, posters and presentations or for the documentation of conferences, workshops and discussions through live facilitation.

For further information please contact Angela Luechtrath:  
[aluechtrath@web.de](mailto:aluechtrath@web.de)



## Session I

**Session leader:** Jürgen Hauber, Centre for Renewable Energy, University of Freiburg

### **The role of actors, networks and institutions in the process of change towards renewable energy self-sufficiency**

- How different actors organize the process of change?
- The role of leadership to change the energy system.
- What practices are used to organize the change of the energy system?

The change in the energy system to one of renewable energy self-sufficiency (RESS) entails a fundamental change in the entire socio-technical system. Due to the all-embracing character of the system transformation, the process itself is organized through a diverse bundle of actors originating from different areas of society. They are politicians, entrepreneurs, farmers, citizens, consumers, conservationists and other stakeholders in the regions who are influencing the organization of the transformation process in different ways. This brings forward the question, how do actors organize such a fundamental process as the transformation of an energy system? For the organizational process, the various actors must encourage the development of relationships that bring together their competences, talents, and resources and align their interests to each other; in the end creating new associations. The relationships within the networks can be of assorted character, they can be governed through the market; informal, more friendship like relations; hierarchical connection, or other formal relationships. Hence, the practices in which actors connect themselves to each other can vary. Another question is what is the driving force behind organizing the network? Normally in a network not all the relations are identical; and often there are some individuals or groups which can be identified as leaders and others that tend to follow. In such asymmetrical networks actors or groups of actors hold certain resources, talents, and competences, which enable them to take on a leadership position and be accepted by the other member of the network. This session offers the opportunity to discuss how actors, networks, and institutions organize the change in the energy system to RESS. We welcome empirical and theoretical papers, which address one or several of the following aspects: The role of networks within the transformation of the energy system, more precisely, e.g. practice approaches focusing on network and/or market practices or leadership approaches that explain the prominent role of individuals or groups and their relationships within the process or other social science and economic science approaches dealing with the role of actors, networks, and institutions.



**Session I - Paper Presentations**

**How to understand the social dynamics of RESS-initiatives?  
Towards an analytical framework**

**Author:** Späth, Philipp

**Coauthor:** Rohracher, Harald

**Institution:** University of Freiburg, Germany

**Time:** Thursday, 15/09/2011: 2:15pm – 4:00pm

**Room:** Peterhof HS4

Local RESS-initiatives promise to contribute to transitions towards more sustainable energy systems. As such, they have raised high expectations among local activists and are increasingly supported e.g. by national funding schemes. But how can we understand the social dynamics of these initiatives? What can we gain from framing them as social movements, networks of firms or policy networks respectively?

I argue for a discourse analytical perspective in the tradition of Maarten Hajer, which highlights the formation of discourse coalitions and processes of discourse structuration and institutionalisation. I elaborate on some core elements of an analytical framework and consider methodological implications.

These considerations will be illustrated by an analysis of the social dynamics of the 'energy vision' process in the alpine district of Murau, Upper Styria, Austria. Since 2001, this initiative follows a vision and strategies to reach 'energy autarky' by the year 2015. This guiding vision was developed in a participatory process, driven by actors strategically forming a growing and heterogeneous network. Which actors were able to shape and direct transition processes to what extent, using what discursive strategies? The case suggests that dynamics across various levels of governance can be highly important both for achieving local discursive hegemony and the mobilisation of resources from outside the region.

Key words: Energy regions / socio-technical systems / sustainability transitions / discourse coalitions / multi-level governance



**Initiating energy system change with an analytically supported envisioning process**

**Author:** Trutnevyte, Evelina

**Coauthors:** Stauffacher, Michael;  
Scholz, Roland W.

**Institution:** Swiss Federal Institute of Technology (ETH) Zürich, Switzerland

**Time:** Thursday, 15/09/2011: 2:15pm – 4:00pm

**Room:** Peterhof HS4

Bottom-up energy system changes often start with visions of several key actors, e.g. energy independence or 2000 Watt society visions. Such visions are then set as strategic goals. But when it comes to implementation, the system change is in fact slow or sometimes even fails. We argue that there are several reasons for that: (1) envisioning may lead to a narrow range of future options which are not supported by all actors, (2) visions are often too generic and not contextualized to specific circumstances, and (3) the consequences of implementing visions are not anticipated up front. We propose a novel approach for overcoming these limitations of current practices by analytically supported envisioning process. We present the methodology and illustrate it with the case of small Swiss community of Urnäsch, where a transdisciplinary case study about its energy system was conducted.

**Local actors, institutional relations and energy transition:  
The case of a local French operator**

**Author:** Gabillet, Pauline

**Institution:** Laboratoire Techniques, Territoires et Sociétés (LATTS), France

**Time:** Thursday, 15/09/2011: 2:15pm – 4:00pm

**Room:** Peterhof HS4

Transition towards renewable energy self-sufficiency is a multi-dimensional process which implies a diversity of actors, sectors and scales. The emergence of a stronger role for actors at the local level opens up the issue of how and to what extent local operators might contribute to this transition.

In France 95% of electricity is still supplied by ERDF, a subsidiary of EDF, while 5% is produced by local operators. There are some cities where local operators are majority owned by the municipalities to whose territories they supply energy. This French case can be compared to the German case, where Stadtwerke are a strong part of the energy system. After the sale of numerous Stadtwerke in the 1990s, there is a move towards remunicipalisation, with municipalities buying back their local operators.

The role of local operators in any transition to renewable energy self-sufficiency has to be taken into account. The socio-political relations between local operators and municipalities are crucial to understanding the capabilities and possibilities to change the energy system. How does local government interact with local operators? Does having a local public operator help municipalities to develop projects for a more sustainable energy system, or do their divergent interests create frictions and tensions in urban energy planning? We adopt here a political science and sociological approach focused on the relations and interactions between actors which help to better understand the techno-economic dynamics and power geometries at play in local energy transition policies.

**The role of actors in transitions towards energy self-sufficient regions:  
The case of Güssing, Austria**

**Author:** Bedenik, Katja

**Coauthor:** Binder, Claudia R.

**Institution:** Institute for Systems Science, Innovation & Sustainability Research (ISIS),  
University of Graz, Austria

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS4

Transitions of today's mainly fossil fuel based energy systems towards more sustainable energy systems are of high interest and are being increasingly supported through governmental funding and analyzed by scientists. Examples where such transitions have been initiated or are carried out more or less successfully are the so called energy regions. They usually envision energy self-sufficiency using regionally available renewable energy sources and building a decentralized energy infrastructure. In Austria, energy regions have emerged since the 1990s and today about 10 percent of Austrian citizens are involved. Attempts to scientifically investigate transitions in energy regions have started only recently.

The objectives of this paper are to provide an in depth analysis of the transitions of the district Güssing. Thereby we analyze the relationship among social structure and actors' decisions, as well as investigate how the transition process is affected by their options and constraints for action. For this we apply the heuristic concept of transitions and the Structural Agent Analysis. The selected study region district Güssing started in 1990 with the decision of the town's mayor to completely withdraw from fossil fuels, which initiated the transition. The results are several small-scale power plants, district heating systems, as well as an increase in regional value-added and new jobs.

Our results firstly provide a semi-quantitative characterisation of the transition process on town and district level, describing the states, phases and milestones of the process. Second we present the structural agent analysis where we identify key actors, interactions among them and their structure of regulation. Finally we examine the role of actors particularly their relevance and effect on the transition in the study region. We conclude our paper with a discussion of the results and an outlook to further research on multi-level and dynamic approaches in investigating the complex interactions in energy regions.

**China's Local Pilot city's Exploration of Renewable Energy-Baoding:  
Green Power Valley of China**

**Author:** Sheng, Chunhong

**Institution:** Freie Universität Berlin, Germany

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS4

China is facing great challenge of high energy demands and climate change. China's president Hu Jintao said at the UN climate change summit: we will vigorously develop renewable energy and nuclear energy. We will endeavor to increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020. It set the tone and strong will of China, but how is a big question mark. Baoding City is called the "National Renewable Energy Industrialization Base", "New Energy Industry National High Technology Industry Base", "New Energy and Energy Equipment Industrial Base", "Solar Comprehensive Application Technology Demonstration Cities. Baoding was also selected as a pilot city in the "China Low-Carbon City Development Program" by the World Wildlife Fund (WWF) in 2008, and as one of the country's eight low-carbon pilot cities by China's National Development and Reform Committee (NDRC) in August 2010.

My paper is going to explore who are pushing for renewable energy in Baoding city and why. Baoding's mayor is called the renewable energy mayor, and Baoding has strong renewable industry. I will look deeply the interaction between local government and local industry in Baoding. Furthermore, I will take international experience and policies diffusion into account. At last, China is a large country with different local conditions, as a pilot city, Baoding's renewable polices, what are its national implications.

China is always in the process of change and reformation. And in China's history, the open up policy are first experimented in some pilot cities then applied nationally. Many local governments see promoting renewable energy as a new opportunity to develop local economy. The local government has strong will to promote renewable energy policies in Baoding. Local governments' policies are running forward compared with national policies.



**Where do Bioenergy Value Chains come from? Organizing efforts to shape value chains to reach RESS**

**Author:** Hauber, Jürgen

**Institution:** Centre for Renewable Energy, University of Freiburg, Germany

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS4

From the perspective of the actors, the generation of added value is one of the main motivations behind the drive towards renewable energy self sufficiency (Hauber und Ruppert-Winkel 2010). Therefore, to reach this goal, the organizing of new value chains is essential. Particularly the constitution of bioenergy value chains requires specific organizing efforts because biomass has to be supplied and transformed to produce energy. Within literature there are different perspectives on value chains existing, but all these perspectives have in common that they take the existence of value chains for granted and ignore the fact that organizing efforts have to be performed to bring value chains into existence. Therefore, the question is stated, “Which practices are performed by actors to organize the bioenergy value chain?”

Following of Kjellberg and Helgesson’s model (2007 a, b) that represents markets as networks of practical translations, it is supposed that the actors organize the exchange between each other by carrying out specific practices. Through this a mode of exchange is constituted. This constituted mode of exchange is characterized by five elements: the market actors, the exchange objects, involved artifacts, enacted market images, and rules that are linked together through the practices in order to coordinate the exchange between the different actors of the value chain.

Based on three coordination problems in markets (Beckert 2009, 2007), which can be represented by asking how the actors are selecting their exchange partners, organizing the concrete exchange, and ensuring the quality of the exchange object. Through these questions the modes of exchange and their elements were scrutinized. Specific to the study, within two regions that have committed themselves to the goal of renewable energy self sufficiency 21 actors were interviewed. The interviews were complemented with interviews of actors in the national markets in order to derive market images and the relevant markets rules in which the regional exchanges could be nested.

The expected empirical results should help to contribute to the above stated questions. Beside of the goal of generating new theoretical insights, the study addresses the practical question of which modes of exchange have to be constituted in order to organize value chains as an important building block toward the transformation of the energy system.

