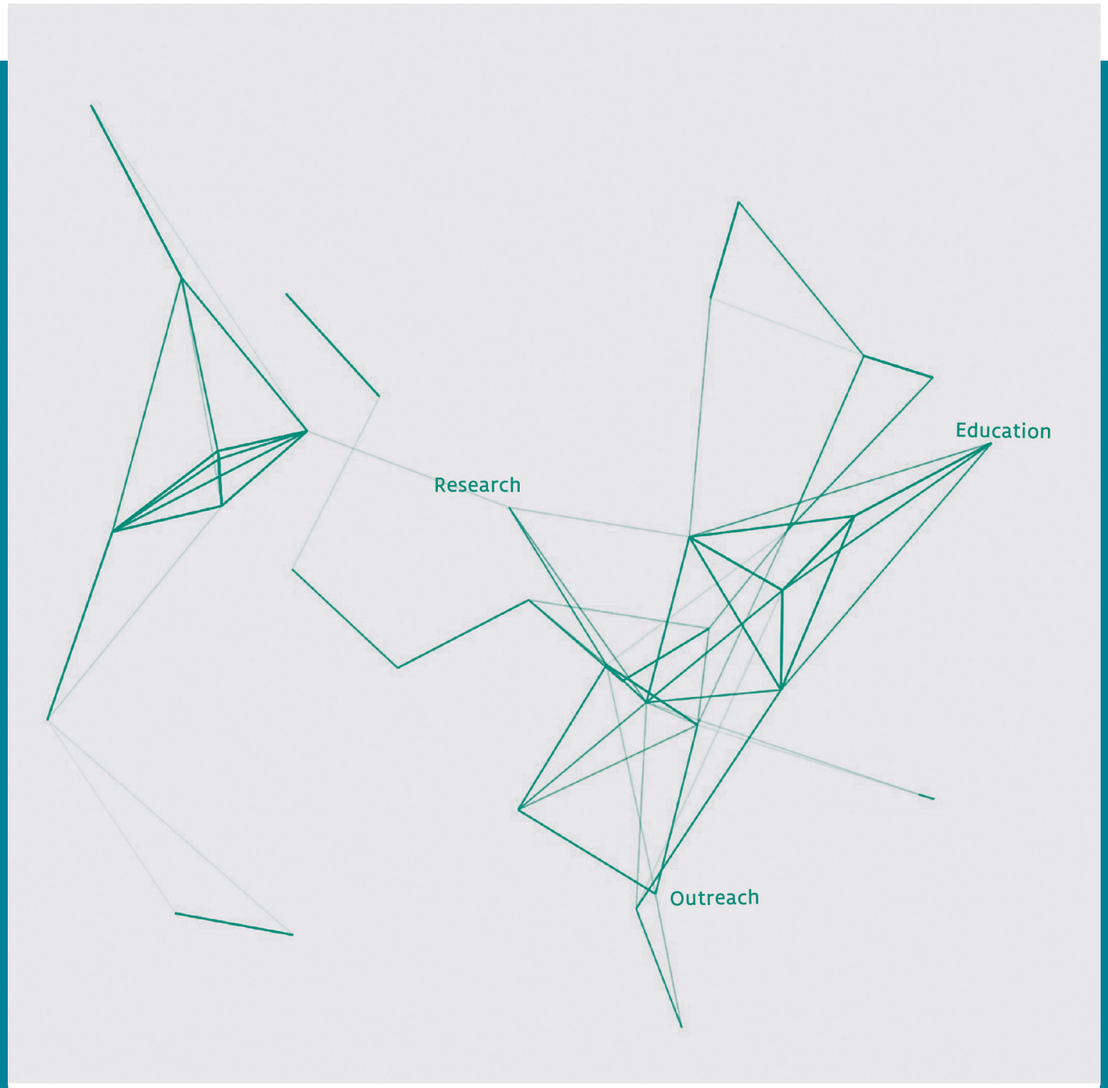
Contact
Energy Science Center (ESC)
ETH Zurich
Sonneggstrasse 28
8092 Zurich

www.esc.ethz.ch
+41 44 632 83 88

Content	**Energy Science Center**
Layout	**Lisa Bettoni**
Cover image	**Charlotte Pistor**
Photos	**p.6 D-ITET, ETH Zurich; p.9/1 Kees Christiaanse, ETH Zurich, p.9/2 Zurich Klimapreis 2014; p.13 Gerry Amstutz, ETH Zurich; p.14/1 Reuter Dominick, p.14/2 Rob Lewis, C2SM/ESC; p. 15/1 Energy Science Center, p. 15/2 Rob Lewis, C2SM/ESC, p. 15/3 Kees Christiaanse, ETH Zurich.**

