

Annual Report 2014/15 ■

**Sustainability Management and
Infrastructure Economics ■**

Sustainability Management and Infrastructure Economics

Our experts in the business area **Sustainability Management and Infrastructure Economics** advise decision-makers worldwide in the design of environmental policy solution strategies and energy management instruments. They promote social acceptance in relation to the implementation of these and, together with interested companies, they develop innovative business models that allow them to expand in the international environment of the “green economy”.

The economists, political theorists, sociologists, engineers and scientists carrying out interdisciplinary and application-oriented research in this area are developing sustainable solutions for private and public institutions (companies, municipalities, associations, ministries).

The customers are supported here in meeting the challenges that result at a company, municipal, national and global level from the attempt to align economic activities more closely with the ideal of a sustainable economic approach.

This business area currently consists of two market segments that deal, in particular, with energy-related issues.



We predict the wholesale price for energy, so called spot-market prices, in advance.

We then use these to examine the profitability of business models in the energy sector.

We design energy and climate policy instruments.

We investigate the potential for acceptance of renewable energies through climate law and politics.

Prof. Dr. Thomas Bruckner

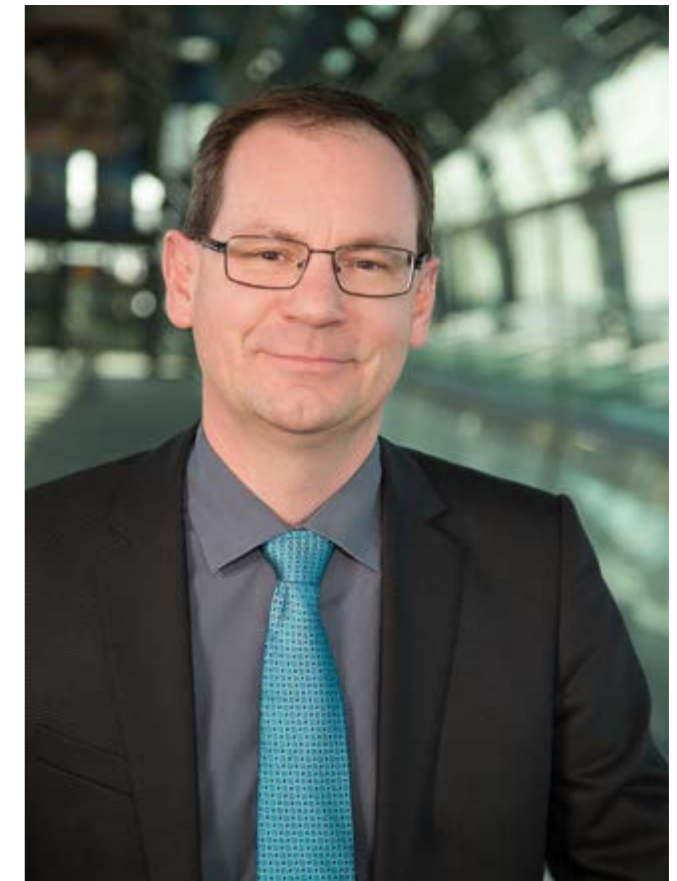
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Energy Management and Energy Economics

Central to our energy-related and application-oriented research activities is the integrative analysis of the economic, ecological and social aspects connected with the provision of energy services at a company, municipal, national, European or global level. We specialize in:

- Economic optimization of innovative energy systems
- Design and economic assessment of innovative energy-related business models (in the context of a fast-changing energy-policy framework)
- Modelling and economic analysis of the energy markets to assess the future development of this framework
- Analysis and design of instruments for energy and climate policy (inclusive policy impact assessment)

The quantitative analysis of the areas of research mentioned is conducted using innovative energy system models, energy management models, agent-based models and integrated assessment models that have been developed in the last few years and successfully implemented to advise decision-makers in the areas of energy management and environmental policy.