**The role of smart cities by transforming the energy system**

**Author:** Stryi-Hipp, Gerhard

**Institution:** Institute for Solar Energy Systems (ISE), Germany

**Time:** Friday 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS4

Recently, governments on European, national and sometimes state levels are intensifying their energy policy by setting long-term goals regarding the reduction of greenhouse gas emissions and the increased use of renewable energies. This leads to a more decentralized energy policy due to the decentralized renewable energy production, increasing relevance of local smart grids including demand side management, and the need to motivate final energy consumer to actively support to the transformation by own investments. On that background, a growing number of cities and communities recognize the responsibility to transform their energy system to become climate gas emissions neutral or to cover their energy demand with renewable energies. Sometimes they are called “Smart Cities”. Their role by the transformation of the energy system is described and policy instruments, which are used to support them, are analysed.

Cities and communities have multiple possibilities to influence the energy system in their municipal area. They can motivate inhabitants and other energy consumer to become more energy efficient and use more renewable energies, as shareholders of public utilities and housing associations they can influence their corporate strategies, and as owner and operator they can reduce the energy consumption of its own buildings. Cities and communities are to a greater or lesser extent active in the energy field since decades, but “Smart City” is characterizing a new quality of engagement. Smart Cities take over responsibility for the entire energy system within their municipal area, setting ambitious goals regarding the transformation of the energy system and developing concepts and strategies to achieve the goals. This is a remarkable, since cities and communities can only influence a minor part of the energy system directly, however the entire system, including supply, storage, distribution and demand has to be transformed to achieve the goals.

A Smart City typically has to go through a process from goal setting by the city council, organizing the participation of citizens and other stakeholders, developing a roadmap for the transformation until the realization of this concept. This process is described and it is analysed in which way the governmental support programmes are supporting this process.

**Green City and Green Economy - Linking Politics with Business**

**Author:** Mans, Ulrich

**Coauthor:** Meerow, Sara

**Institution:** University of Amsterdam, Netherlands

**Time:** Friday 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS4

In the light of cumbersome national energy transitions, cities across the world are increasingly taken a leadership role in promoting renewable energy self-sufficiency (RESS). This can take many shapes and forms, and has thus far often been limited to pilot initiatives and visionary experiments aimed at promoting renewable energy schemes. Cities in Europe and the United States are generally in the lead when it comes to municipal strategies towards decentralized solutions and self-sufficiency. Renewable energy generation at municipal utilities, photovoltaic promotion, thermal water heating regulations and public building energy standards all have their share in this.

However, the need for renewable energy in Western cities is limited. Energy efficiency is a much greater concern for most city leaders, and is, after all, much cheaper to implement. This is in sharp contrast to those cities that do not have the option of reducing the amount of energy: cities in emerging markets that are moving fast to become the megacities of tomorrow. Where population growth is imminent and economic development unimpeded, the life-style choices of many will change quickly. As a consequence, cities in China, India or Brazil will face much greater levels of energy demand – very soon.

For them, increasing the level of self-sufficiency is simply a precondition to sustaining the status quo. The problem of energy security features much higher on their agenda than does the voluntary greening of a city's energy supply for Europe's municipal decision-makers. Trial and error are part and parcel of this trend, and underscores the necessity to exchange lessons learned between those municipalities that have taken the initiative to test-run RESS solutions within their jurisdiction. This paper therefore looks at experiences from around the globe, and aims to highlight lessons learned from cities in emerging market economies that have become new, inspiring actors in promoting RESS.



**Industrial Policy as Climate Policy: the Importance of Promoting Domestic Components Manufacturing for the Diffusion of Renewable Energy**

**Author:** Jerneck, Max

**Institution:** Lund University, Sweden

**Time:** Friday 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS4

Development and diffusion of renewable energy is dependent upon supportive public policies. According to institutional sociological theory (Dobbin 1994), the form and content of such policies are likely to be shaped by prevailing ideas about the appropriate role of the state in the economy. A key aspect of those ideas is industrial policy; I propose that this factor is crucial for the diffusion of renewable energy. The countries with the highest rates of installed capacity - Germany, Denmark and Spain - have all developed domestic renewable energy industries. In China, policy makers waited to promote the installation of renewable energy until domestic components industries were mature enough to meet demand. (Mendonca 2007). Meanwhile in the United States, renewable energy policies have met resistance because most components would be manufactured abroad (NY Times 11/06/2009). I hypothesize that successful policies to promote renewable energy require concurrent policies to foster domestic production. Drawing on second hand sources and using a historical institutional sociological framework, I test this hypothesis by comparing paradigms of public and industrial policy with renewable energy development and diffusion in China, the United States, Germany, Denmark, Spain, France and the UK.

## Session I - Poster Presentations

### Participatory methods for supporting an accelerated development and implementation of renewable energy sources

**Author:** Düspohl, Meike

**Coauthor:** Döll, Petra

**Institution:** Institute of Physical Geography Goethe University Frankfurt, Germany

The German state of Hessen aims at covering by 2020 20% of its energy consumption (without traffic) with renewable energy. The latest event in Japan drives the urgency to identify sustainable strategies to implement renewable energy sources. For reaching this goal in Hessen a transformation process in counties and communities has to be set up. There are conflicts that might prevent us from reaching this goal and a sustainable energy supply system in the following decades.

Transforming the energy system of a county or community by overcoming those conflicts, stakeholders have to cooperate. One conflict might be the definition of a sustainable energy system due to the ecological impacts of renewable energy sources e.g. biomass and wind energy on ecosystems. It is the state of the art that participation leads to a better identification of sustainable and implementable strategies. However, there is no well established standard design for successful participatory processes. This poster presents the concept and tool that support the participatory process for the elicitation and integration of stakeholder perspectives in the problem field of sustainable renewable energy use.

The modeling tools are actor-based model (ABM) with the software DANA (Dynamic Actor Network Analysis). For initiating the participatory process, a total of 15 most relevant institutional actors, inter alia, energy sector, financial sector, public decision makers, and NGOs, will be identified in this study. The representatives will be interviewed individually and invited to participate in workshops. Their problem perceptions and the goals that guide their actions will be depicted in Perception Graphs. Subsequently, these graphs will be discussed and exchanged in workshops. Apart from eliciting problem perceptions, alternative actor-based scenarios of the development and implementation of renewable energies will be developed. In this study, the impact of the applied participatory method on social learning of the involved actors will be evaluated.

**Regional energy transition processes: Physical realities, Power, and People**

**Author:** Gailing, Ludger

**Institution:** Leibniz-Institute for Regional Development and Structural Planning (IRS),  
Germany

The poster aims at presenting an outline of the core ideas and the methodological assumptions informing two key research projects (2012-2017) located at the IRS. The interdisciplinary projects include historians, colleagues from political and social sciences, spatial planning experts, and economists. The principal idea of our research programme is to analyse the “blind spots” of the hitherto existing institutionalisms and of the research about the governance of the commons with relevance for the spatial construction of public goods:

- The issue “physical realities” stands for the growing interest in human geography and socio-scientific technical and environmental research in processes of coevolution between social and physical worlds, beyond purely deterministic or socioconstructivist approaches.
- “Power” stands for the area of conflict between participation and hierarchical and/or market-driven modes of governance. We need more insights in the relevance of power in institutional configurations, socio-spatial contexts, and constellations of stakeholders.
- The third issue “people” targets at the role of individuals in the protection and development of common goods. We would like to investigate how and why individual actors – e.g. “local champions”, intermediaries or counsellors – have an impact on the construction of problems, on identity building, and on problem-solving in spatial settings and situations.

The empirical examples of the research programme will be regional transition processes of the energy system. We will connect the issues “energy” and “regional spatial development” with our work on regional common goods from the perspective of governance and institutionalisms. The main challenge consists in describing the relationship between the dimensions of “physical realities”, “power”, and “people” and the specific features of energy infrastructures and energy landscapes in transition to a more sustainable energy system. The poster will present first examples of assumptions and of operationalisations of our theoretical perspectives in the field of regional energy transition processes.

**Sustainable use of bioenergy: bridging climate protection, nature conservation and society.  
An inter- and transdisciplinary approach in Lower Saxony, Germany**

**Author:** Ibendorf, Jens

**Institution:** University of Göttingen, Germany

The energetic use of biomass is gaining more and more attention. Since the Renewable Energy Sources Act (EEG) got in Germany in force in 2000, the energetic use of biomass is rapidly increasing. Many and very different stakeholders are involved in the process of production and usage of bioenergy. Every stakeholder such as farmers, administration, nature protection agencies, energy suppliers, neighbors around the biogas plant etc. has a different view on the whole process chain; therefore conflicts of diverse interests are particularly connected to bioenergy. In this research it will be shown, that only an inter- and transdisciplinary approach might reduce the conflicts. The interaction of economical, ecological and social research is necessary to combine the results for a decision support system aiming a sustainable path for a future usage of bioenergy. This support system can be used for a possible further extension of bioenergy on a local and regional level. In this case, the applied methods, models and tools are interacting on different controlling scales. This concept increases the transparency during a decision process, reveals the weakness and strength of the sustainability of various biomass concepts and their effects e.g. on nature, climate, landscape, economic efficiency and on social indicators like acceptance and participation. The decision support system is tested in three regions of Lower Saxony in workshops with all relevant stakeholders including farmers who evaluate a site specific cultivation of various energy crops. However, this approach will invigorate the several advantages of bioenergy and places the current problems on an operational base. Decision makers can see the influence of a decision on other parameters. A dialog-based communication is involved in the test.

**Developing knowledge and strategies for enabling and governing transitions to a low carbon society**

**Author:** Søggaard Jørgensen, Michael

**Coauthors:** Lauridsen, E. H; Jørgensen, U.

**Institution:** Department of Management Engineering, Technical University of Denmark

Most of the research on low carbon society in Denmark has hitherto focused on developing scenarios and analyzing possible policy instruments, including market mechanisms, costs and impacts in relation to known options and impacts. The Danish Council of Strategic Research funds the four year research alliance “Enabling and governing transitions to a low carbon society” during 2010-2013. The aim of this alliance is to conceptualize the dynamics of transition processes towards a low carbon society by involving the diverse set of actors from consumers to governmental agencies, companies and organizations.

Transition of the path-dependent, socio-technical regimes in the energy system is a governance challenge, since transitions need to occur simultaneously in different arenas without necessarily having a specific ‘centre’ of co-ordination. Changes of regimes require innovative breakthroughs in technology, changes of institutional frames and changes in social practices, but also increased utilisation of well known solutions is important. The research alliance focuses in a number of inter-linked projects on five overall transition arenas in society: standards and certifications, households, companies, cities, and national and international policy. Theoretically the research alliance builds upon a combination of theories including social practice theory, innovation economy, institutional theory, actor-network theory and governance theory. Through a combination of historical analysis, case studies and action research, the research alliance analyses the roles of socio-technical experiments, creation and utilisation of ‘windows of opportunity’ and stabilisation of changes in societal niches into regime transformation. The results of the alliance will comprise of:

- Methods which enable stakeholders to make continuous adjustments of objectives and means in unavoidably conflict ridden transition processes.
- Analyses of how key measures and institutions at different societal levels might contribute to transition processes.
- Characterisation of 4-6 typical sustainable transition set-ups as complex contexts, which are identifiable to actors in similar situations.