ETH zürich



Energy Science Center

Annual Report 2014

Energy
Science
Center

Bridging research, education and outreach across different departments and research fields to answer the energy challenges of today and tomorrow

Table of Contents

Dear Colleagues and Partners,

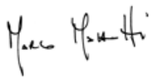
2014 was a very intense year for the Energy Science Center (ESC) at ETH Zurich and we are happy to report on our activities. We would especially like to welcome our three new members: Prof. Tobias Schmidt (D-GESS), Prof. Thomas Schmidt (D-CHAB) and Prof. Eleni Chatzi (D-BAUG), bringing the total number of members to 60 from 11 departments.

In the area of research, the ESC successfully organised a call for energy research seed projects. Eight projects were selected for funding, receiving an overall total of 800'000 CHF from the Energy Fund of ETH foundation. The full list of recipients is in the report. In addition, the ESC initiated two large cross-departmental research projects that successfully gained funding from the National Science Foundation through its National Research Programme No. 70 ("Energy Transition"), receiving a total of 2.7 Mio. CHF. We then started to work on the idea of two research platforms, one in the area of energy system modelling and one in distributed energy systems.

In education, the ESC further improved the quality of the highly sought-after Master in Energy Science and Technology (MEST) that continues to attract highly qualified students from all over the world, enabling us to build a community of young engineers that can think "out-of-the-box". The ESC also actively supported the setup of the new interdisciplinary Master in Integrated Building Systems (MBS).

Building on its large and active community both within and outside ETH Zurich, the ESC organised many events in 2014. The two largest of these were "Energieversorgung 2050: Integration oder Inseldenken?" about the future energy supply in Switzerland, and "Klimarunde 2014", co-organised with the Center for Climate Systems Modeling (C2SM), each event attracting well over 400 participants.

For 2015 we will continue to intensify our work to bring researchers from different departments together aiming to solve the energy challenges of the future, also strengthening our outreach to industry, government and the public.



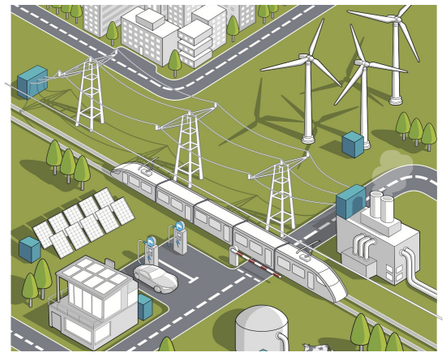
Marco Mazzotti
Chair

Christian Schaffner
Executive Director

The Energy Science Center

Core Activities

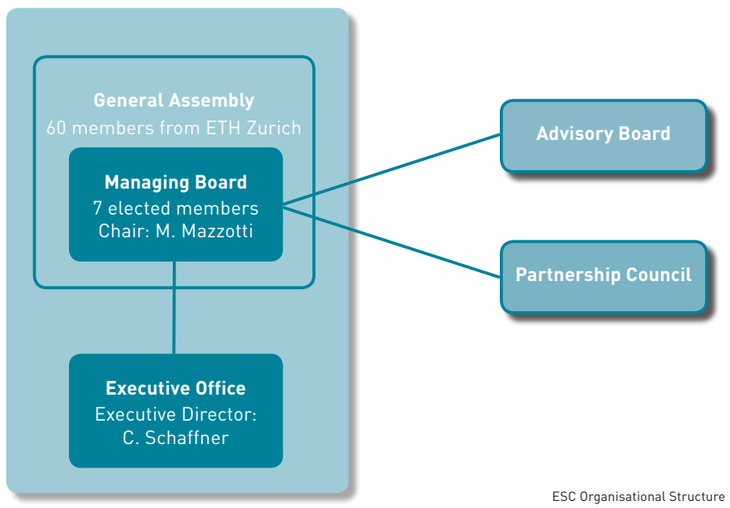
According to the ESC Mission, the ESC activities can be categorized in three main areas: Research, Education and Outreach.