Led by: **Hendrik Kondizella**
Head of Unit Energy Management
and Energy Economics

Stakeholder Dialogue and Social Acceptance

Our application-oriented research relates in particular to success factors (best practice) and barriers that promote or impede the creation of sustainable energy systems at an international level. Our specialist fields are:

- Development of innovative methods to cope with transformation processes in companies, regions and nations resulting from the energy transition
- Social acceptance research regarding innovative technologies in the energy sector
- Integrated evaluation of infrastructure projects and conducting stakeholder dialogues (taking economic, ecological and social aspects into consideration)
- Designing strategies that make it possible to achieve cooperative solutions in international negotiation processes related to environmental protection

In terms of methodology, our analyses are based especially on the identification of best practice examples, the comparative analysis of the situation in different countries, approaches from a political science perspective and the use of innovative dialogue and mediation processes.

Led by: **Prof. Dr. Thomas Bruckner**
Head of Unit Stakeholder
Dialogue and Social Acceptance



■ Reservoirs of the Nant de Drance pumped-storage power station. With an output of 900 MW, it will generate around 2.5 billion kWh of electricity per year when it commences operation at the end of 2018.
© Michel Martinez, 2012

■ Basel refuse incineration plant at night
© Simon Havlik, 2005

Integrated Resource Planning (IRP)

Energy companies want to generate electricity efficiently, while it is in customers' interest to use as little electricity as possible. However, for many years this reduced the revenue and profits of energy producers. A resource-efficient energy management system can resolve this conflict of interest. Instead of selling kilowatt hours, providers sell a specific energy service. Revenue and profit are no longer measured solely in terms of electricity sales and it is now worthwhile for energy providers to promote energy-saving measures.

From municipal energy supplier to resource-efficient energy manager

Basel's municipal utility IWB is working to become an energy management provider with support from Leipzig Fraunhofer Center researchers. In so doing, it is responding to the liberalization of the Swiss energy market. From 2018, Swiss customers will be free to select a provider of their choice on the European energy market.



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Duration: 2014 – 2018
Client: IWB, Basel
Supported by: Institute of applied Informatics (InfAI), University of Leipzig

With a view to securing its position on the energy market in the Basel region, IWB intends to work with its customers in future to optimize its energy supply and become a modern energy services provider. The business models to be analyzed should include all energy sources (electricity, heat, biogas and natural gas). Leipzig Fraunhofer Center researchers from the Energy Management and Energy Economics Unit and experts from Leipzig University are providing specialist support for the implementation process.

Answers to strategic questions

The simulation will also provide answers to strategic questions in future – questions such as: which customer groups are particularly attractive to competitors and how can IWB secure the loyalty of these groups in the long term? At the same time, IWB is seeking to blaze fresh trails in its model development. For example, it is planning to integrate the decision-making behavior of its customers into the software. It is making use of the Big Data Center at Leipzig Fraunhofer Center to process and analyse its corporate and customer data.

Simulating customer-side measures

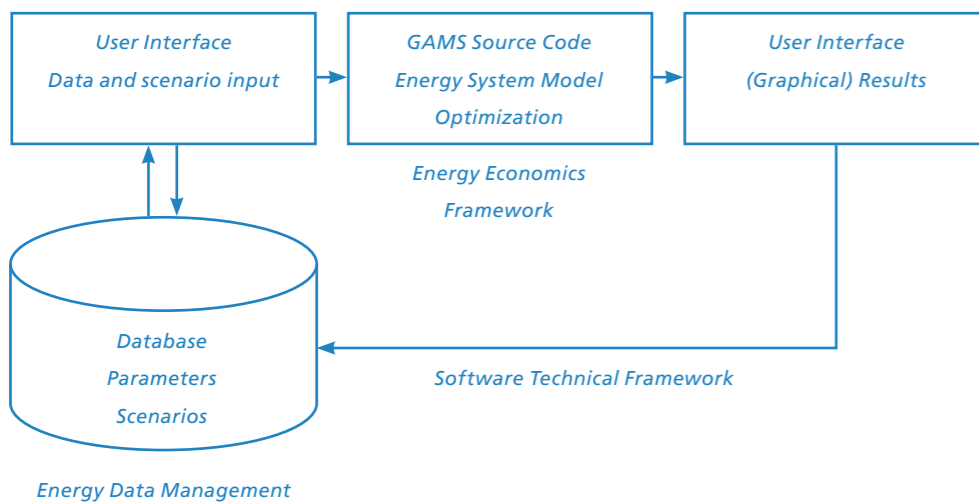
The interdisciplinary team first developed the IRPsim simulation model, which simulates Basel's energy supply and demand structure for the next 20 years. This software allows IWB to plan for the medium term and select the most cost-effective energy measure - for example, when deciding whether or not to introduce variable electricity tariffs.