**Keywords:** Sustainable transition, governance, low carbon society, socio-technical experiments.

**Towards a theory of “autarkic energy-regions”**

**Author:** Kunze, Conrad

**Institution:** Technical University of Cottbus, Germany

Interviews and participatory observation were made in a qualitative, sociological field research over an 18 month period in seven “energy-regions” in one German county, Brandenburg. The empirical findings were grouped in typical cases, categorising how renewables might be applied in the countryside (cf. Busch/Kunze 2011). Beyond that a theoretical model was developed, to explain why regions that seem quite similar on the first sight often show a very different pace in developing towards “energy autarky” (cf. Wehnert/Nolting 2010). Some succeed quickly, while others are slow, some fail completely and the most still refrain from initiating a local energy transition.

Instead of the predominant technical or economical explanations, the model is a proposal to analyse social and technical aspects as one inter-dependent process. In other words, the technical complexity of a local energy-structure depends on the level of “social complexity”. That comprises public opinion and the ability of locals to settle conflicts and reach common agreements. Both determines in how far a technology is passively accepted and if there is a willingness for active, financial participation. Participation in turn has an influence on the allocation of profits form energy production. If a majority or at least significant local groups benefits, technology acceptance is likely to increase. Therefore the whole process may be perceived as self-perpetuating. Regions may start with very simple forms of technology application like a few solar panels and develop towards higher levels of acceptance and participation that on the long term allow for highly complex technologies like intelligent grids. The autarkic “energy-region” represents therefore a variety of different developmental paths that may, in a row of social and technical advances, result in a state often referred to as “energy autarky”.

**Local Approaches to Urban Energy Transformations. A case study in Berlin**

**Author:** Laborgne, Pia

**Institution:** IWAR, Technical University of Darmstadt, Germany

For the goal of a more efficient use of resources, the local level has an important role. Especially cities constitute major contexts for the consumption of resources and are centres for ecological innovation. Different approaches for transformations in energy production and energy use have been developed locally.

The poster presents work on a PhD thesis realized in the framework of an interdisciplinary researcher group on urban infrastructures. It is applying the multilevel perspective which analyses transformations as interplay of three different levels: landscape, regime and niches (referring to Geels). The thesis intends to enhance the empirical basis on how transformations develop locally and how local experiments (niches) potentially transform the regime. Therefore, three case studies in major urban regions are realized (Berlin, Frankfurt/Main and Ruhr Metropolis).

The poster presents the hypothesis, questions and the analytical framework of the PhD thesis as well as results from the Berlin case study. It is based on the analysis of 14 semi-structured qualitative interviews with local actors and experts, a literature study, official documents and a media analysis. It has been realized in 2010/2011. Central questions to be discussed will be: which is the scope of action for the local level regarding energy, what strategies are developed? What is the role for local niche development, i.e. local experiments? Two such local experiments are analyzed in detail: a specific contracting approach in public buildings and local “climate protection contracts” with enterprises. The thesis is that challenges regarding energy are met very differently in different local contexts. Niches are developing locally emanating from windows of opportunity on the landscape level but also from specific local constellations.

**Building niche network for transforming energy systems towards sustainability: The case of Freiamt rural district in the Black Forest Region**

**Author:** Mahzouni, Arian

**Institution:** Department of Urban Planning and Environment, Royal Institute of Technology (KTH), Stockholm, Sweden

This paper will shed light on the interaction between people, technology and institutions for community-driven energy production and generation. It will, in particular, examine the role of local institutions and networks in developing renewable energy sources for creating sustainable community. Based on a case study of Freiamt District in the State of Baden-Württemberg<sup>1</sup>, the institutionalization process and bottom-up approach to developing foundations and principles of local initiatives in transforming energy systems will be discussed. The new concept of multi-level perspective (niche-regime-landscape) will be used to examine the institutional process in which the socio-technical niches have developed. Furthermore, in a rural context, the opportunities and challenges of the emerging small-scale and decentralized renewable energy as alternatives to existing large and centralized energy supply systems (regimes) will be discussed.

Key words: sustainability transition, multi-level perspective, niche network, local institutions, rural development, Freiamt

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<sup>1</sup>Freiamt has taken capacity building efforts towards creating a renewable energy community. See Agentur für erneuerbare Energien (2011): Kommunal Erneuerbar - So wird's gemacht. Available on: <http://www.unendlich-viel-energie.de/de/politik/detailansicht/article/149/kommunal-erneuerbar-so-wirds-gemacht.html> (accessed 5 February 2011).



**Municipalities as the Protagonists of the Energy Transition-Project 100% Renewable Energy Regions**

**Author:** Müller, Kathrin

**Institution:** Competence Network Distributed Energy Technologies (deENet), Kassel, Germany

Due to the increasing decentralized development of renewable energy sources, local protagonists are gaining more importance, while the “100% Renewable Energy Region” (100% RE Region) provides the setting for the energy transition.

Many regional protagonists are working on converting their regions’ energy supply to a system that in the medium or long term exclusively draws from renewable energy sources. The project “100% Renewable Energy Regions” identifies and accompanies local protagonists that have set themselves this target. The project is funded by the Federal Ministry for the Environment and is implemented by the Competence Network Distributed Energy Technologies (deENet) in Kassel. The aim of the project is to create a national network which will strengthen the experience exchange on different levels as well as accelerate the transfer of knowledge among the regions.

A total of about 120 100% RE Regions and Starter Regions have been identified, and the number is rising annually. These regions are usually governmental units such as municipalities or districts, some of them also constitute regional associations. They cover a total area of almost 100 000 km<sup>2</sup> and have a combined population of about 17.1m. The predominantly rural areas are spread all over Germany, with clusters in the south of Bavaria as well as the northern part of Germany.

Looking at renewable electricity production, it can be said that many regions have already made good progress. However, in the areas of heat recovery and particularly mobility most regions have not by far reached a sustainable energy supply system. Project work has shown that the participants working on the energy transition have fairly diverse backgrounds. Also, functions, motives as well as tasks are usually unequally distributed in new participant constellations. On the regional level, it is mainly individuals with a political or administrative background (mayors, district council members, economic development, etc.) as well individuals from economics (corporations, agriculture and forestry, craft) and citizens’ initiatives (associations, foundations).

**The amount of biomass derived from short rotation coppice (SRC) in Germany is growing continually**

**Author: Neubert, Florian P.**

**Institution: Technical University of Dresden, Germany**

The amount of biomass derived from short rotation coppice (SRC) in Germany is growing continually. This energy source represents an alternative to scarce fossil fuels, and contributes to the mitigation of climate change and increasing local added value. However, the cultivation and use of biomass from SRC does not automatically imply sustainable production. Sustainability assessments employed in agriculture and forestry cannot be used due to the contrasting rotation time of a few years. For a qualitative sustainable assessment of biomass from SRC, specific socio-economic criteria and indicators (C&I) have to be developed and tested. The objective of this study is to develop socio-economic C&I, based on a participative multi-criteria analysis applied in three case study areas (Lausitz, Mittelsächsisches Lösshügelland, Metropolregion Hamburg) within the joint research project AGROFORNET. On the basis of a literature review, C&I will be analyzed and structured. An expert survey in each case study area will specify special characteristics, reduce the number of relevant C&I and identify local actors and stakeholders. Within a bottom-up process, the social groups affected will be actively integrated in a regional description of problem areas and the definition of C&I. The definition of C&I is likely to differ in the three case study areas, on the basis of the individual experiences of actors and stakeholders, and regional economic, demographic and structural differences. The extent to which the C&I defined coincide or contrast must be analyzed, and whether constraints upon the implementation of SRC can be identified. Based on the results, a general C&I catalogue for regional assessment will be developed. The contribution of biomass from SRC to sustainable rural development will be optimized and the acceptance of SRC by all those affected will increase with the creation of consensus.

**Municipal Renewable Energy Governance: Opportunities, Good-Practice Examples and Success Conditions**

**Author:** Schönberger, Philipp

**Institution:** Wuppertal Institute for Climate, Environment and Energy, Research Group 2: Energy, Transport and Climate Policy, Germany

The poster will introduce my dissertation project, which is titled *Municipal Renewable Energy Governance: Opportunities, Good-Practice Examples and Success Conditions*. The idea of the dissertation is to apply research approaches regarding the success conditions of environmental policy – especially renewable energy policy – to the municipal policy level. This way, insights about the success conditions of municipal renewable energy policy are to be gained.

The dissertation's first part, which has already been completed, describes and analyses the opportunities of local communities to promote renewable energies. In the second part, which is supposed to be completed in 2012, three good practice examples are compared in order to derive success conditions.

One main hypothesis of the project is the assumption that *municipalities, compared to other state and private actors, have the potential to play a key role in German renewable energy governance*. Although both private actors and the European Union have gained importance in the past twenty years, German municipalities can still apply five distinct and important modes of governance in the field of renewable energy policy. Moreover, the thesis of a general development towards a 'cooperating and ensuring state', which increasingly delegates its tasks and thus becomes less important, cannot be confirmed in the area of municipal renewable energy governance.

**Effects of fiscal stimulus packages on the development of renewable energies**

**Author:** Techert, Holger

**Institution:** Cologne Institute for Economic Research, Germany

As a result of the recent economic crisis, governments of many countries passed fiscal stimulus programs to help their economies. Some of the packages contain considerably high investments in clean energy. These efforts are made to accelerate the structural change towards a sustainable economic growth and to promote new industries. Thereby a basis for a self-supporting economy towards renewable energy self-sufficiency (RESS) will be established. But a conflict between fiscal and environmental policy exists. While the environmental policy instruments have to be well elaborated and should be lasting, a fiscal stimulus has to be timely as well as time-limited. The paper deals with the question, whether a fiscal stimulus package is an appropriate instrument to establish the basis for a RESS and to initiate the process for a structural change. Several case studies are done for countries with relevant “green” elements within their fiscal stimulus programs. The effectiveness of the fiscal stimulus packages is measured by the development of order entries for renewable energy systems at the manufacturers. The order entries will be evaluated country specific by an impact analysis based on the counterfactual situation. Three aspects are especially considered: First, the development of order entries will be analyzed for the periods of time with and without the fiscal stimulus. Second, the development of order entries will be analyzed for similar countries with and without relevant green stimulus packages. Third, development of order entries will be analyzed with regard to macroeconomic variables. Therefore interviews with manufacturers of wind turbines, photovoltaics, electrical inverters and production facilities for photovoltaics will be conducted. On basis of the results, the case studies will be continued to assess further development of clean energy and to evaluate the effectiveness of the fiscal stimulus packages.

**Market integration of renewable: analysis of actors' goals, strategies and options**

**Author:** Wassermann, Sandra

**Coauthors:** Kast, Thomas; Klann, Uwe; Nienhaus, Kristina; Reeg, Matthias; Nils, Roloff; Weimer-Jehle, Wolfgang

**Institution:** University of Stuttgart, Germany

Due to successful policy support, electricity generation from renewable energies has gained a relevant share in the German energy supply system. The support of a demand-oriented feed-in which can be achieved for instance by an enforced market integration of renewables is considered to be one of the related challenges. Hence, new regulation mechanisms are currently developed and discussed in order to ensure a smooth transition for renewable energy power plant operators from guaranteed feed-in tariffs to the liberalized electricity market.

A variety of actors is involved in this development process as well as in the actual process of market integration. These actors' goals, strategies and options are examined in an interdisciplinary research project<sup>1</sup>. The focus of the project is the development of an agent based simulation model as an instrument to analyse possible actions and interactions of the relevant stakeholders as well as the effects for the overall system, in accordance to the respective regulation mechanisms under consideration.