A sustainable energy system is one of the most complex challenges that humankind is facing. Such an energy system must be viable given the limited available resources; it must also relieve the strain on the natural environment and not compete with the basic needs of the world' s population.
A plausible sustainability vision should be responsive to the central challenges facing the energy system. These are: climate change, access to energy services, local pollutants, risks and benefits to society.
To build such a sustainable energy system additional knowledge and new technologies are needed, relying on the expertise and cross-cutting research of engineering, economic and social scientists.

The ESC of ETH Zurich was founded in 2005 as an interdepartmental competence center to facilitate energy research and teaching activities across research fields and departments.
The ESC contributes significantly to the integration of specialists and disciplines and aims to be one of the most influential centers in energy research with national and international visibility.
www.esc.ethz.ch →

The Research Center for Energy Networks (Forschungsstelle Energienetze – FEN) is affiliated to the Energy Science Center.
www.fen.ethz.ch →



ESC Organisational Structure

Mission

The Energy Science Center (ESC) aims to facilitate the deployment of an environmentally friendly, reliable, low risk, economically viable and socially compatible sustainable energy system. The ESC enhances cooperation between ETH Zurich, industry, government, and society on energy related issues, offering a platform for nourishing the exchange of information between the engineering sciences and the social sciences as well as for directing joint projects.

The ESC synergistically combines key expertise in various energy disciplines to address large-scale problems successfully and to form flagship projects. These programmes will be large, financially intensive projects that have a visibility far beyond ETH Zurich and should promote energy research to a large extent.

Organisational Structure

The General Assembly, containing the ESC members, is the ESC governing body. Currently sixty professors from eleven different departments are members of the ESC.
The **Managing Board** is the executive body of the ESC and is composed of five members elected by the General Assembly. The managing board elects one of its members as chair.
The **Executive Office** is run by the Executive Director, who reports to the chair of the managing board.
The **Advisory Board** comprises representatives from industry and administration and advises the ESC on its activities.
The **Partnership Council** is formed by foundations and industry partners who make substantial donations to the programme of the Center through the ETH Foundation.

Partnership Council

The Center's Partnership Council meets biannually with the ESC Managing Board and Executive Director.
Members represent foundations and industry partners who provide significant financial support for projects and programme through the ETH Foundation and who are interested in playing an active role in building joint initiatives

The ESC welcomed 3 new members in 2014!

Prof. Dr. Eleni Chatzi, Structural Mechanics Group
Prof. Dr. Thomas Schmidt, Electro-chemistry Laboratory
Prof. Dr. Tobias Schmidt, Energy Politics Group

Research

Approach

Themes, areas and role

The ESC research activities focus on large, cross-cutting themes run as inter-departmental and inter-disciplinary projects in the four strategic areas of: energy and information, integration of renewables, integrated modelling and energy-water-land nexus. The ESC identifies relevant topics in the area of energy research. This also includes participation in National Research Programs (NRP) and European Research projects (Horizon 2020).
The ESC research activities consist of:

- Taking a proactive role in the energy research activities of ETH Zurich and supporting its strategic goals in all areas of action (efficiency, grids, storage, provision, economy, geothermal and more);
- Supporting the professors and institutes active in these fields by leveraging its network inside ETH Zurich with other universities and industry;
- Gathering opinions and open questions within the energy sector internally and externally, synthesising and disseminating them amongst researchers of ETH Zurich;
- Hosting researchers for specific projects in order to facilitate inter-departmental research projects;
- Promoting flagship programmes in the area of energy research.

www.esc.ethz.ch/research.html →

Report

ESC Report on Pumped Hydro Storage

The Federal Ministry of Economy and Energy of Germany, the Federal Ministry for Science, Research and Economy of Austria and the Federal Department of Environment, Transport, Energy and Communications of Switzerland signed a cooperation agreement in 2012 for the development of an interconnected pumped hydroelectric system. Under this framework, three comprehensive studies covering the main research areas were carried out and are summarised in this ESC report.

www.esc.ethz.ch/publications.html →

Energy Fund of ETH Zurich Foundation

Seed Projects

The Energy Fund of the ETH Zurich Foundation funds seed projects, in close cooperation with the Energy Science Center (ESC). Seed projects are intended to foster application-oriented basic research by offering a pragmatic opportunity to explore and develop visionary ideas of high social relevance in an early stage towards a concept for further research, to be eventually funded by regular funding mechanisms and bodies.
This funding opportunity for post-doctoral projects of up to one year is financed with a maximum budget of 100'000 CHF per project from thematic funds of the ETH Zurich Foundation. 8 seed projects were financed in 2014 (see Annex).

