

SCCER

Efficiency of Industrial Processes



Annual Conference 2015

Invitation

Energy Efficiency – Opportunities in the Process Industry

18 Sep 2015
10:15–15:15

ETH Zurich

The vision of the Swiss Competence Center for Energy Research on Efficiency of Industrial Processes (SCCER EIP) is to enhance the energy efficiency of the Swiss process industry.

Research and development within the SCCER EIP addresses systems at different scales, from individual process units to integrated processes up to integrated sites connected with their surroundings, with a focus on technological innovation but also addressing organisational and managerial aspects.

New concepts and processes, innovations and demonstration facilities are being developed, tested and evaluated to enable the industry sector to reach its energy efficiency targets according to the “Energy Strategy 2050” for Switzerland and to improve its competitiveness.

The **Annual Conference 2015** will provide an opportunity for all participants to discuss the potentials for energy efficiency in the process industry and to get an update about scientific highlights from the research activities.

Main topics:

- Tandem presentations on industry-relevant topics from research and industrial partners
- Poster session with scientific highlights from the work packages
- Networking lunch and apéro

We are looking forward to welcoming you in Zurich.

Research partners:

ETH zürich



Lucerne University of Applied Sciences and Arts
HOCHSCHULE LUZERN
Engineering and Architecture
FH Zentralschweiz



In cooperation with the CTI

 **Energy funding programme**
Swiss Competence Centers for Energy Research

 Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Commission for Technology and Innovation CTI

Programme

09:45	Registration and coffee
10:15	Welcome and overview of the SCCER EIP Prof. Dr. Philipp Rudolf von Rohr (ETH Zurich)
10:20	Overcoming the energy-gap in the Swiss Industry: SCCER EIP and the Swiss Energy Agency, a partnership to target the Swiss Energy Strategy 2050 Dr. Armin Eberle (EnAW) and Marina Santoro (Lucerne University of Applied Sciences and Arts)
11:00	Carbon dioxide in industrial flue gases: The challenge of enabling its capture and utilization Ermanno Filippi (Casale SA) and Prof. Dr. Marco Mazzotti (ETH Zurich)
11:40	The challenge of the application of energy efficiency measures in the industry: From a research to an industry perspective Pieder Cadruvi (Flumroc AG) and Yasmina Abdelouadoud (Lucerne University of Applied Sciences and Arts)
12:20	Networking Lunch and Poster Session
13:50	Energy efficiency as the main driver in ICT: Path-breaking solutions in the design of supercomputers and data centers Dr. Bruno Michel (IBM Research Lab Zurich) and Prof. Dr. Dimos Poulidakos (ETH Zurich)
14:30	Energy and resources efficiency methodology in petrochemical sites Prof. Dr. Greet van Eetvelde (INEOS AG) and Prof. Dr. François Maréchal (EPF Lausanne)
15:10	Summary of the Annual Conference 2015
15:15	End of conference, Apéro

Registration

Participation at the SCCER EIP Annual Conference 2015 will be free of charge. However, registration is mandatory.

Please register via the [online form](#).

Venue

ETH Zurich, AudiMax (HG F 30)
Rämistrasse 101, 8092 Zürich

Detailed information and directions: <https://www.ethz.ch/en/campus/locations/zurich-region/HG.html>

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Abstracts

Overcoming the energy-gap in the Swiss Industry: SCCER-EIP and the Swiss Energy Agency, a partnership to target the Swiss Energy Strategy 2050

Dr. Armin Eberle (EnAW) and Marina Santoro (HSLU)

If industrial energy efficiency pays, why is it not happening? Many studies indicate that although energy efficiency (EE) measures are economically viable oftentimes they are not implemented. Potential explanations of the energy-gap include market failures, modelling flaws, behavioural effects, lack of EE investments' "strategicity" and have for many years engaged researchers of different disciplines worldwide, from engineers to economists and psychologists. Yet, local political and economic forces, i.e. government and industries, need to concretize strategies and methods to achieve results: competitive, costs-effective, energy-efficiently and climate-friendly industrial production sectors.

Since 1999 the mandate of the Swiss Private Sector Energy Agency (EnAW) is to consult both Swiss firms and the Swiss government to achieve these results in compliance with international and national agreements and laws on CO₂-emission reduction. The industry-tailored programs offered by EnAW, together with the provided Energy Management System (EMS) and the guidance of the EnAW moderators, successfully complement the federally adopted CO₂ steering tax resulting in ambitious goals having been reached over the last 15 years of intense activities. The SCCER-EIP and EnAW are partners in the diffusion of best practices and lessons learned to further boost EE solutions implementation, to stay on track with the already achieved results and to face the even more demanding challenges of the Swiss Energy Strategy 2050.