"In Leipzig Fraunhofer Center, we have a project partner that stands out from other providers thanks to the breadth of its energy industry expertise. Its previous results have convinced us on all counts. The team of researchers at the Leipzig Fraunhofer Center is able to take into account additional aspects relating to market development and consumer behavior."

Patrick Wellnitz, Head of Energy Solutions, Development

software architecture of the IWB energy system model



Protecting cultural heritage in times of climate change – the EU project “Climate for Culture”

“Climate for Culture” can look back on five years of successful cooperation. Twenty-seven partners from 14 countries investigated the impact of climate change on the indoor environments of historical buildings and developed mitigation and adaptation solutions for the future.

From Neuschwanstein Castle to the Sistine Chapel, many world heritage sites are suffering the effects of climate change. This is because rainfall is increasing and with it the moisture levels in the buildings. An international team of researchers investigated the impact this is having on the indoor environments, art collections and energy demands of historical buildings as part of the EU project “Climate for Culture”.

Climate change is altering the climate of spaces inside historical buildings

Leipzig Fraunhofer Center researchers were serving as finance and project managers in the EU project. With a total funding budget of some EUR 5 million, Climate for Culture is one of the largest cultural research projects ever established, bringing together experts from 27 partner institutions and 14 countries. With scientific coordination from the Fraunhofer Institute for Building Physics, the project for the first time coupled climate modeling with building simulation tools and applied these tools in castles, museums and churches.

Climate for Culture – brochure summarizes results

A key result of the research, aside from the climate, energy-demand and risk maps, is the software that the owners of heritage property will be able to use in future to access online advice as to how to manage their historical buildings in an energy-efficient and sustainable manner. Additionally, the brochure “Built Cultural Heritage in Times of Climate Change”, developed by Leipzig Fraunhofer Center researchers, summarizes selected findings from the project.

Duration: 11/2009 – 10/2014

Funding: European Commission (7th Framework Program)

Partners: Fraunhofer Institute for Building Physics IBP, Fraunhofer Institute for Silicate Research ISC, Czech Technical University Prag, Italian National Research Council - Institute of Atmospheric Sciences and Climate, University of Zagreb, Foundation for Research and Technology - Institute of Electronic Structure & Laser, Max-Planck-Institute for Meteorology, Technical University Munich, Eindhoven University of Technology, University of Ljubljana, Gradbeni Institut ZRMK - Center for Indoor Environment, Building Physics and Energy, Uppsala University - Campus Gotland, Andreas Weiß - Freelance conservator-restorer, Jan Radon - Engineering Consulting & Software Development, Krah&Grote Measurement Solutions, TB Käferhaus GmbH, Haftcourt Ltd., ACCIONA Infrastructure, Bavarian Department of State-owned Palaces, Gardens and Lakes, Bavarian State Painting Collections – Doerner Institute, National Trust for England, Wales and Northern Ireland, Kybertec Ltd., Glasgow Caledonian University, Center for Documentation of Cultural & Natural Heritage Egypt, Jonathan Ashley-Smith – Consultant for Conservation Risk Assessment, The National Institute of Cultural Heritage France, The London School of Economics and Political Science, Fondazione Salvatore Maugeri



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■ Main façade with pool and Flora fountain Neuschwanstein Castle in winter.
© Bayerische Schlösserverwaltung, Andrea Gruber, Rainer Herrmann, Maria Scherf

■ Blicking Hall, United Kingdom.
© National Trust Images/Andrew Butler

■ Karlštejn Castle, Czech Republic.
© Czech Technical University Prag/Kybertec Ltd.



“This project has been a success story.”

Mr. Dr. Kurt Vandenberghe, Director for Directorate Climate action and resource efficiency, Directorate-General for Research and Innovation, European Commission.



The research leading to these results has received funding from European Union's Seventh Framework Programme for research, technological development and demonstration under Grant Agreement No. 236973.