http://www.esc.ethz.ch/research/seed-projects.html →

Research projects

Zernez Energia 2020

No fossil fuels used for heating or hot water in an entire village – that is the ambitious goal of the Zernez Energia 2020 research project. ETH scientists have studied the feasibility of the project and presented the initial findings in an exhibition. Located in the Engadine, Zernez has set the goal of using only renewable sources to meet its energy requirements for buildings in the municipality, thus reducing CO_2 emissions to zero.
The project, Zernez Energia 2020, is supported by the Swiss federal government. An interdisciplinary team from ETH Zurich in the fields of urban design, building systems, construction physics, energy research and ecological system design are closely involved in the project. These researchers have analysed the feasibility of the project and now present the initial findings in an exhibition. The conclusion is that essentially the ambitious goal is possible and will not compromise the townscape, though perhaps not before 2020.
To reduce energy consumption, the researchers have proposed measures including the refurbishment of buildings and converting oil heaters and electric heating to district heating from the municipality's wood-chip heating system and to heat pumps. This transformation depends heavily on the active participation of house owners.
"These measures can greatly reduce CO_2 emissions, but not completely to zero," says Michael Wagner, project manager and colleague of Kees Christiaanse, Chair of Architecture and Urban Design at ETH Zurich.

Research Partners
Chair of Architecture and Urban Design, D-ARCH, ETH Zurich (Project Leader)
Architecture and Building Systems, D-ARCH, ETH Zurich
Chair of Building Physics, D-ARCH, ETH Zurich
Chair of Ecological Systems Design, D-BAUG, ETH Zurich

External Partners
Gemeinde Zernez
Amstein + Walthert AG
STW AG für Raumplanung

Sponsors
CTI – Commission for Technology and Innovation
SFOE – Swiss Federal Office of Energy

http://zernezenergia2020.ch/home/ →

"Zernez Energia 2020" won Special Award
The Energy Science Center project Zernez Energia 2020 was awarded the Special Award for 'Buildings & Home' on November 26th at the Zurich Climate Prize 2014.
The jury was especially impressed by the systematic and holistic approach: the project includes the required key factors, i.e. energy production, distribution and storage, and energy efficiency. Furthermore, the reviewers highlighted the promising nature of the project, hoping that it will lead other communities to follow this approach.

Integration of sustainable multi-energy-hub systems at neighbourhood scale (IMES)

The SNF NRP-70 project Integration of sustainable Multi-Energy-hub Systems at neighbourhood scale (IMES) will develop and provide a comprehensive simulation approach for decentralised power production which tackles at the same time technical, economic and social issues. It will establish a new methodology to evaluate decentralised power production solutions and formulate techno-economic decision guidelines for implementation of decentralised power production integrating renewable energy sources, natural gas-based micro-cogeneration and storage (power-to-gas and batteries). These guidelines will contain recommendations on how neighbourhood-scale power productions should optimally be implemented today and in the future, which are the technical, economic and social barriers to be overtaken and where innovation is necessary to bring distributed power generation to the market.
IMES will have a direct impact on the advancement of multi-energy-hub systems through the techno-economic guidelines for implementation of power production at a neighbourhood scale, contributing to the effective deployment of decentralised power production in Switzerland and Europe. Knowledge sharing and innovation will also contribute to Switzerland competitiveness in a future carbon-constrained world.

Partners
Automatic Control Laboratory, D-ITET, ETH Zurich
Chair of Building Physics, D-ARCH, ETH Zurich
Chair of Environmental Sciences Natural and Social Science Interface, IED, ETH Zurich
Group for Sustainability and Technology, D-MTEC, ETH Zurich
Laboratory for Energy Conversion, D-MAVT, ETH Zurich
Separation Processes Laboratory, D-MAVT, ETH Zurich
Research Center for Energy Networks (FEN), ETH Zurich
Timing: 2014 - 2017
Amount (CHF): 1.3 Mio
This research project is part of the National Research Programme "Energy Turnaround" (NRP 70) of the Swiss National Science Foundation (SNSF). Further information on the National Research Programme can be found at www.nrp70.ch.

Integrating Modelling of Energy System (INMES)

The goal of the seed projects titled "Integrated Modelling of Energy Systems" (INMES) is to accomplish the preparatory work needed to set up a framework for an integrated energy system model that encompasses a holistic approach and that will be hosted at the Energy Science Center (ESC) of ETH Zurich. Such a framework will allow researchers from within ETH Zurich or from other research organisations to run scenario analyses, test new modelling techniques, verify theoretical findings through simulation in the area of energy production, transportation, distribution and consumption. It will encompass all major energy carriers (i.e. electricity, gas, coal, oil, heat and cooling). The geographical scope will be worldwide, with a step-by-step increase in detail in the area of interest (e.g. Switzerland, its neighbouring countries, and Europe).