Carbon dioxide in industrial flue gases: The challenge of enabling its capture and utilization

Ermanno Filippi (Casale SA) and Prof. Dr. Marco Mazzotti (ETH Zurich)

If our society is serious about tackling the climate change problem, capturing carbon dioxide from the flue gases of power plants and of industrial plants and storing it safely underground shall be a key component within a portfolio of solutions. ETH Zurich is at the forefront of research in all aspects of the so-called Carbon Capture, Utilization and Storage (CCUS) technologies. The process engineering challenges of CCUS, as well as those related to the earth sciences, will be described and discussed, together with the main lines of research at ETH Zurich that address them, particularly those aimed at reducing the energy penalty associated to CCUS.

From an industrial perspective, carbon dioxide is used in the production for instance of such important chemicals like methanol and urea. In this context, capturing it from industrial flue gases, which would otherwise be vented to the atmosphere, represents a very promising approach to improve the energy efficiency and the environmental friendliness of the relevant processes. Casale SA is worldwide leader in the synthesis of methanol and urea, among others. It will be presented and discussed how Casale SA is actively exploring innovative technological and business opportunities based on the capture and reuse of carbon dioxide.



The challenge of the application of energy efficiency measures in the industry: From a research to an industry perspective

Pieder Cadruvi (Flumroc AG) and Yasmina Abdelouadoud (Lucerne University of Applied Sciences and Arts)

Work Package 4 focuses on the development of advanced process integration techniques for the efficient use, reuse and conversion of energy in industrial processes and larger systems as well as solutions for the integration of renewable energy resources in industrial processes. Flumroc AG, located in Flums, Switzerland is an industrial partner of the SCCER EIP. Various studies have been performed by an engineering firm and the Lucerne School of Engineering and Architecture (HSLU), focusing on the production facility in Flums, where large amounts of excess heat are available and partly used for district heating purposes.

The HSLU will present the outcome of the completed PinCH analysis, which had the specific aim of increasing the process energetic efficiency, and of the Variation Study which highlighted the possible improvement of the existing excess heat recovery through the integration of a heat storage and ORC plant. This contribution will be further elaborated upon by the technical director of the facility in Flums, Pieder Cadruvi, who will give his insight on the challenges that are facing energy-intensive industries.

Energy efficiency as the main driver in ICT: Path-breaking, solutions in the design of supercomputers and data centers

Dr. Bruno Michel (IBM Research Lab Zurich) and Prof. Dr. Dimos Poulikakos (ETH Zurich)

The Information Technology (IT) industry must play a key role in the global effort to reduce carbon-dioxide emissions as it consumes ca. 2% of the world energy with a strong, demand-driven, upward trend. The IT industry already strives to digitally control and to optimize emission-intensive hardware and software processes. With computation being an important part of many public, industrial and academic institutions, it becomes essential to address the challenge of energy aware and low power high performance computing.

We will demonstrate the employment, for the first time, of an emerging processor architecture, exhibiting a higher efficiency in terms of MFlops/W, for the solution of challenging scientific problems and the harnessing of the “waste” heat that is inevitably generated as close as possible to the source with a very high temperature level. This allows for the heat to be re-used for space heating or process heat, thus replacing combustion or other process at the second user and offsetting the carbon dioxide emission by the generation of electricity. The goal is to demonstrate a high performance, low power consumption datacenter/computing operation approaching zero net emission. In addition we will present a visionary concept targeting the generation of novel integrated flow-battery designs for the simultaneous power delivery and cooling of supercomputer systems. If successful, flowing chemicals and electrochemistry will be responsible for powering computers instead of externally provided electrical power.

Energy and resources efficiency methodology in petrochemical sites

Prof. Dr. Greet van Eetvelde (INEOS AG) and Prof. Dr. François Maréchal (EPF Lausanne)

To answer the Energy Efficiency Directive, energy and resources efficiency assessment in large industrial plants is realised starting from an energy audit and leading to an energy savings roadmap. Computer aided methods are applied to systematically analyse the energy and resources usage in the processes under study. The use of process integration and exergy analysis techniques helps to identify energy savings options and make a thermo-economic analysis of the identified energy savings measures. The large scale integration and its implementation is a major challenge to allow heat recovery or efficient energy conversion and waste management between processes on the industrial sites. The practical implementation of the solutions is analysed organising the exchanges and considering the resilience of the system.

