

CRAG - IRGC Symposium 2013

WORKSHOP 3 GOVERNANCE OF ENERGY TRANSITION

Thursday, November 21, 09:00 – 17:00, BC 03

Many countries, among which Switzerland and Germany, have announced ambitious plans to phase out nuclear energy and to substantially reduce their CO₂ emissions. Switching production to more renewable energy sources (in particular wind and solar) implies a profound transformation of the energy system. The transition is only achievable if the major stakeholders (governments and regulatory bodies, power producers, grid companies, industrial consumers, and citizens) play the game.

This workshop will address the challenges and corresponding economic, social and political risks of such profound energy transitions for national policy makers and identify best practices and possible models for successful energy transition. Key topics include how to deal with uncertainty in energy scenarios, and how to better understand and communicate with consumers.

1. Energy transition is embedded within a complex sociotechnical system. Energy scenarios are typically used to inform policy-makers and market-players, but such scenarios are often laden with a myriad of uncertainties, such as the performance of new innovative technologies, the capacity of the production system to adapt to changing conditions as well as stakeholders' acceptance of transition pathways. The first session aims at addressing a series of questions related to how energy scenarios integrate uncertainty.

- What are the main features of energy scenarios?
- Are traditional quantitative or model-based scenarios sufficient for the current challenge of energy transition?
- How are different types of uncertainty – technological, economic, environmental, social and geopolitical – characterized and dealt with in the design and evaluation of scenarios?
- How can energy scenarios account for uncertainty of the demand, including societal preferences?

2. Energy transition has both national and cross-border effects, affecting producers and consumers alike. Supply and demand dynamics are driven, for instance, by price mechanisms (e.g. relative price of coal) and by ratcheting expectations (e.g., on green growth and economic prosperity). These different forces can be conflicting. The second session will address how to foster sustainable behavioral change among the relevant stakeholders, possibly through large societal debates.

- What are the alternative mechanisms for engaging stakeholders, and in particular final consumers in the energy transition debate?
- Is it realistic to believe that end-consumers can have a significant impact on overall energy demand in the future?
- What kind of instruments can be designed to encourage consumers to make the right decisions?
- How to set hard (e.g., end-user energy cost) and soft (possibly “nudge”) incentives to promote new functions such as flexible processes and transformation of consumers into “prosumers” as in co-generation?

European Outlook on Low-Carbon Economy

By 2050, energy from renewables could potentially account for up to 80% of energy consumption thanks to cross-border trade, enhanced ability to deal with intermittency through smarter grids, better energy storage and more flexible production from non-renewables sources. These changes will require significant investments and considerable national, regional and international coordination in building and using smarter smart grids.

How can scenario developers help us reach this goal? How can consumers help and be helped?

SESSION 1: DEALING WITH UNCERTAINTY IN ENERGY SCENARIOS

08:30 REGISTRATION DESK OPENS

09:00 WELCOME AND INTRODUCTION

Prof. Matthias Finger, Ecole Polytechnique Fédérale de Lausanne (EPFL)

Prof. Ortwin Renn, University of Stuttgart

09:15 ENERGY TRANSITION IN SWITZERLAND AND GERMANY

Switzerland's Energy Strategy 2050

Dr. Matthias Gysler, Swiss Federal Office of Energy

Addressing Societal Uncertainties in Energy Transition using "Context Scenarios"

Dr. Wolfgang Weimer-Jehle, University of Stuttgart

10:15 COFFEE BREAK

10:45 ENERGY TRANSITION: VIEWS FROM OUTSIDE

The Need to Account for Uncertainty in Forecasting

Dr. Inês Azevedo, Carnegie Mellon University

The Use of Energy Scenarios in the French Debate on Energy Transition

Andreas Rüdinger, Institute for Sustainable Development and International Relations (IDDRI)

Discussion

12:30 BUFFET LUNCH BREAK

SESSION 2: COMMUNICATING AND UNDERSTANDING CONSUMER BEHAVIOR

13:30 INTRODUCTION

Prof. Daniel Favrat, EPFL

Prof. Ortwin Renn, University of Stuttgart

13:45 COMMUNICATION IN SOCIOTECHNICAL SYSTEMS FOR ENERGY TRANSITION

The Swiss-Energy Scope: An Energy Calculator for Switzerland

Prof. Daniel Favrat, EPFL

Engaging the Public by Stimulating Questions: A New Exhibition on Energy Transition, Sustainability and Smart Grid