Partners
Centre for Energy Policy and Economics, ETH Zurich
Laboratory for Energy Conversion, D-MAVT, ETH Zurich
Laboratory of Reliability and Risk Engineering, D-MAVT, ETH Zurich
Power Systems Laboratory, D-ITET, ETH Zurich
Research Center for Energy Networks (FEN), ETH Zurich
Timing: 2014-2015
Amount (CHF): 200'000

Assessing Future Electricity Market (AFEM)

In the SNF NRP-70 project "Assessing Future Electricity Markets" (AFEM) three main questions will be answered:
- How will the Swiss and European electricity market evolve if the existing market mechanism (energy only market, reserve market) were perpetuated as is?
- How will the market evolve if additional market components such as capacity markets are introduced?
- How do future market models need to be designed in order to give the "right" investment incentive (e.g. flexibility markets) for an efficient and carbon-free electricity supply system?

The goal of the first two research questions is to first analyse the current design of the electricity market in Europe today and then identify shortcomings both of the existing setup and of already discussed additions (such as capacity markets or capacity payments). This involves identifying the necessary and suitable assumptions and simplifications in order to be able to model the specific behaviour of market participants while limiting the complexity to a feasible level.

The third research question will be answered by developing new models which enable analysing the specific behaviour of future electricity supply systems in which renewable energy sources (RES) are likely to be deployed at large scale. The high amount of variable electricity production mainly from wind and photovoltaic generation units will increase the dynamic fluctuation within the overall system significantly.

The models being developed within AFEM need to be able to take these fluctuations into account in order to e.g. study the behaviour of a proposed flexibility market or other new market designs. Such a market would allow the valuation of specific dynamic capability of power generation (e.g. pumped-hydro storage), demand-side management (DSM) and storage (e.g. batteries, power-to-gas) technologies. The proposed market models will be evaluated according to the energy and climate goals set by the "Energy Strategy 2050" of the Federal Council.

Partners
Chair Economics/Energy Economics, D-MTEC, ETH Zurich
Chair of Geoinformation Engineering, D-BAUG, ETH Zurich
Laboratory for Energy Conversion, D-MAVT, ETH Zurich
Research Center for Energy Networks (FEN), ETH Zurich
Research Center for Sustainable Energy and Water Supply, University of Basel
Timing: 2014-2018
Amount (CHF): 1.4 Mio
This research project is part of the National Research Programme "Energy Turnaround" (NRP 70) of the Swiss National Science Foundation (SNSF). Further information on the National Research Programme can be found at www.nrp70.ch.

Research Focus

Clean, affordable and reliably available energy is of paramount importance to the well-being of modern societies. Developing future environmentally friendly energy systems requires research in a large number of scientific disciplines. Most of these are cultivated at ETH Zurich, which has a bright tradition in energy-related research.

Education

MEST

Master in Energy Science and Technology

The ESC supports a world-class interdisciplinary master programme for energy engineers. The Master in Energy Science and Technology (MEST) is a specialised programme of a unique type, enabling studies across a wide range of energy–related courses offered by ETH Zurich.
Running since 2007, it is a joint programme between two Departments: the Department of Information Technology and Electrical Engineering (D-ITET), as the host department, and the Department of Mechanical and Process Engineering (D-MAVT). Another nine departments actively contribute to the MEST through the tutors and their offer of over fifty energy-related core courses.
In the seven years that it has been running, the MEST has grown to become the third most sought-after Master at ETH Zurich and also the largest inter-disciplinary master's programme. The number of energy-related courses that the students can choose from has risen from 40 at its inception to 54 to date (4 compulsory and 49 elective).