An important prerequisite for the set up of an agent based model is the thorough analysis of the relevant actors. The actor analysis is led by theoretical assumptions, derived from neo-institutionalism and is conducted with the help of guideline-based interviews with representatives of the important actor groups. In a first step actors' constellations and their exercise of influence in the current discussions of new regulation mechanisms are analysed. In the following step the actors' analysis examines how regulation mechanisms would influence actors' goals, strategies, and options. Furthermore the effects on the overall system are investigated, such as the effectiveness of the various instruments regarding market integration.

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<sup>1</sup> The project is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and is coordinated by the German Aerospace Center (DLR) - Institute of Technical Thermodynamics - Systems Analysis & Technology Assessment. Project partners are the Interdisciplinary Research Unit on Risk Governance and Sustainable Technology Development (ZIRN) at the University of Stuttgart, Kast & Winter Simulation Solutions, and the Institute for Future Energy Systems (IZES).



## Session II

**Session leader:** Timo Böther, Institute for Ecological Economy Research, Heidelberg

### **The economic impacts of renewable energies while taking social and ecological aspects into account**

- How can regional value added in relation with the use of renewable energy be determined?
- What different approaches exist?
- How can non-monetary effects be quantified?

Besides the ecological advantages, an important economic benefit of renewable energies is local value added, which can be achieved to a greater extent by renewable energy sources than by the usage of imported fossil fuels. Value added through renewable energies represents an indicator for the determination of the economic performance of a municipality. At the same time, it is a motive for action, which, for example, is pursued by more and more 100% renewable energy communities and regions that have the goal of renewable energy self sufficiency.

To what extent communities benefit from the investments in renewable energies depends on the number and the activities of the local actors who participate in the creation of value added. Since, the plant manufacturers and the suppliers are often not present in the community itself and are geographically situated in a few locations the actual operation of the plants plays a decisive role for local value added. However, little research regarding the scientific analysis and quantification of the real regional value added has been done so far. Therefore, this forum wants to introduce and compare basic approaches to determine value added in relation with the use of renewable energy.

On the one hand, the focus lies on the direct effects that accompany the production and the operation of the plants because these are easier to quantify distinctively. Furthermore, contributions to the non-monetary effects that account for the social as well as the ecological implications are welcome.

## Session II – Paper Presentations

### Employment effects of renewable energy expansion on a regional level – first results of a model-based approach for Germany

**Author:** Ulrich, Philip

**Coauthor:** Distelkamp, Martin; Lehr, Ulrike

**Institution:** Institute of Economic Structures Research (GWS) mbH Osnabrück, Germany

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS1

National analyses (Lehr et. al 2011) have shown that both gross and net effects of the expansion of energy from renewable sources (RES) on employment are positive for Germany. These modelling approaches also revealed that this holds true for both present and future perspectives under certain assumptions on the development of exports, fossil fuel prices and national politics. But how are employment effects distributed within Germany? What components contribute to growth impacts on a regional level? To answer these questions (new) methods of regionalisation were explored and developed for the example “wind energy onshore” for Germany’s Bundesländer. Our main goal was to develop the methodology applicable to all RES in future research. For the quantification and projection we needed to distinguish between jobs generated by domestic investment as well as exports on the one hand and jobs for operation and maintenance of existing plants on the other hand. Further we analyse direct and indirect employment. For the estimation of direct effects a regional database with information from a survey as well as data from associations and agencies were used. Indirect effects on the national level are generated with the help of the input vectors specifically designed for wind mill production and maintenance in the national study. To estimate these effects on the regional level not only the input-output-framework but also regional interaction has to be taken into consideration. How much of the input demand is generated in the region? If it is imported, from which regions does it come? The most important variables in the regional allocation model used are distribution of supply for specific inputs, regional specialisation, sectoral import dependences and distance. They are used in a consistent modelling framework. The results show, that gross employment is particularly high in the regions in the northwest of Germany. But especially the indirect effects spread out to the whole country. Regions in the south not only profit from the delivery of specific components but also from other industry and service inputs.

**Municipal added value through solar power systems in the city of Freiburg**

**Author:** Funcke, Simon

**Institution:** Centre for Renewable Energy, University of Freiburg, Germany

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS1

A transformation of the conventional energy system towards renewable energies entails a stronger decentralisation of energy generation, as the production units are smaller and have to draw on regional potentials. This can have positive socio-economic effects in the form of local added value in regions where the potential is exploited.

This paper's focus lies on methods which can be used to determine local added value. Existing methods can be used to calculate economic effects on most steps of the value chain through the unit of Euro per kilowatt (€/kW). Another method based on the number of employees was developed to enable the inclusion of enterprises or institutions that do not publish numbers in €/kW and research institutes, which can be responsible for a large share of the regional added value.

Local added value consists of direct and induced effects which are caused by the relevant organisations in the region examined. Net profits, net employment effects, as well as the local share of business taxes, income taxes and investments are considered to be part of the direct effects. Induced effects originate from reinvestments of these effects and can be calculated using the Keynesian multiplier.

The methods were applied in a case study in the German city of Freiburg. The solar industry for power generation was chosen as an example, as Freiburg is home to the world's largest solar research institute as well as many solar enterprises. The local added value through solar systems in the year 2009 was calculated at 37.7 million Euros of which 83 percent was generated by direct and 17 percent by induced effects. This can be converted into roughly 1,500 jobs within the city boundaries. Based on some cautious assumptions, these numbers should be considered as minimum values.



**Bioenergy Regions: Monitoring of techno-economic aspects of regional bioenergy production and use**

**Author:** Offermann, Ruth

**Coauthors:** Seidenberger, Thilo; Thrän, Daniela

**Institution:** Deutsches BiomasseForschungsZentrum (DBFZ) gGmbH, Germany  
Helmholtz Centre for Environmental Research UFZ, Germany

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS1

In the context of the German competition 'bioenergy regions', 25 model regions across Germany are currently supported for three years by the Federal Ministry for Food, Agriculture and Consumer Protection in their efforts to establish efficient bioenergy networks to optimise the regional bioenergy use. Among other things, the regions aim to increase the number of installed biomass conversion plants, to realize efficiency improvements and to find alternative feedstock solutions during the competition. The progress of these "bioenergy-regions" is monitored and evaluated by accompanying research activities divided into socio-economic and techno-economic aspects. In the context of the techno-economic assessment the development of network-induced biomass use and its possible effects on regional value added are analysed. During the competition several surveys have been carried out to monitor the development of bioenergy production and use of the selected 25 regions. Regional plant operators are asked about technical details, type and quantity of input materials and amount of energy produced. This material flow analysis forms the basis for further analyses dealing with the assessment of financial flows and indicator-based evaluation of regional economic impacts related to bioenergy activities. Finally, the influence of the bioenergy networks on regional value creation shall be analysed.

The first survey, carried out in 2010, revealed status-quo regional network-related bioenergy flows that give insight on the bioenergy production state of the region and also the role of the bioenergy network. Most important however, will be the identification of changes in bioenergy production and use during the competition. The 2011 survey of plant operators will show how the regions developed during the first half of the competition. A final survey will be carried out in 2012 when the competition will officially be ended. All results retrieved so far show a great diversity of the 25 selected regions. The number of bioenergy conversion plants per region ranges from one up to more than 100. At the moment many of the biogas plants have an insufficient share of waste heat use. Main results of the 2011 survey will be an analysis of how the regions could improve waste heat use of biogas plants and if alternative feedstock solutions could be implemented as especially the use of residual material provides a net value creation opportunity.

**A holistic evaluation of energy scenarios with multi criteria decision analysis – Results from an interdisciplinary and transdisciplinary case study in a small village in Brandenburg**

**Author:** Braune, Ines

**Coauthors:** Prof. Dr. Schmuck, Peter

**Institution:** Berlin Institute of Technology, Germany

**Time:** Friday, 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS2

Multi Criteria Decision Analysis (MCDA) – a tool for decision aid coming from operations research – is able to evaluate different alternatives with monetary AND non-monetary indicators. Thus it can be applied for the evaluation of energy systems regarding sustainable development. The method further works with participative elements as it encourages the weighting of sustainability aspects by stakeholders. As MCDA is able to bring together knowledge from local stakeholders with scientific data and offers a holistic evaluation of the alternatives it can support local decision making towards renewable energy systems. However, little experiences are available from practical applications of MCDA in real decision processes of communities aiming at self sufficiency. Within the project “Bioenergy- Region Ludwigsfelde” a MCDA evaluation has been applied in a small village on its way becoming a “bioenergy village”.

Here MCDA has been combined with already established tools accompanying the process to a “bioenergy village” such as planning workshops, citizens’ meetings and best-practise-trips. A set of indicators addressing 14 aspects of sustainable development has been developed for the evaluation of different energy scenarios for the village. Besides local value added three other economic aspects were considered. In addition to that different social aspects such as disturbances due to transport as well as common ecological aspects are accounted for. In two workshops local stakeholders had the opportunity to bring in their point of view by weighting the aspects of sustainable development. The group found a consensus by weighting many economic and social aspects higher than ecological ones reflecting their concerns about the bioenergy project. With the MCDA method PROMETHEE stable rankings of the energy scenarios could be achieved convincing the group that the bioenergy scenarios are more sustainable for the village than the fossils fuel ones and helping them to identify the scenarios that are now followed up.

**Session II – Poster Presentations**

**Start-up Company Development - Analysis of a Waste-to-Energy System in Northern California**

**Author:** Cole, Nancy J.

**Institution:** University of Freiburg, Germany

An investigation of the potential for an anaerobic digestion (AD) system as part of a waste-to-energy scheme will be made in Sonoma County, California. The pre-processing steps, a digester design and the scrubbing steps to remove impurities will be explained. Several factors might result in the biomethane market becoming economically palpable compared with conventional natural gas fuel.

California has set forward many regulations to aid in a transition towards more renewable energy sources. Some key policies will be evaluated for their potential to drive the waste-to-energy market. A waste characterization of a specific landfill site in Sonoma County shall be defined and the share of organic material will be quantified, as well as a glance at the waste profile. An assessment of the current state of waste diversion and prospects for future projects will focus on strategies that meet the State and County's goals and mandates to increase waste diversion.

The evaluation shall determine the amount of biogas and type of products that can be generated from the use OFMSW; such products include sellable renewable energy and marketable co-products, such as liquid fertilizers, soil amendments, etc., in an environmentally friendly manner. A discussion about the pretreatment steps of the waste and the process of upgrading the gas shall be discussed.

There exists very little information on the biodegradation of a mixed feedstock derived from MSW. Consequently, this demands a two-fold analysis of the AD system. Firstly, to evaluate how much gas will be generated theoretically. Secondly, to evaluate the engineering parameters for an AD system based on technology that has proven successful. An additional investigation of pre and post processing steps shall be mentioned as a necessary part of the full system. The result shall determine optimal system components to build a sound business plan that can obtain project funding and financing for the venture. Some basic cost calculations will be evaluated.