Prof. Ilan Chabay, Institute of Advanced Sustainability Studies, Potsdam

14:45 BREAK

15:15 SOCIETAL DEBATE FOR BEHAVIORAL CHANGE

Quad Participation Project of the Integrated Concept for Energy and Climate Protection Baden-Württemberg
Rainer Carius, Ministry of the Environment; Climate Protection and the Energy Sector Baden-Württemberg

Investigating Energy Consumption Behavior in the Context of Germany's Energiewende
Sophia Becker, University of Stuttgart

Switzerland

Aline Clerc, Fédération Romande des Consommateurs

Discussion

17:00 COCKTAIL RECEPTION , AT "LE HODLER" IN THE ROLEX LEARNING CENTER

ORGANISER BIOGRAPHIES

Matthias FINGER

Professor, Chair of Management of Networked Industries, Ecole Polytechnique Fédérale de Lausanne

Born in 1955, Matthias Finger, a Swiss and French citizen, received his Ph.D. in Education in 1986 and his Ph.D. in Political Science in 1988, both from the University of Geneva. After having been Assistant Professor at Syracuse University, New York (1989-1991) and Associate Professor at Columbia University, New York (1992-1994), Matthias Finger was appointed Full Professor at the Swiss Graduate School of Public Administration in Lausanne in 1995. He was appointed Full Professor at the Ecole Polytechnique Fédérale de Lausanne in October 2002. Between 2003 and 2009 he was the Dean of EPFL's School of Continuing Education. As of 2009, he is in charge of executive education at EPFL's Middle East campus. He is the co-editor in-chief of the Journal on Competition and Regulation in Network Industries since 2008. He has been appointed Area Director for Transport at the Florence School of Regulation in 2010. Matthias Finger's main interest is on the de- and re-regulation of the network industries (postal services, telecommunications, electricity, railways, air transport, urban public transport, water). An additional research focus is currently being developed on the intelligent governance of large urban systems. Matthias Finger is a member of the Swiss Federal Electricity Regulatory Commission (ELCOM) since 2007.

Ortwin RENN

Professor and Chair of Environmental Sociology and Technology Assessment, University of Stuttgart

Ortwin Renn serves as full professor and Chair of Environmental Sociology and Technology Assessment at Stuttgart University (Germany). He directs the Stuttgart Research Center for Risk and Innovation (ZIRUS) at Stuttgart University and the non-profit company DIALOGIK, a research institute for the investigation of communication and participation processes in environmental policy making. Renn also serves as Adjunct Professor for "Integrated Risk Analysis" at Stavanger University (Norway) and as Affiliate Professor at Beijing Normal University. Ortwin Renn has a doctoral degree in sociology and social psychology from the University of Cologne. His career included teaching and research positions at the Juelich Nuclear Research Center, Clark University (Worcester, USA), the Swiss Institute of Technology (Zürich) and the Center of Technology Assessment (Stuttgart). His honours include an honorary doctorate from the Swiss Institute of Technology (ETH Zürich), an honorary affiliate professorship at the Technical University Munich and the "Distinguished Achievement Award" of the Society for Risk Analysis (SRA). Among his many political advisory activities the chairmanship of the "State Commission for Sustainable Development" (German State of Baden-Württemberg) and the participation in the "Federal Government's Ethics Committee on Germany's Energy Futures" are most prominent. Renn is primarily interested in risk governance, political participation and technology assessment. He has published more than 30 books and 250 articles, most prominently the monograph "Risk Governance" (Earthscan: London 2008).

Daniel FAVRAT

Director, Energy Center, Ecole Polytechnique Fédérale de Lausanne

Daniel Favrat graduated from EPFL with a diploma in Mechanical Engineering in 1972 and a PhD in 1976. He then spent more than twelve years in industrial energy research centers in Canada and in Switzerland. Since 1988 he is professor at EPFL and director of the Laboratory for industrial energy systems. Since 2001 he is also director of the Institute of Energy Sciences, which groups nine chairs covering both thermo-fluid sciences and electricity. His research includes systemic analyses in what is called environomics (a contraction of energy, environment and economics). He also contributes to the design of advanced equipment for a more rational use of energy (heat pumps and organic Rankine cycles, fuel cells and biogas engines, thermal power plants including geothermal and solar). Within the frame of the Alliance for Global Sustainability between the Ecole Polytechnique Fédérale de Lausanne, MIT and the University of Tokyo, he contributed to several projects among which the elaboration of a design platform accounting for sustainable development. Prof Favrat is a member of the Swiss Academy of Engineering Sciences and the vice-president of the standing energy committee of the World Federation of Engineering Organisations. He is associate editor of several well established scientific journals. He also contributed to a white book on advanced energy technologies published by Novatlantis and is the coauthor of two books on "thermodynamics and energy systems" published by the "Presses Polytechniques Universitaires Romandes".