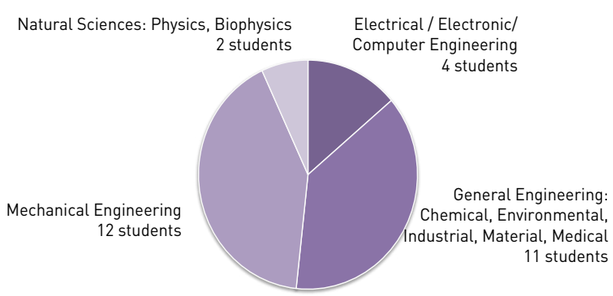
The ESC coordinates the interdisciplinary Master's degree programme Master in Energy Science and Technology (MEST) at ETH Zurich.
For autumn 2014 the MEST admission committee received more than 150 applications from all over the world, for around 30 places in the course.

www.master-energy.ethz.ch →

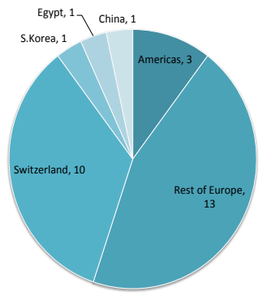
Alumni Support and Career Development

Aiming to develop a stronger Alumni Network, ESC has encouraged the networking of the MEST students. The ESC organised the first MEST social event, a barbecue evening, in November 2014. 40 MEST students attended.

Students Previous Study



Origin of Students



MBS

Master in Integrated Building Systems

The ESC supports the interdisciplinary Master's degree programme in Integrated Building Systems (MBS) at ETH Zurich.
This programme provides a science-based education in building systems and technologies with a strong emphasis on the energy performance and the environmental impact of buildings. The emphasis is on the integration of sustainable energy technologies at both the building and the urban level.

www.master-buildingsystems.ethz.ch →

The Frontiers Series

Frontiers in Energy Research

Frontiers in Energy Research is a series of lectures given by Ph.D. students for Ph.D. students of their energy-related research work. It aims to disseminate knowledge of ETH Zurich energy-related research activities throughout the research community. The "Frontiers in Energy Research" gives students the opportunity to present and discuss their energy-related research activity to the broader ETH research community and learn more about other pertinent projects.
The presenters are doctoral students who take this opportunity to present their research. The weekly presentations are open to the public, free and do not require registration.

The Frontiers series has been running successfully since the spring semester in 2012, which staged 24 seminars, followed by another 19 in the autumn of that year. The spring semester 2014 hosted 14 seminars.

www.esc.ethz.ch/events/frontiers-in-energy-research.html →

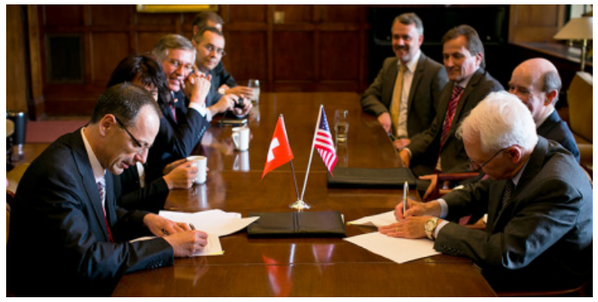
Outreach

The ESC believes in the need to discuss energy issues in an interdisciplinary manner, in order to provide a comprehensive view on actual research and development topics.
Our outreach activities also include:

- Collaboration with energy related associations
- Regular workshops with industry partners
- Representation of the ETH Zurich in energy-related topics towards policymakers and institutions.

Collaborations

Throughout 2014, the ESC has collaborated with important national and international companies (i.e. EKZ,EWZ,Alstom), associations (*foraus*) and institutional partners (i.e.Stadt Zürich), working on specific research projects, publications and events.
The ESC also hosted official delegations of the energy ministries of Germany, Austria and Italy and participated in delegations to Germany, Hong Kong, London and Boston.



Website

Thanks to the new ESC website, which incorporates a news and media channels section, all news related to the ESC and its members activities in the energy field are now published online.
The Media channel highlights the ESC visibility in the media: newspaper articles and videos about ESC projects and events are shown in this section.

Exhibition

Zernez Energia 2020

To mark the 100th anniversary of the founding of the Swiss National Park in Graubünden, the community of Zernez has a goal that by 2020 it will meet its entire building-related energy needs from its own production whilst reducing CO2 emissions to zero.

Events

Shale Gas & Fracking: State of the Art

The one-day workshop organised by the ESC, under the auspices of the Swiss Gas & Water Industry Association and the Swiss Competence Center for Energy Research, prompted the dialogue on the topic of shale gas & fracking by providing the scientific and technical background for an in-depth discussion involving the key stakeholders and the audience (around 180 people).

www.esc.ethz.ch/events/shale-gas-and-fracking.html →

Energieversorgung 2050: Integration oder Inseldenken?

How will the Swiss energy system look in 2050? Which are the technical and political challenges to tackle in order to ensure resource availability and an environmentally friendly energy supply?