**An Analytical Framework for Assessing the Performance and Adaptiveness of Bioenergy Supply Chains**

**Author:** Eberhardt, Gerd

**Coauthor:** Grundmann, Philipp

**Institution:** Leibniz Institute for Agricultural Engineering Potsdam-Bornim e. V. (ATB)  
Potsdam, Germany

Bioenergy supply chains may contribute to energy security, mitigation of greenhouse gas emissions, energy savings and economic added value. To provide these benefits bioenergy supply chains need to be adaptive towards changes. Communities which strive for energy autarky face the endeavor to foster resilient bioenergy supply chains. However, bioenergy supply chains are challenged among others by increasing energy costs, structural change in rural areas, restrictions from nature protection and climate change. Our aim is to develop an analytical framework and methods for assessing the performance and resilience of bioenergy supply chains. On this foundation we seek to design strategies that improve performance and resilience of bioenergy supply chains.

We model bioenergy supply chains in the two study areas Havelland-Fläming (Brandenburg) and Meissen (Sachsen) to assess the impact of increasing energy costs, structural change, nature protection and climate change. We delineate a conceptual and analytical framework for studying performance and resilience of bioenergy supply chains, and define an analysis procedure. Bioenergy supply chains are complex systems including a diversity of resources, actors, transactions, technologies, institutions, organizations and governance structures. The framework for analysis needs to display the dependency from these factors of the performance and resilience of bioenergy supply chains. Analyzing the interplay of actors, technologies, institutions and governance structures may reveal valuable insights in how to foster performance and resilience of bioenergy supply chains in different contexts.

**Added Value of Analyzing Value Nets for Bioenergy Production and Fertilizers from Waste Water Residues**

**Author:** Maaß, Oliver

**Coauthor:** Busch, Henner

**Institution:** Leibniz Institute for Agricultural Engineering Potsdam-Bornim e. V. (ATB)  
Potsdam, Germany

Answering the threat of climate change and securing the energy supply are two key elements if economic prosperity for our society is to be preserved. In response to these challenges the ELAN projects seeks ways to establish regional energy systems that incorporate adaptation and mitigation efforts and rely on regional bio-energy resources. The analysed land use systems build around the integrated and sustainable usage of nutrient-rich waste-water from the metropolitan region of Berlin for the fertilization and irrigation of energy crops in Brandenburg. Waste-water is rich in Phosphorus- and Nitrogen-compounds which nowadays are simply dumped into streams and rivers. This practice causes eutrophication of surface waters and the final loss of these nutrients for agricultural use. By reintroducing them into agricultural production a closed nutrient cycle can be achieved. Furthermore through the use of waste-water the expected effects of climate change (a lower precipitation and thus decline of ground water level) can be buffered. The production of bio-energy from energy crops planted on marginal agricultural land can contribute to a more secure, renewable and climate friendly energy supply in the region.

We analyse the regional added value and transaction costs through the production of bio-energy and fertilizers from waste-water residues. The particular focus is on the emergence of so called “value networks” to better understand the several interactions, interdependences and numerous side effects of land use and bio-energy activities. The analysis encompasses the main actors and their economic activities, as well as the institutions and governance structures regularizing the transactions between the value networks and the natural system. Our preliminary conclusion is that externalities have to be identified and quantified. In addition a regime of compensatory payments as integral part of sustainable concepts of land use with a focus on bio-energy production has to be in place.

## Session III

**Session leader:** Patric Schlager, Institute for Landscape ecology and Nature Conservation, University of Hohenheim

### **Renewable energy self-sufficiency and integrated, sustainable land use systems**

- How can biodiversity, agricultural/bioenergy production, landscape aesthetic concerns etc. be integrated into sustainable concepts of land use systems?
- How can Geographic Information Systems, Remote Sensing, and Life Cycle Assessment be used to design integrated and sustainable concepts of land use?

Human behavior has a strong impact on ecological, hydrological, climatic and other aspects of environmental systems, from a local to global scale. Among scientists and decision makers it is widely agreed that in the last decades these influences featured negative effects in terms of biodiversity, ecosystem services, or climate change, leading to an increased susceptibility of human societies and globally interconnected economies relying on ecosystem services and support. Therefore, a sustainable behavior towards these goods is necessary, that integrate ecological and social perspectives in order to establish sustainable management systems. A key variable for the sustainable use of ecosystem services is the sustainable management of land use systems, which are facing increased pressure from global, national, regional and local developments triggered through altered ecosystems (desertification, erosion), population growth, and economic developments on the global market. Since the change of the energy system to renewable energy self-sufficiency is partly related to changing land use systems (bioenergy, biofuels, short rotational plantations) (spatially explicit) concepts are needed that consider land use systems not only as a resource base for energy crops, but also take their role in climate protection goals into account (e.g. peatlands), biodiversity goals (e.g. declining breeding birds all over Europe), landscape aesthetic concerns, and agricultural production for livestock and food. Therefore, we are seeking scientific papers that are dedicated to integrated and sustainable concepts of land use with a focus on bioenergy production. Methodologically the forum is related to geographic information systems (GIS), remote sensing (RS), life cycle assessment (LCA) techniques and to landscape analysis, assessment and planning.

**Session III – Paper Presentations**

**Spatial planning, regional energy and sustainable development: How are they interlinked?**

**Author:** Wächter, Petra

**Coauthors:** Ornetzeder, Michael

**Institution:** Institute of Technology Assessment of the Austrian Academy of Sciences,  
Vienna, Austria

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS3

Resource scarcity is strongly connected with land use and its organisation and management. Since we cannot use renewable energy resources endlessly it is even more important to put efforts on reducing energy demand and on using resources in the most sustainable way possible. Spatial planning institutions take a crucial role in deciding where land can be used for which resources and for what purposes. Local and regional authorities have the main power to designate land leading to unfavourable decisions about sustainable land use. This results in a competition between different energy sources, land use for food or energy crops, siting decisions for power generation and agricultural versus living use.

The paper will explore the crucial aspects in regard to scarcity of land and their impacts on sustainable development. In that light it wants to investigate the influence and the possibilities of available regional energy resources to contribute to greater sustainability in the energy sector and it focuses on actors and institutions involved in the socio-technical framework conditions such a transition demands.

Based on a back casting scenario approach combined with expert interviews, the results of the project E-Trans 2050 emphasize the manifold cross-cutting aspects of governance structures and spatial planning concerning energy transitions. Critical issues are region-specific production of energy and its use, settlement structures and transport system, which all have a determining influence on energy demand. Combining the knowledge of extensive energy use with available energy resources in spatial planning decisions is a main challenge towards a long term sustainable energy system.

**Integrated Spatial Energy Planning; A method to unite land use planning and renewable energy development**

**Author:** Foster, Piper

**Institution:** Sopris Foundation Aspen, Colorado, USA

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS3

Spatial planning is neglected as a tool to implement renewable energy in the United States. This deficit hinders economic growth and carbon reduction goals. Public discussion about renewable energy in the US focuses myopically on funding instruments, without addressing sophisticated but practical topics like site selection, transmission, and regulation. The research objective - to discover European land use instruments and policies for renewable energy development and determine if they could be replicated in the US — expanded spontaneously during the study. Something more was discovered: land use planners and government officials (at the regional scale) across Germany, several cantons in Switzerland and two regions of North England are currently inventing dynamic planning tools and protocols specifically for renewable energy; though the practitioners are not collaborating, their specific spatial planning instruments and policies are highly similar. This includes permitting regulations, tools to optimize site selection, concrete methods to increase citizen acceptance, and essential but overlooked flanking policies. Finally, the methods observed have identical philosophical roots and strive for identical goals: to deploy local renewables in a space efficient, timely manner.

After researching this real - time evolution that is uniting spatial planning with energy development, I collected the practices under a cohesive structure. I name this unique methodology Integrated Spatial Energy Planning (ISEP).

The benefits of employing the ISEP protocol are as follows: lead time is shortened between project application and realization; habitat and viewshed are protected; contention is reduced; financially stronger projects are achieved; and local energy supply and demand are holistically considered. As a side benefit, ISEP is proven to encourage local ownership models and ensure that proposed projects are scale - appropriate: thus the public more readily endorses new projects. “Spatial relevant energy,” “energy logistics,” and “energy density” reference synergies around which European planners organize, but are concepts largely absent from US planning discussion. Finally, policy learning is economically efficient-





saving decision makers from the wasted time and money prompted by mistakes and redundancy.

The article follows this structure: first, the specific methodology of Integrated Spatial Energy Planning is explained, with a detailed description of the step - by - step protocol and its utility. Second, recommended planning instruments are introduced. Third, flanking policies are named. Fourth, collected best practices from US jurisdictions are suggested, while at the same time discussing several instructive failure lessons from US regions. The article closes with arguments for the local economic benefits available to communities who introduce Integrated Spatial Energy Planning.

**Linking energy- and land-use systems: Risks and opportunities of using agricultural residues for energy generation in Tanzania**

**Author:** Terrapon-Pfaff, Julia C.

**Institution:** Wuppertal Institute for Climate, Environment and Energy, University of Trier, Germany/ Belgium

**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS3

Modern bioenergy applications are regarded as a promising option for decentralized energy generation in the rural areas of Sub-Saharan Africa, especially since large parts of the region have a high potential of producing biomass for energy purposes. However, it is known that the use of biomass for energy applications can lead to land use competition and put food security at risk. Bioenergy pathways that use biogenic wastes and agricultural residues entail far fewer risks of resource competition compared to those using food and energy crops to generate energy. But so far biogenic residues, such as those from agriculture processing, represent a still largely untapped potential (UNEP 2009, S. 20). Moreover, the scientific basis for estimations of the sustainable country-specific potential of agricultural residues is still very limited. But knowledge of critical success factors, individually derived responses to local conditions, as well as socio-economic and environmental site effects is essential for the successful and sustainable future uses of the available residues in Tanzania and other developing countries.

This paper presents an attempt to evaluate the theoretical and technical energy potential of process residues from different crops in Tanzania with regards to their potential to achieve renewable energy self-sufficiency on farms and in rural communities. A set of sustainability indicators with particular focus on environmental and socioeconomic criteria is applied to identify risks and opportunities of using these residues for energy generation. In particular the positive and negative effects on the land-use-system (soil fertility, water use and quality, biodiversity, etc.) as well as on rural development and reduction of energy poverty are evaluated. Our analysis show that energy generation with agricultural residues could not only improve and secure the local energy supply but could furthermore improve the sustainability of current land use practices.

**The REE-Mix spatial decision support system: Assessing the potentials for regional renewable energy supply**

**Author:** Jergentz, Stefan

**Coauthor:** Elsässer, David

**Institution:** Institute for Environmental Science, Landau University, Germany

**Time:** Friday, 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS3

Regional renewable energy sources are getting increasingly important (IEA 2010). The promotion of sustainable energy supply is also political aim in many countries (Lund 2010). A large technological progress was achieved, but there is a lack of management to support further development. Renewable energy sources need more space than classical power plants, but the energy can be generated decentralized according to local needs (de Vries 2007, Angelis-Dimakis 2011). Land requirements for different types of renewable energy and efficiency of the resources can be analyzed using GIS (geographical information system). A modular decision support system (DSS) is developed to assess those land requirements and potentials support decision making of stakeholders such as local authorities, energy suppliers or banks. REE-Mix (REnewable Energy Mix) is a GIS based tool to calculate potentials for renewable energy on a local scale. Due to the modular setup, REE-Mix should be easily applicable on many regions. Main aim of the DSS is the detection of potential spatial conflicts for the renewable energy sources wind, sun, water, biomass and geothermal energy. Possible solutions for conflicts can be achieved with spatial analysis as well as optimization of energy allocation and infrastructure. First modules were developed, assessing wind and solar energy as well as optimization of geothermal heating network. REE-Mix can be used as one part in the framework of the EU initiative Covenant of Mayors to develop a Sustainable Energy Action Plan (SEAP) for local authorities commit to reduce their CO<sub>2</sub> emission. Together with a baseline emission inventory the potentials for renewable energy build the basis to raise a local climate protection plan.