SPEAKER ABSTRACTS AND BIOGRAPHIES

Matthias GYSLER

Chief Economist, Swiss Federal Office of Energy

SWITZERLAND'S ENERGY STRATEGY 2050

On September 4th 2013, the Swiss government decided on a new energy strategy, the so-called "Energy Strategy 2050." The goal is to rebuild the energy supply system by stages until 2050. In particular, the government decided on a set of measures to reduce energy consumption and to deploy timely and economically acceptable new renewable energies. The Energy Strategy 2050 has now been handed over to parliament. As far as possible, the objectives of the Energy Strategy 2050 are to be reached by the use of market mechanisms. While in a first phase until 2020 financial support does play an important role, in the medium term, financial support measures shall be phased out and an incentive scheme is to be implemented, for example by issuing incentive levies or taxes.

BIOGRAPHY. Dr. Matthias Gysler studied economics and econometrics at the University of Zürich, Switzerland, and earned his doctorate in the field of experimental economics from the same University in 2002 while working at the Swiss Federal Institute of Technology in Zürich as a research assistant. Before his studies he worked several years for an insurance company. Matthias Gysler started to work for the Swiss Federal Office of Energy (SFOE) 2003. Since the end of 2004 he is the Head of the Energy Policy Section, since April 2011 head of the Market Regulation Section and since spring 2005 additionally Deputy Head of the Energy Economy Division. In 2008 Matthias Gysler was appointed as Chief Economist of the SFOE. Currently Dr. Gysler is responsible for energy market regulations for the electricity and gas markets, socio-economic energy research and economic analysis of energy policy topics.

Wolfgang WEIMER-JEHLE

Scientific Executive Director, Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS)

ADDRESSING SOCIETAL UNCERTAINTIES IN ENERGY TRANSITION USING "CONTEXT SCENARIOS"

To prepare for future developments in energy markets, energy scenarios – mostly model based – are used to demonstrate the feasibility of energy visions or to evaluate the effects of policy measures. The uncertainty and complexity of the future development of the embedding society which is coupled with the energy scenarios via "framework conditions" (e.g. the future development of population, economy and technology) and also via implicit assumptions (e.g. technology preferences, consumer behavior, international conditions) are not well reflected in traditional energy scenario analysis. Viewing energy systems as socio-technical systems, researchers at the Helmholtz research alliance ENERGY-TRANS use "context scenarios" – which consist of augmenting model-based energy scenario analysis with the societal scenarios – to inform policy for the "Energiewende" project.

BIOGRAPHY. Wolfgang Weimer-Jehle is physicist by training and senior researcher, project manager and scientific executive director at ZIRIUS (Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies). His research interests concentrate on qualitative and quantitative methods of systems- and scenario-analysis, particularly in the field of energy systems and sustainability. He managed several scenario projects concerning energy issues and organized policy advisory processes in this field. A special focus of his work is methodological research on Cross-Impact Balance Analysis (CIB) which was developed by Weimer-Jehle in 2001. In 1989 he attained a doctorate in Synergetics, worked 1990-1992 as a safety analyst and project manager in an engineering and consultancy enterprise, 1992-2003 as a project manager, and since 1999 as a deputy department director at the Center of Technology Assessment in Baden-Wuerttemberg. From 2004 to 2012 he was senior researcher and deputy director at the Interdisciplinary Research Unit on Risk Governance and Sustainable Technology Development (ZIRN). In 2012 he joined the newly founded Research Center ZIRIUS.

Inês AZAVEDO

Assistant Professor, Department of Engineering and Public Policy, Carnegie Mellon University

THE NEED TO ACCOUNT FOR UNCERTAINTY IN FORECASTING

Policy makers, energy analysts and modelers seek to understand how future energy systems are likely to evolve. In many cases, this is done through the use of scenarios, and in other instances projections. I will review recent efforts to produce scenarios and forecasts of energy consumption, energy costs and prices in the United States and globally, and highlight the importance of: 1) uncertainty characterization; 2) transparency regarding the limitations of scenarios and projects in the energy space; 3) understanding different modeling approaches to produce scenarios and forecasts in the energy space.