These and other questions were addressed to the speakers (policymakers, companies and academic representatives) who attended this event organised together with the foreign policy think tank *'foraus'*. The scientific talks, which mainly focused on the electricity network development and supply reliability, and the panel discussions with international guests (Dr. Urban Rid, German Federal Ministry for Economic Affairs and Energy and Dr. Christian Schönbauer, Austrian Federal Ministry of Science, Research and Economy) , were followed with great interest by more than 430 participants.

www.esc.ethz.ch/events/energieversorgung2050.html →

Klimarunde 2014

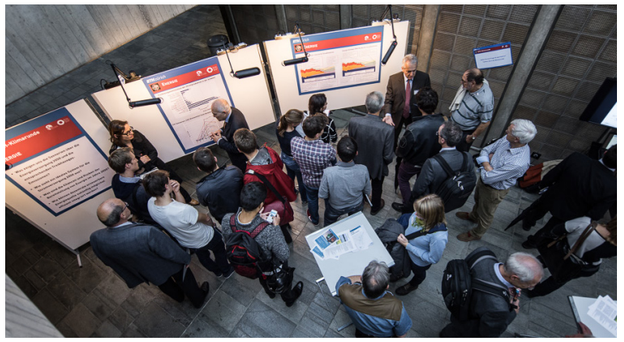
Klimarunde 2014, organised by the Center for Climate Systems Modeling (C2SM) together with the ESC, was divided in two parts:

- *Tischgespräche* - where the general public had the opportunity to discuss the conference topic directly with ETH experts.
- Presentations and panel discussion - with important speakers from industry, politics and academia.

The event analysed the challenges imposed by the climate change to individuals and society; what are the technical, social, institutional, political and financial answers to this challenge.

370 people joined Klimarunde

http://www.c2sm.ethz.ch/events/past-events/eth_klimarunde_2014.html →



Annex

Members (as of 31.12.2014)

D-ARCH
Prof. Dr. Jan Carmeliet
Prof. Dr. Kees Christiaanse
Prof. Dr. Andrea Deplazes
Prof. Dr. Hansjürg Leibundgut
Prof. Dr. Arno Schlüter

D-BAUG
Prof. Dr. Robert Boes
Prof. Dr. Paolo Burlando
Prof. Dr. Eleni Chatzi
Prof. Dr. Stefanie Hellweg
Prof. Dr. Martin Raubal
Prof. Dr. Bozidar Stojadinovic

D-CHAB
Prof. Dr. Christian Copéret
Prof. Dr. Konrad Hungerbühler
Prof. Dr. Maksym Kovalenko
Prof. Dr. Reinhard Nesper
Prof. Dr. Javier Pérez-Ramirez
Prof. Dr. Thomas Schmidt
Prof. Dr. Alexander Wokaun

D-ERDW
Prof. Dr. Fredrick Evans
Prof. Dr. Domenico Giardini
Prof. Dr. Chrtistoph A. Heinrich
Prof. Dr. Johan Robertsson

D-GESS
Prof. Dr. Renate Schubert
Prof. Dr. Tobias Schmidt
Prof. Dr. Andreas Wenger

D-INFK
Prof. Dr. Friedemann Mattern

D-ITET
Prof. Dr. Göran Andersson
Prof. Dr. Jürgen Biela
Prof. Dr. Christian Franck
Prof. Dr. Johann Walter Kolar
Prof. Dr. Ayodhya Nath Tiwari
Prof. Dr. Vanessa Wood

D-MAVT
Prof. Dr. Reza S. Abhari
Prof. Dr. Konstantinos Boulouchos
Prof. Dr. Chiara Daraio
Prof. Dr. Paolo Ermanni
Prof. Dr. Lino Guzzella
Prof. Dr. Petros Koumoutsakos
Prof. Dr. Wolfgang Kröger
Prof. Dr. Edoardo Mazza
Prof. Dr. Marco Mazzotti
Prof. Dr. Christoph Müller
Prof. Dr. David Norris
Prof. Dr. Hyung Gyu Park
Prof. Dr. Dimos Poulikakos
Prof. Dr. Horst-Michael Prasser
Prof. Dr. Philipp Rudolf von Rohr
Prof. Dr. Giovanni Sansavini
Prof. Dr. Aldo Steinfeld