**Estimating the biomass potential from agricultural production of Lüchow-Dannenberg (Germany) – a GIS based approach**

**Author:** Schlager, Patric

**Coauthors:** Krismann, Alfons; Schmieder, Klaus

**Institution:** Institute for Landscape and Plant Ecology, University of Hohenheim, Germany  
Institute for Landscape ecology and Nature Conservation, Germany

**Time:** Friday, 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS3

Over recent years many communities and local municipalities in Germany have set themselves the objective to achieve self - sufficiency with renewable energies. With assistance from political support programs such as the “Renewable Energies Act” this resulted in a boom on the renewable energy market. Besides the positive effects of higher energy proportions from renewable energies in the production process, we observe increased pressures on land use systems due to different demands such as agricultural production for food and livestock, climate protection goals, energy production, biodiversity goals or landscape aesthetic concerns. Aspects of these pressures are ploughed grasslands and grassland intensification, two - crop systems, monocropping of corn etc. with the known negative outcomes in terms of biodiversity. Hence, our biomass potential analysis, which was realized in a project called *Renewable Energy Regions*, considered different social and ecological indicators (e.g. integrated biodiversity areas, food production etc.) and alternative crops for bioenergy production in order to ensure an integrated social - ecological approach to land use for energy production. Methodologically the study is linked to GIS technologies where we combined spatial and statistical land use information. In the study we found that for our study area Lüchow - Dannenberg even with 10% of acreage for nature conservation purposes, 10% alternative crops for biomass production and 20% organic farming another 50% of the actual energy production could be realized.

Keywords: biomass potential analysis, GIS, social - ecological approach

**Potential survey of the economically applicable share of green waste for biogas production on the example of four municipalities**

**Author:** Pick, Daniel

**Coauthors:** Dieterich, Martin

**Institution:** Centre for Renewable Energy, University of Freiburg, Germany  
Institute for Landscape and Plant Ecology, University of Hohenheim, Germany

**Time:** Friday, 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS3

Due to the aim of quantifying so far unused grass clippings for biogas production, the institute of landscape and plant ecology of the University of Hohenheim in collaboration with the centre for renewable energy of the University of Freiburg conducted a survey in the district of Schwäbisch Hall. The public concern of this project has to be seen in the hope of covering relevant shares of the biogas production with biomass residues. This alternative use promises to diminish the negative outcomes of the biogas production using field crops. The primary assumption concerning the several grass fractions in question was that they should meet the conditions for landscape conservation materials which gain the highest feed in fee for biogas according to the Renewable Energy law. This applied to:

- Areas of nature protection
- Unused farming Grassland
- Private backyards
- The accompanying strips of streets
- The accompanying strips of water courses
- Public spaces in the reasonability of municipalities

The grass areas were investigated with the help of remote sensing, site inspection, and inquiries among the building yards of communities. Additionally because of lacking data in this new research area, the masses/ hectare had to be tested.

As a result of the investigation the assumption arises that the highest percentage of the assumed biomass is hardly available for technical, legal, inquiry related or economical constraints. In fact according to the used methods only the public spaces are really suitable for concepts aiming biogas production.

Suggestion: In order to recover the bigger part of unused biomasses besides legal adjustments and technical improvements a different examination design is needed. Instead of trying to quantify biomasses top down, incentives should be given to the owners to announce the biomass they could provide.

**Session III – Poster Presentations**

**Sustainable Land Use Systems: How to Support and Manage Transition to Renewable Energy Production**

**Author:** Skodra, Julita

**Institution:** Technical University Berlin, Germany

Developing sustainable land use systems based on renewable energy in era of high pressure on land conversion, water shortage and altered environment due to climate change requires coordinated multi-disciplinary approach supported by new technologies.

In that direction, arranging various land uses in mosaic shape, as a part of ecoagricultural system, in order to preserve biodiversity, on the one side, and sustain agricultural productivity on the other side can be improved by including bioenergy production. Furthermore, new important tools, such as Geographic Information System and Remote Sensing combined with life cycle thinking methods provide enhanced base for creating land use systems with environmental, economic and social efficient outcomes. However, to encourage transformation to new energy systems, planning and management must be supported by policies and incentives at larger scales.

**A new “Transition forestry movement” or good old sustainability – How to deal with potential conflicting land use in times of regional bio-energy initiatives?**

**Author: Sprenger, Torsten**

**Institution: University of Göttingen, Germany**

A growing amount of “grass roots” initiatives driven by the energy and peak-oil discussion are aiming towards regional sustainable production systems. However, these activities may have the same attitude. But sustainable use and production processes may occur diametrically opposed to each other. Many groups and associations are now initiating “green” projects and get involved into long-term decision making processes via public participation.

Generally forest transitions go along e.g. with dynamic cultivation processes and land use changes, shifting socio-cultural requirements, changing economic aims and timber production schemas or global impact scenarios. It follows that transition in forestry corresponds with changing forest management principles, where overuse of forests may be fast and dramatic in consequences, but building forests needed more than generations to be established in these latitudes. This indicates that even little shifts in management concepts are able to change the appearance of forests dramatically.

Actual forest transition concepts do have similarities, but also conflict potential within and between forestry experts and local land users or energy producers. Sustainability is claimed on each side to be a basic fundament for local energy autonomy. But rising demand for energy and prices for firewood are reflecting the intensified pressure on forest resources. This gets into conflict with classical sustainability in forest management, which tries to maintain forests as ecosystems and for the production of high valuable timber, reflecting economic sustainability.

This Paper discusses local energy autonomy and the potential role of small forest owners and community forests within. How can forest management react on rising biomass demands or even participate in the energy production boom without losing classical sustainability? Will a transition in local land use aims require a shift in forest management on larger scale?

## Session IV / V

**Session leader:** Michael Kress, Institute for Ecological Economy Research, Heidelberg and  
Järmo Stablo, Centre for Renewable Energy, University of Freiburg

### **The different roles of citizens and the meaning of energy conservation in order to reach RESS**

The range of topics in the session includes but is not limited to:

- Attitudes towards and opinions about local renewable energy plants (and the corresponding varieties in different regions / countries)
- Practical suggestions for new forms of information and participation to generate acceptance, prevent protests, and promote financial participation
- How is the reduction of energy demand institutionalized in existing concepts or strategies to reach RESS?

In addition to technical, economical and ecological aspects, communities or regions, which have set the goal to reach RESS, have to consider social issues as well. Beside the important regional key actors, also the 'average citizen' plays an important role in the transformation to RESS. Since the local development of renewable energies is characterized by direct influences on a citizens' vicinity, the planning and construction of tangible plants can sometimes lead to societal resistance. Otherwise, willing citizens can expedite the change of the energy system.

As driving or hindering force in the change process, inhabitants hold different roles. They have to be considered as political actors and also as consumers, investors or constituents. These different roles of the citizens, their individual attitudes and demands as well as the regional circumstances have to be taken in account in order to avoid conflicts and protest and to generate acceptance and (both financial and political) support for RE.

Equally, to reach the goal of RESS a considerable reduction in (fossil) energy demand in many cases is necessary. Socioeconomic research, which tries to understand and explain energy relevant behaviour dates back to the oil-crisis of the 1970s. Energy saving campaigns, financial incentives, and legislative regulations based on the findings have been implemented since and where mainly oriented towards invention and diffusion of more energy efficient technologies. Subsequently in recent decades the relative efficiency of energy services has constantly increased. However, success in reducing absolute energy demand is still lacking. The up to now missing success of this "efficiency-strategy" is frequently seen as a result of so called 'rebound-effects' which describe the reversion of





energy efficiency gains through greater production and consumption of goods and services. While many current scientific concepts do see possibilities to bring these effects under control through better energy efficiency policy, other authors perceive the reasons for the so far failing of this strategy lying deeper in socio-cultural structures and institutions of modern societies. In their views a culture of moderation and less affluent lifestyles as well as a non technical and non dominating societal relationship with nature is necessary for overcoming the crisis of high consumption of (fossil) energy.

Taking into account these different conclusions concerning the reasons and suggested solutions to the problem of high energy use, the session wants to give room to discuss the question how the topic of energy conservation could be handled in the context of an intended RESS.

#### Session IV / V – Paper Presentations

##### Opening speech

##### **The Role of citizens in Renewable Energy Communities - Social Acceptance of Renewable Energies and Sufficiency**

**Author:** Schweizer-Ries, Petra

**Institution:** Saarland University, Germany

**Time:** Thursday, 15/09/2011: 2:15pm – 4:00pm

**Room:** Peterhof HS2

**Acceptance, Demand and Participation – Attitudes and behavior patterns in communities with the goal of renewable energy self-sufficiency**

**Author:** Kress, Michael

**Institution:** Institute for Ecological Economy Research, Heidelberg, Germany

**Time:** Thursday, 15/09/2011: 2:15pm – 4:00pm

**Room:** Peterhof HS2

Introduction and Aim: Besides technical, economical and ecological aspects, local authorities of communities aiming at a 100% RE self-sufficiency (RESS) should also take social issues concerning the inhabitants into account. To avoid conflicts and to generate an 'active' acceptance, the attitudes and needs of the inhabitants as consumers and political actors should be considered. This paper will contribute to a deeper understanding of these issues by answering following questions:

- What grade of RESS-acceptance can be observed in exemplary communities?
- Which attitudes and other internal variables influence the acceptance?
- Which differences in attitudes and behaviors concerning RESS exist in different regional contexts and between different social groups?

Theoretical Concepts and Methods: Based on theoretical literature, findings of further empirical studies, and own explorative research, a draw of an explanatory model of RESS-relevant attitudes and behavior was designed. This model combines 1) a concept of acceptance considering attitude (e.g. evaluations of plants) and behavior (e.g. demand, engagement), 2) potential causal variables (e.g. perceptions of political process and specific RE-technologies, economic valuations, ecological awareness) and 3) assumptions about coherences between these variables. To measure these variables and to analyze the coherences between them, a representative telephone survey was conducted among a stratified random sample of 2128 citizens of four German communities. Presented Findings: In this paper, the findings of the telephone survey concerning the mentioned research questions will be presented - for example the high general 'passive' acceptance of RE in contrast to low 'active' acceptance in terms of political and financial engagement; differences in evaluations of used technologies partly due to ecological concerns; differences in the attitudes and behaviors of social groups e.g. regarding age, gender and education. Besides analytical and theoretical insights, the paper will also include practical suggestions for local authorities, derived from the presented findings.