BIOGRAPHY. Inês Lima Azevedo is Assistant Professor in the Department of Engineering and Public Policy at Carnegie Mellon University. She is co-PI and the co-Director for the Climate and Energy Decision Making Center (www.cedmcenter.org). She has a PhD in Engineering and Public Policy from Carnegie Mellon University (2009). Dr. Azevedo's research interests lie at the intersection of environmental, technical and economic issues, such as how to address the challenge of climate change and to move towards a more sustainable energy system. She addresses complex problems in which traditional engineering plays an important role but cannot provide a complete answer. In particular, she has been looking at how energy systems are likely to be shaped in the future, which requires comprehensive knowledge not only of the technologies that can address future energy needs but also of the decision-making processes followed by different agents in the economy. Dr. Azevedo has also been working on assessing how specific policies will shape future energy systems, especially in a carbon-constrained world.

Andreas RÜDINGER

Research Fellow, Climate and Energy Policies, Institute for Sustainable Development and International Relations

THE USE OF ENERGY SCENARIOS IN THE FRENCH DEBATE ON ENERGY TRANSITION

From November 2012 to July 2013, France organized a comprehensive multi-stakeholder debate in order to define the national strategy and to subsequently frame the 2014 law on the energy transition. Although the debate has been shaped by existing national and European objectives, it left substantial uncertainties regarding the design of policy options for long-term decarbonisation trajectories. In this context, the analysis of existing energy scenarios developed by various stakeholders was important to quantify different policy options and their impacts. To do so, an expert group (led by Michel Colombier, IDDRI, and Patrick Criqui, LEPII Grenoble) has been set up to develop an innovative methodology to compare scenarios based on different modeling tools. Besides the quantitative outputs of different scenarios, this analysis aimed at opening the "black box" of scenario making to scrutinize the underlying hypothesis and provide useful information on the nature and impact of technological, economic and other risks within the different scenarios. At the same time, this exercise fostered the capacity building process among all stakeholders to enable a better understanding and use of the different scenarios within the debate. This contribution will provide a critical assessment of this process, its potential and limits and possible inspirations for other countries.

BIOGRAPHY. Andreas Rüdinger has been a research fellow at the Institute for Sustainable Development and International Relations (IDDRI Paris) for the last two years. Within the department for energy and climate policy, his work focuses on national energy transition strategies and their coordination with the European policy framework. He has published several comparative studies on the energy transition in France and Germany, with a specific focus on energy efficiency policies and low-carbon financing mechanisms. During the French Debate on the Energy Transition, he has been technical advisor for the debate's chairman Laurence Tubiana and contributed to several working groups as a member of the expert committee. He studied political sciences at the Institut d'Etudes Politiques Bordeaux and the University of Stuttgart, where he wrote his master's thesis on nuclear policies in Germany and France under the direction of Prof. Ortwin Renn.

Ilan CHABAY

Senior Fellow, IASS and Professor, Department of Social Science and Technology Assessment, University of Stuttgart

ENGAGING THE PUBLIC BY STIMULATING QUESTIONS: A NEW EXHIBITION ON ENERGY TRANSITION, SUSTAINABILITY, AND SMART GRID

A mobile exhibition on the German energy transition (Energiewende) opened on October 3, 2013. We designed the exhibition to serve two primary purposes: 1) to stimulate the interest and curiosity of visitors about both social and technological aspects of the Energiewende and its implications for their lives and 2) to observe and collect data about visitors' simulated interactions with an energy grid as the data for an agent-based model of consumer behavior regarding energy. Visitors could adopt a role for their visit - consumer, energy supplier, energy regulator - that provided frameworks to further interest and insight into the processes and tradeoffs in energy production, distribution, and the transition. A multi-player physical and electronic interactive game is the centerpiece of the exhibition and is intended to engage groups of visitors in exploring the options and consequences of individual or coordinated electricity use with a simplified smart grid system. I will outline the exhibition design and initial observations on its use and visitor responses.