D-MATL
Prof. Dr. Jennifer Rupp

D-MTEC
Prof. Dr. Lucas Bretschger
Prof. Dr. Massimo Filippini
Prof. Dr. Elgar Fleisch
Prof. Dr. Volker Hoffmann
Prof. Dr. Sebastian Rausch

D-USYS
Prof Dr. Peter Edwards
Prof. Dr. Reto Knutti
Prof. Dr. Anthony Patt
Dr. Michael Stauffacher
Prof. Dr. Bernard Wehrli

Total: 60 members

Managing Board (as of 31.12.2014)

Prof. Dr. Marco Mazzotti
Prof. Dr. Reza S. Abhari
Prof. Dr. Göran Andersson
Prof. Dr. Jan Carmeliet
Prof. Dr. Massimo Filippini

Executive Office (as of 31.12.2014)

Dr. Christian Schaffner – Executive Director
Deborah Hufton - Education
Lisa Bettoni - PR and Communications
Dr. Pedro Crespo del Granado – Post-doctoral Fellow

Members Partnership Council

ABB Schweiz
Alpiq
Alstom
Axpo
BKW
CKW
EKZ
ewz
Repower
Shell
swisselectric

Honours and prizes awarded to members of ESC

Prof. Göran Andersson, D-ITET,
Felix Wu Distinguished Lecture in Power Systems, University of Hong Kong, Hong Kong

Prof. Dr. Lucas Bretschger, D-MTEC,
Elected President of the European Association of Environmental and Resource Economists, Italy

Prof. Dr. Christophe Copéret, D-CHAB,
International Organic Chemistry Foundation Yoshida Lectureship Award, Kyoto University, Japan;
Meloche Lectureship, University of Wisconsin–Madison, USA;
P.H. Emmett North American Catalysis Society Award, North American Catalysis Society, USA

Prof. Dr. Lino Guzzella, D-MAVT,
Watt d'Or 2014, Swiss Federal Office of Energy, Switzerland

Prof. Dr. Johann Walter Kolar, D-ITET,
R. David Middlebrook Award, Institute of Electrical and Electronics Engineers, USA;
Semikron Innovation Award, Semikron Foundation, Germany

Prof. Dr. Marco Mazzotti, D-MAVT,
Honorary Doctorate in engineering (Dr. Ing. E.h.), Otto-von-Guericke University, Magdeburg, Germany

Prof. Dr. Javier Pérez-Ramírez, D-CHAB,
Beilby Medal and Prize, the Royal Society of Chemistry and the Institute of Materials, Minerals and Mining, United Kingdom

Prof. Dr. Dimos Poulikakos, D-MAVT,
Distinguished Professor without Borders, Brazilian government, Brazil

Prof. Dr. Jennifer Rupp, D-MATL,
SNSF Starting Grant, Swiss National Science Foundation, Switzerland;
Top Young Scientist under the age of 40 at the World Economic Forum China 2014, China

Prof. Dr. Aldo Steinfeld, D-MAVT,
Elected to the Scientific Council, Scientific International Center of Heat and Mass Transfer, USA

Prof. Dr. Alexander Wokaun, D-CHAB,
Wilhelm Jost Memorial Lecture, Academy of Sciences at Göttingen, Germany

Prof. Dr. Vanessa Wood, D-ITET,
Science Award Electrochemistry, Volkswagen AG and BASF, Germany

List of Seed Project 2014

Name of the Project	Group	Professor
Plasmonic Temperature Measurement for Energy Technologies	Optical Materials Engineering Group	Prof. David J. Norris
Bi-functional conductive electrodes for thin-film solar cells	Laboratory of Thermodynamics in Emerging Technologies	Prof. Dimos Poulikakos
All Solid State Li+ Batteries with high Thermal Operation Windows	Electrochemical Materials	Prof. Jennifer Rupp
Next Generation Separators for Safe, High Performance Lithium Ion Batteries	Laboratory for Nano-electronics	Prof. Vanessa Wood
Novel photo-anodes for photo-electrochemical water splitting using earth abundant materials and scalable manufacturing processes	Laboratory of Energy Science and Engineering	Prof Christoph Müller
Non-linear Resonant Structures for Efficient Energy Production	Mechanics and Materials	Prof. Chiara Daraio
Porous nitrogen-doped carbon materials generated from fractal gels for CO_2 capture	Chemical Reaction and Separation Engineering	Prof. Giuseppe Storti
Forward osmosis water desalination based on nano carbon membrane	Nano-science for Energy Technology and Sustainability	Prof. Hyung Gyu Park