**Local and regional energy-self sufficiency as local government initiative or as a citizen initiative – A comparative analysis**

**Author:** Bobsien, Armin

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**Time:** Thursday, 15/09/2011: 2:15pm – 4:00pm

**Room:** Peterhof HS2

Since the UNCED Conference in Rio 1992 many municipalities have adopted a leading role to achieve voluntary GHG reduction targets by promoting the use of renewable energies and energy efficiency policies on local level. For example, local strategies and plans can be put forward by Local Agenda 21 activities or adaptation of voluntary GHG reduction targets as part of association with networks such as ICLEI, Klimabündnis or others. In Germany, the federal government also offers a range of strategies, instruments and financial support to assist local governments to produce their own local “Klimaschutzkonzept” (climate protection concept). Most of those approaches have in common, that they are often initiated and administrated on local government level and offer only a limited role for public participation in practice. For example, studies on local climate protection concepts are commissioned by local governments to specialist planning bureaus or research institutes, where experts produce reports on local CO<sub>2</sub> budgets, CO<sub>2</sub> reduction potentials and recommendation of strategies and measures to reduce CO<sub>2</sub> emissions. Often those concepts are adopted by local councils and local citizens are informed later through media campaigns.

Since 2006, the Transition Town Movement has emerged in SW-England as a “new kid in town” offering a markedly different approach on how a community can plan for local and regional energy self-sufficiency. Transition Town initiatives use a citizen-led process where citizens are informed and consulted by fellow-citizens and a local “Energy Action Descent Plan” (EADP) is produced as result of citizen interaction based on creative planning methods.

This paper offers a comparative analysis between two case studies of similar towns in SW-England and Germany (Totnes, Emmendingen) which have used different methodologies with the aim to achieve local energy sufficiency.

**Reduction of energy demand to achieve the goal of local Renewable Energy Self-Sufficiency (RESS)**

**– Reconstruction of the integration processes based on a qualitative case study**

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**Time: Thursday, 15/09/2011: 4:30pm – 6:15pm**

**Room: Peterhof HS2**

Many local governments in Germany aim to support their energy needs entirely with renewable energy. Limited resources make it necessary in this context to address the question of how less absolute energy can be consumed in these municipalities. Especially in the context of a targeted reduction in energy consumption, it must be remembered that consumption is a basic phenomenon of human action and every decision made by individuals and their behavior affects energy demand. To make this basic phenomenon tangible and workable within a strategy for RESS, it is necessary to reduce its complexity. A major challenge in this case in general is the derivation of variables that are associated with the target variable "energy demand", in particular the identification of variables that can be controlled and manipulated by the actors situated in the municipality. These challenges are not only of a cognitive nature. In addition the identification and selection of variables and the perceptions of their interdependencies is affected by the value systems of different actors engaged in the efforts to reach RESS. For example, various scientific and non - scientific publications, in addition to the changes in technical infrastructure to raise energy efficiency, identify the need for a reduction in individual consumption levels in order to save energy while other authors strictly deny such necessities.

Against this background, this paper deals with the question, "By what mechanisms and processes is it possible for actors at the local level to make a complex and multifaceted variable such as "energy demand" workable and, moreover, how do they integrate the results into efforts to reach RESS through the formulation of concrete (infrastructure) measures and policies?" To reach this objective an inductive study based mainly on the longitudinal analysis of qualitative data was conducted for a community that set the target to be "energy independent" by the year 2020 and sought a significant reduction in energy consumption.

Initial results suggest that for further analysis of the data it may be constructive to focus on the processes which lead to the – preliminary – identified circumstance where the issue of "energy demand" was conceptualized by the local actors as an issue among other topics, such as "local economy" or "building", although measures and decisions in the latter are essential fields related with the consumption of energy itself. Therefore, in the further evaluation of data, efforts will be made to answer the question of whether such a conceptualization of the theme "energy demand" is more of a reactive than proactive reading of the variable targeted. On the one hand, this kind of conceptualization could combine the values of different players behind concrete (mostly technical) measures which are elaborated in this consensually created "energy - field" and in this way can be integrated into the efforts to reach RESS. In other areas of interaction between the same actors, in which the impact on energy consumption by emphasizing other aspects like "competitiveness of the municipality" does not represent a significant decision variable, conflicts could arise due to different value systems.

**A Transdisciplinary Approach for Energy Sustainability –  
Lessons learnt from a Spanish town**

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**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS2

Due to the current world-wide ecological and energy crisis, more and more European cities have become aware of the necessity to develop in an energetically sustainable way [1]. There are three strategies to attaining the goal of sustainability: Consistency (development and implementation of innovative energy technologies), Efficiency (rational use of these energy technologies) and Sufficiency (revision of energy demands and time of use). Many efforts have been made in the past to improve Consistency and Efficiency, but much less attention has been paid to the third strategy for energy sustainability. Sufficiency means a change of life styles and energy mentality for the end-users, fundamental modifications of their values and daily habits as well as an improvement of awareness of energy service demands [1]. These modifications need time and appropriate interventions in order to change the energy culture, a very challenging task.

As members of a European CONCERTO+ project, being in charge of socio-economic project monitoring, our team has had the opportunity, over the last five years, to follow up on the interactions between various involved institutions, the Municipality and the inhabitants of a city in the north of Spain. We followed the principles of a transdisciplinary approach [2,3,4] which we consider appropriate in dealing with the complexities of the project. During several field studies, applying a mixed research design with a combination of investigation methods (including e.g. expert interviews, polls, questionnaires, and workshops) [5,6], the level of consciousness of the inhabitants were analysed and contrasted with their daily habits. We assessed their actual involvement in community activities and their interest in active participation in urban planning processes. In parallel, in cooperation with the municipality, awareness-raising activities among the inhabitants were realized.

This article will summarize our experiences of the project, describing the results of the field studies in the Spanish town and analysing the transdisciplinary processes of working together with the local community [7]. We will answer the following questions: What



opportunities of involvement and inhabitant participation have emerged and how were they realised? What are the direct and secondary outcomes of the interventions? What could be made different if the project would start now? We will discuss the outcome of the transdisciplinary approach, how it has developed in this instance and how it could be improved for further projects. We will have an outlook of our contribution to transdisciplinary sustainability research in the future.

Key words: transdisciplinary, sustainability science, energy sustainability, sufficiency

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**Bioenergy villages and regions in Germany: An interview study with initiators of communal bioenergy projects on the success factors for restructuring the energy supply of the community**

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**Time:** Thursday, 15/09/2011: 4:30pm – 6:15pm

**Room:** Peterhof HS2

Regarding a safe and sustainable energy supply, an increasing use of renewable energy is necessary. In addition to the fluctuating energy of wind, sun and water, bioenergy may contribute a stable offer of heat and electricity. An important element of a socially acceptable use of bioenergy is the involvement of the local population and other local stakeholders during the implementation of a bioenergy project.

In this context, the “bioenergy village” concept, which involves the residents of small towns or villages in planning, funding and implementing the conversion of the energy supply from fossil fuels to biomass, is a great chance to approach sustainable energy scenarios at the community level. In 2000 the first bioenergy village has been initiated by a scientist team from the University of Goettingen and was realized by the residents of the village Juehnde in southern Lower Saxony.

Meanwhile there are about 50 established bioenergy villages in Germany.

The study examines the success factors and the different pathways concerning the implementation of bioenergy village projects in Germany through a qualitative interview study with project initiators in 25 bioenergy villages. This study focuses on the question how to convince people to participate in a communal bioenergy project and the changes of individual and social well-being during the process of planning a bioenergy village.

In the second part a transdisciplinary and interdisciplinary action research project will realize the development of three counties of Lower Saxony to integrative bioenergy regions by supporting sustainable bioenergy projects in cooperation with all local participants.

**Keywords:** bioenergy village, action research, success factors



**Social Conflicts resulting from Renewable Energy Promotion and Strategy to minimize conflicts – focusing on the concept of participatory governance**

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**Time:** Friday, 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS2

Renewable energy sources (RES) are dramatically highlighted with current situation from the issue of climate change to the very recent nuclear crisis in Fukushima. Most of countries as well as international NGOs have set the future energy scenarios with ambitious RES promotion targets.

In fields where RES facilities built, however, there have been a lot of serious conflicts from local inhabitants and/or even environmental NGOs. The conflicts caused by RES promotion can be categorized as: (1) the lack of public acceptance; and (2) the environmental destruction like land use problems.

Previous studies on conflicts from RE facilities suggest some solutions: (1) financial incentives to increase public acceptance; (2) technical development of RE systems to reduce environmental troubles; and (3) the supplement to the lacks of RES promotion policies which attracts the notice of political scholars.

This research aims to find out (1) who opposes the RES promotion; (2) why they oppose the RES promotion; and (3) how the opposition/conflicts can be minimized, and finally sets hypotheses: (1) the conflicts are raised by „minorities“ like local inhabitants and/or environmental NGOs who are relatively left out of decision making process; and (2) the „minorities“ should be more strongly involved in the decision making process in order to minimize conflicts. To verify the hypotheses this research will deal with (1) environmental conflict experiences in the past; (2) the idea of the Aarhus Convention; and (3) the concept of “participatory governance”.

This research employs methods including literature survey, field study and interviews with involved stakeholders like governmental officers, project developers, local inhabitants and NGO activists.

Keywords: renewable energy promotion, public acceptance, environmental destruction, conflicts, decision making process, participatory governance.



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**Shared Ownership as a Success factor for local and regional Renewable Energy Projects**

**Author:** Rupp, Johannes

**Institution:** Institute for Future Studies and Technology Assessment (IZT), Germany

**Time:** Friday, 16/09/2011: 9:15pm – 11:00pm

**Room:** Peterhof HS2

Renewable energy projects provide a range of local and regional opportunities for taking action. Particularly this applies for the development of own decentralized energy generation capacities as a significant contribution to promote a sustainable change in the energy supply system in a municipality or region. Beyond, active stakeholder participation can also support the generation of an additional added value on the ground. This applies even more for shared ownership projects achieved by financial participation. Possible key shareholders are citizens, land owners, local entrepreneurs, energy utilities, banks or projects developers. But having committed shareholders alone is not enough for a successful realization and acceptance of renewable energy projects. Rather it is the alignment with overall objectives and an adequate design that is vital for having for instance a shared owned wind turbine, biogas plant or a local heating network as part of a local and regional renewable energy supply system.

Thus following key questions come up: What are appropriate approaches for shared ownership projects on a local or regional level? How can they contribute to promote local or regional overall objectives? What are adequate designs, e.g. legal forms/ financial products? Who are active key stakeholders?

The presented article reflects key results of a two years research project focusing on the promotion of acceptance of renewable energies through financial participation. The research project funded by the Federal Ministry of Environment, Nature Protection and Nuclear Safety has been carried out by the IZT - Institute of Future Studies and Technology Assessment, Berlin. The methodological approach comprised desk research, interviews, focus groups and a regional stakeholder workshop. Final deliverable of the research project is a guideline in form of a PPT Slide set and a documentary addressing representatives of politics and administration as well as local and regional multipliers like e.g. energy initiatives.