BIOGRAPHY. Ilan Chabay is Senior Fellow, Institute of Advanced Sustainability Studies, Potsdam, Germany and Professor, Helmholtz Alliance Energy Trans at Department of Social Science and Technology Assessment, University of Stuttgart. His research focuses on interrelationships between knowledge, learning, and societal change related to global change and sustainability. Projects include 1) transformations in the Eurasian Arctic due to resource extraction and mutual effects in non-Arctic regions, 2) creating an exhibition and multiplayer physical +electronic smart grid game to engage visitors and stimulate their interest in the Energiewende. Game responses are being used to assess visitors' attitudes and behavior regarding the Energiewende, and 3) building a multi-disciplinary platform for decision making at multiple levels on food and agriculture. He held the Hasselblad Chair in public learning and understanding of science for sustainability at Chalmers University and University of Gothenburg, Sweden from 2006-2011. Previously, he was research scientist at US National Institutes of Standards and Technology, associate director of the Exploratorium science center, San Francisco, and consulting professor of chemistry at Stanford University. He has published numerous papers in peer-reviewed journals and lectured extensively on natural science, social science, and inquiry- and experiential based learning around the world.

Rainer CARIUS

Head, Climate Protection and the Energy Sector Baden-Württemberg, Ministry of the Environment

QUAD PARTICIPATION PROJECT OF THE INTEGRATED CONCEPT FOR ENERGY AND CLIMATE PROTECTION BADEN-WURTTENBERG

Energy policy and climate policy are complex and long-term issues to tackle. Therefore those policies need to be founded on a stable economical and socially accepted basis. Thus it was necessary to provide citizens as well as organized interest groups and associations from Baden-Württemberg with the opportunity to participate in the formulation of the Integrated Concept for Energy and Climate Protection Baden-Württemberg. Furthermore it expressed the state government's will to meet its claim of strengthening the involvement and the participation of people in the process of designing and shaping the energy transition and to reach the targets for climate protection. The presentation will highlight how the BEKO (Citizen and Public Participation for the Integrated Concept for Energy and Climate Protection Baden-Württemberg) succeeded in engaging different stakeholders on diverse topics, including electricity generation.

BIOGRAPHY. Rainer Carius holds a Master of Science in Mechanical Engineering, University of Darmstadt and Ecole Central de Lyon. Master of Science in Management, Troy University Alabama. After several years as a product manager in German industry Carius worked as senior researcher in the department for technology, society and environmental economics at the Center of Technology Assessment in Baden-Württemberg. He served as head of several research projects concerning regional concepts of sustainable development, shareholder and public participation, standards of environmental quality and risk management. Carius is co-author of two books and has published about 20 articles. He also served on different advisory boards on a regional and national level and lectures at the University Hohenheim. Since 2003 Rainer Carius works for the Ministry of the environment, climate protection and the energy sector of Baden-Württemberg, Germany. Carius currently is in charge of the public participation project of the integrated concept of climate protection and energy in Baden-Württemberg (BEKO).

Sophia BECKER

Research Fellow, Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS)

INVESTIGATING ENERGY CONSUMPTION BEHAVIOR IN THE CONTEXT OF GERMANY'S ENERGIEWENDE

Energy consumers are involved in Germany's Energiewende in multiple ways. A future energy system with high proportions of fluctuating renewable energy production relies on methods to forecast, flexibilize and reduce demand in order to be reliable. Predicting user behavior regarding energy use and energy efficiency investments is also highly relevant for robust scenario building and informed policy making. In our research, we therefore investigate the role of behavioral and technological changes related to energy demand as well as interactions between the two, e.g. in the case of smart meters or in the case of rebound effects. To address these topics, I will summarize crucial research findings about consumer behavior with respect to energy efficiency and energy consumption, followed by an overview of our research projects related to energy consumption behavior within the Helmholtz Alliance ENERGY-TRANS.

BIOGRAPHY. Sophia Becker is research fellow at the Research Center for Interdisciplinary Risk and Innovation Studies, ZIRIUS (University of Stuttgart, Germany). After her studies of Psychology at the University of Münster, Germany and the Université René Descartes Paris, France, she is currently doing a PhD in Sociology at the University of Stuttgart. In her doctoral thesis, she investigates the mental mechanisms of rebound effects related to car-based mobility. Her research activities are integrated into the interdisciplinary Helmholtz Research Alliance ENERGY-TRANS, Research Field User Behavior and Demand Management. She also works as a teacher at the University of Stuttgart and the University of Lüneburg, promoting students in their own small-scale research projects about the energy use patterns of private solar energy producers.