Interdisciplinary Research Collaboration for Cultural Heritage Conservation

With a comprehensive study that examines the economic factor and the social value of cultural heritage, the Leipzig Fraunhofer Center is collaborating in a Fraunhofer-Gesellschaft model project which aims to develop innovative conservation and digitalization concepts for cultural heritage artifacts.

On July 2nd, 2014, representatives from the Fraunhofer-Gesellschaft, the Leibniz-Gemeinschaft and the Prussian Cultural Heritage Foundation (SPK) signed a formal agreement with the Staatliche Kunstsammlungen Dresden (Dresden State Art Collections) and the Saxon State and University Library Dresden (SLUB). The Research Alliance Cultural Heritage (FALKE) thereby responded to former State Minister Prof. Dr. Sabine von Schorlemer's intention to bundle the social, natural and cultural studies expertise of these partners.

The research alliance is unique in Germany. It aims to jointly develop new methods for the restoration and conservation of cultural artifacts and to further intensify the knowledge transfer between research and practical application. Another objective is to embed the significance of cultural heritage more deeply in the public consciousness.

Study on cultural heritage as an economic factor

In a model project, experts from the Leipzig Fraunhofer Center's Stakeholder Dialogue and Social Acceptance Unit will now evaluate cultural heritage as a regional economic factor, its social value and the significance of investing in preventive and restoration measures for the first time by conducting a study that uses the Dresden art collection museums as an example. They will also support the Fraunhofer-Gesellschaft project managers to coordinate and communicate the entire project. The Executive Board of the Fraunhofer-Gesellschaft has agreed to make 1.5 million euros available for the project over the next three years.

Duration: 6/2015 – 7/2018

Partners: Fraunhofer-Gesellschaft, Leibniz-Gemeinschaft, Prussian Cultural Heritage Foundation, Staatliche Kunstsammlungen Dresden (Dresden State Art Collections), Saxon State and University Library Dresden

Funding: Fraunhofer-Gesellschaft Executive Board

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Forschungsallianz
Kulturerbe

Network for the energy and environment sector in the Danube Region

TREC – Transnational Renewable Energy Cluster – Donau

The "Transnational Renewable Energy Cluster (TREC) – Danube" project seeks to drive economic growth in the energy and environment sector in the Danube Region and to establish Leipzig as a strong research partner in this macro-region.

Since 2010, 14 countries with their different cultures, religions, languages and policies, including Romania, Bulgaria, Hungary, Serbia, Slovakia, Moldova and Ukraine have constituted the Danube Region, a macro-region of the European Commission. Since 2011, these countries have been pursuing a joint, uniform concept for promoting infrastructure, business, environmental conservation and prosperity.

Internationalization strategy for Leipzig energy and environment cluster

Leipzig Fraunhofer Center researchers from the unit Stakeholder Dialogue and Social Acceptance are linking Leipzig's Netzwerk Energie und Umwelt (NEU e.V.) with suitable partners and clusters in this region as part of the "Transnational Renewable Energy Cluster (TREC) – Danube" project. They are developing a long-term strategy for internationalizing the Leipzig-based network.

Collaborative European projects in the Danube Region

Funded by the German Federal Ministry of Education and Research (BMBF), the project has the goal of establishing European research projects and industry partnerships in the Danube Region. The intention is to work together on developing innovative energy and environmental technologies, development concepts as well as standardization and marketing concepts. TREC Danube has yielded initial fruit in the form of project initiatives in the fields of geothermal energy and biomass use.

"With the Leipzig Fraunhofer Center, both we as the cluster management team and our network members have access to professional support in our internationalization efforts in Central and Eastern Europe – something which is indispensable for developing a strong, well-functioning international platform."

Daniel Reißmann, Cluster Manager, Leipzig's network for energy and the environment.



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Duration: 7/2014 – 7/2015

Funding: Federal Ministry of Education and Research

Partners: German Biomass Research Center gGmbH (DBFZ), Leipzig's network for energy and the environment (NEU)

Leipzig's network for energy and the environment was awarded the Bronze Label by the European Cluster Excellence Initiative in 2013. This certificate underscores the cluster's aspiration of bringing together companies, research institutions and investors from the energy and environment sector at a European level.

TREC

GEFÖRDERT VOM

Bundesministerium
für Bildung
und Forschung