**Session IV / V – Poster Presentations**

**Uncertainty assessment for renewable electricity in sustainable energy systems**

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Energy security has turned into a major challenge in world economies and the adoption of measures, like renewable electricity (RES-E), is being experienced to improve the reliability of energy systems. RES-E is a forward-looking option that not only enhances energy security, but also moves towards the environmental targets in the reduction of greenhouse gases emissions to combat climate change. RES-E promises to be a very reasonable step in the future development of energy systems. Nonetheless, the upgrade to sustainable energy systems involves inherent risks and uncertainties, which affect the public perception of RES-E. The intermittency discourse, the investments costs and market-price formation, the knowledge of their technical capacity, its easiness to access the current electric infrastructure or environmental impacts are some examples. Furthermore, it becomes an obstacle in decision-making processes as it faces the contradiction between uncertainty and sustainability. Sustainability is a premise that can only be projected into the future. It requires long-term planning and implicitly the need of knowing what is to come and due to the lack of knowledge, it presents a challenge. A review of uncertainty in the deployment of RES-E will be presented from different points of view that include technical, economical, social, political and environmental aspects. This paper will first question how much the concept of uncertainty varies between stakeholders and second will discuss how uncertainty could be handled in a sustainable future. This work will be based on a theoretical framework, document analysis and expert interviews. Understanding the uncertainty in RES-E is a step for the acceptance and development of renewable energy in the future energy mix as it will provide a hint for decision-making in the goal of achieving sustainable energy systems.

**Social acceptance of smart grids: Empirical evidence from a Cross- European Country study**

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**Coauthor:** Kuenzel, Karoline

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Overview

The growth of renewable energies which underlie considerable daily and seasonal fluctuations increases grid operations' complexity. Smart grids are electricity networks that can intelligently integrate more fluctuating renewable energy into the electricity supply system. Smart grids create furthermore the basis for an enhanced grid management and an increased energy efficiency. Due to these reasons, a significant reduction of CO<sub>2</sub> emissions is deemed as feasible (IEA, 2010). Smart grids can reduce CO<sub>2</sub> emissions both through better management of the grid and by facilitating the deployment of low-carbon technologies (IEA, 2010) To secure a continuing high supply security the transformation of the energy grid comes along with the introduction of innovative technical equipment that is able to transport and process both data and electricity. Several changes as the installation of smart meters will directly affect the consumers. Using smart meters consumers will have access to realtime information about their energy consumption and will have the chance to save energy and to reduce costs. An important requirement is acceptance and active adoption of the new possibility by the consumers. In our study we were focusing on consumers and their role and influence on the future energy market. Especially along with increasing market liberalization energy firms need to understand and react upon consumer preferences. However, we still only poorly understand consumer preferences in the field of smart grids and how those preferences differ across different consumer typologies and different countries. Thus we ask what customers are. The survey is embedded in a European research project IMPROSUME together with partners from Norway and Denmark<sup>1</sup> preferences in the field of smart grids and how do customer preferences differ between different customer types and across countries? Which expectations and which concerns might customers have to smart meters? Which characteristics do those customers have, who show a willingness to pay for a smart meter?

<sup>1</sup> <http://www.alexandria.unisg.ch/Projekte/laufende-Projekte/70172/L-fr>

#### Method

We conducted an online consumer survey on smart grids for four European countries (Germany, Switzerland, Austria and Lichtenstein). After recruitment of consumers by online and print media, by leaflets and by inserts to the electricity bill of a regional energy provider we got a sample of 837 probands. A hierarchical clustering based on Ward's method on SPSS was used to identify three clusters. The analysis is based on questions relating the advantages and reservations of using smart meters. We characterized each customer type according to socioeconomic aspects.

#### Preliminary Results

In line with previous research (Forsa 2010) we detected a high number (around 2/3) of consumers who do not have any prior knowledge and have never heard about smart meters. Different results, however, were obtained from Germany where only about 1/3 of respondents stated to have never heard about smart meters. Another interesting outcome is the fact, that the expected advantages of the usage of smart meters greatly outweigh the concerns by almost all respondents. In line with this we detected a high willingness to pay for a smart meter by one third of the consumers. With help of a cluster analysis we furthermore assigned consumers to three clusters, each with consumers that have different amounts of concerns and expect different amounts of advantages. Surprising differences about their willingness to pay for smart meters and their attitude to the consumption of green energy could be established. Those results have implications for further research on social acceptance of smart grids and managerial business model design for smart grid products and services.

**Investigating Energy Sustainable Transformations at the Individual Level**

**Author:** Gigli, Michaela

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**Institution:** Fraunhofer Institute for Systems and Innovation Research (ISI), Karlsruhe, Germany

This paper aims to provide further insight into to the research of societal transformative change towards sustainable development. It adds psychological explanations about the subsystems of individuals into inter- and transdisciplinary approaches that explain energy system transitions. According to Grins et al. (2010), transitions of societies are understood as a shift in structure, culture and practices. They exhibit radical change in the structure of systems and subsystems of society, which is seen as resulting from the co-evolution of cultural, technological, economic, ecological and institutional development (p. 108).

Attempts are made to explore the underlying determinants and processes of cognitive, emotional and behavioral change on the individual level in the energy transition process. Taking a viewpoint from a systems-based perspective, each individual can be characterized as a subsystem within higher systems like that of municipalities, regions or societies. The individual perspective focuses on individuals both as citizens and public actors at different levels.

Empirical knowledge is gained by applying that psychological perspective to transition research, especially in case studies of regions or municipalities. In this manner, we acquire practical knowledge on the appraisals and perceptions that shape decision making and actions of homeowners towards the energetic refurbishment of their buildings by adoption of RE heating systems, while at the same time tackling the energy efficiency potential. Data are based on quantitative and/or qualitative analyses of a German municipality. The insights obtained can lead to adjustments in the theoretical framework, in line with a theory-practice iterative process.



## Session VI

**Session leader:** Ramchandra Bhandari, Centre for Renewable Energy, University of Freiburg

### **Innovative technological approaches towards renewable energy self-sufficiency, taking social and/or ecological aspects into account**

- What new technological approaches can help to increase the decentralized use of renewables towards energy self-sufficiency?
- How are social and/or ecological aspects integrated into technological approaches to increase the use of renewables?
- What are innovative concepts for rural electrification based on renewable energy?

The change of the energy system towards renewable energy self-sufficiency (RESS) entails the implementation of different technological supplies, which are again influencing local societies and the environment. Therefore, approaches which take into account social and ecological needs are necessary. In this regard, this session aims to attract scientists who are developing innovative approaches for the implementation of a decentralized use of renewable energies in different fields of technologies, which take the aforementioned criteria into account.



## Session VI – Paper Presentations

### Co -Design Methodology for the Development of Sustainable and Renewable Energy Systems for Underserved Communities: A case study with the Pinoleville Pomo Nation

**Author:** Shelby, Ryan

**Coauthors:** Perez, Yael; Agogino, Alice

**Institution:** University of California, Berkeley, USA

**Time:** Thursday, 15/09/2011: 2:15pm – :00pm

**Room:** Peterhof HS3

The notion of developing sustainable communities is generally accepted as a way to reduce the negative environmental impacts associated with human activities, increase the health of citizens, and increase the economic vitality of communities within a country. In order to further the development of sustainable communities, federal and local governments have placed significant attention upon designing sustainability and renewable energy technologies, such as photovoltaic (solar) and grey water recycling system to reduce (1) fossil fuel based energy consumption, (2) water consumption, and (3) greenhouse gas (GHG) emissions associated anthropogenic activities. The Pinoleville Pomo Nation (PPN) of Ukiah, CA, is an example of a Native American community that has embarked upon an infrastructure development program to design and build culturally appropriate, sustainable housing for its members.

This paper describes the co-design methodology created by the author to partner with communities that have historical trauma associated with working with outsiders on projects that involved substantial usage of engineering and scientific artifacts, renewable energy technologies for example, that have not integrated their value system or has been historically denied to them. As a case study, we present the lessons learned from a partnership with the PPN and UC Berkeley's Community Assessment of Renewable Energy and Sustainability (CARES) team to develop sustainable housing that utilizes sustainability best practices and renewable energy technology as well as reflect the long-standing culture and traditions of the PPN. We also present the Pomo-inspired housing design created by this partnership and illustrate how Native American nations can partner with universities and other academic organizations to utilize engineering expertise to co-design solutions that address the needs of the tribes.

**Local socio-economic structures: Critical factor for introducing modern energy services for off-grid communities**

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**Time:** Thursday, 15/09/2011: 2:15pm – :00pm

**Room:** Peterhof HS3

The introduction of sustainable energy technologies (SET) is key to achieve effective global climate change mitigation and to meet challenges we currently face, like energy security, global warming and global poverty. In particular, the provision of modern energy services through renewable energy technologies offers multiple development opportunities for the population in off-grid communities in developing countries and emerging economies. Although this potential is already known, the broad dissemination is still low.

The socio-economic and institutional context, in which modern energy technologies are supposed to operate, represents the most significant constraint that determines the performance of measures introducing new energy solutions. The underlying aim of implementing SET is to ensure the long-run adoption of the technologies, i.e. as part of the daily routine of people. This implies a process of adaptation at the user level as well as changes of the socio-economic structure. The introduction of a new technology within a community requires a network of individuals and/or organisations that provide products and services. Furthermore, a sustainable adoption of the technology requires the establishment of clear channels between users and value chain.

The initiative WISIONS, run by the Wuppertal Institute, is aiming to improve the South-South and North-South knowledge transfer on good-practice implementation models for sustainable energy supply. In the last six years more than 50 projects have been selected for support – based on a framework of sustainability criteria's. In particular community-based solutions have been supported, where residents are beneficiaries as well as agents of change. Essential success factors, such as social acceptance, motivation, feelings of affiliation and ownership, can be better developed when the local population is actively involved and their needs are considered. Common (socio-economic) challenges faced within the projects implementation models as well as critical success factors are discussed in this paper and illustrated with selected case studies.

**Rural Electrification and the Massive-scale Diffusion of Small Photovoltaic Systems in Developing Countries**

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**Institution:** Warwick Business School, University of Warwick, UK

**Time:** Thursday, 15/09/2011: 2:15pm – :00pm

**Room:** Peterhof HS3

Paradoxically, solar systems, which were thought in the 1980's to be a “technological fix” capable of quickly providing electricity to remote areas of developing countries, are still not disseminated very widely. Even if the cost of the energy service provided can be in many instances in parity with fossil fuels, small photovoltaic systems remain unaffordable for the majority of rural inhabitants without proper financial support mechanisms.

This presentation examines the progresses that have been made in the design of adapted schemes for the large dissemination of such systems. Market-based mechanisms overcome partly the limits of donor aid-projects. They build on public-private partnerships where a network of local entrepreneurs contributes to the maintenance of systems. But, even in the most active countries, the number of systems disseminated - in the range of several ten thousands to several hundred thousands systems - remains marginal compared to the number of un-electrified households.

Nevertheless, Light Emitting Diodes (LED) technology opens new perspective of self-sustained market diffusion. Furthermore, new practices from rural energy providers tend to target more precisely the demand of end-users for affordable lighting with a wider range of systems and the combination of photovoltaic systems with a variety of technologies to satisfy other energy needs than basic lighting in rural areas. The innovation introduced by the massive diffusion of mobiles phones in developing countries tend also to create simultaneously new market for small photovoltaic systems and the conditions for the diffusion of these systems.

Drawing notably comparisons between the features of the market for photovoltaic with the ones for mobile phones, this presentation looks at the different options that seem to be viable for up-scaling the dissemination of small photovoltaic systems and how they could help to meet the social demand for electricity and the expectations of rural inhabitants in the future.