02
Workshops

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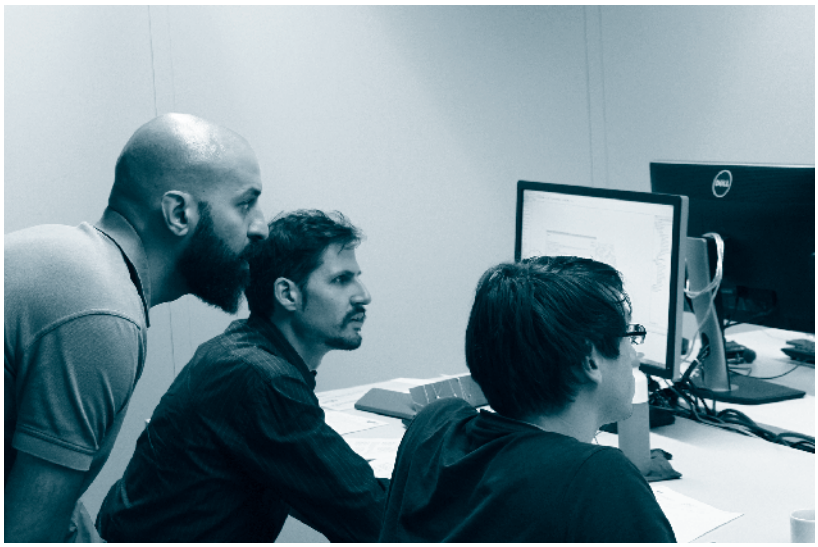

City Energy Analyst Toolbox
June 13 & 14 / 9:00 – 18:00

Description: The City Energy Analyst (CEA) is a novel computational framework for the analysis of building energy systems at neighborhood and district scales developed at ETH Zurich. The framework, which is based on ArcGIS, helps define strategies for minimizing energy intensity, carbon footprint and annual costs of energy services in an urban context.

Participants were invited to take part in the first public CEA Toolbox workshop, as part of the SBE16 conference held at ETH Zurich. The 2-day session consisted of theoretical input, as well as individual and group work. The participants came from a wide range of backgrounds from design-based disciplines (e.g. architects and urban designers) to engineering (e.g. mechanical, civil and energy systems experts and consultants) and ranging in position from PhD student to assistant professor. The workshop had a total number of 9 participants from 7 different countries in 3 continents representing 8 institutions.

Organisers: Amr Elesawy, Anja Willmann, Martin Mosteiro (ETH Zurich, Chair of Architecture and Building Systems) and Jimeno Fonseca (Future Cities Laboratory, Singapore-ETH Centre)

Review by Organisers: The workshop intended to present the tool to a diverse audience and check its role in creating synergies between various scenarios in an urban context, with the aim of reducing energy consumption and GHG emissions. It also aimed to assess the user friendliness of the tool as well as its importance in the field. The first half of the workshop consisted of an introduction to ArcGIS as the underlying software and the concept of the CEA toolbox, a theoretical input on urban energy systems, the different demand types and how they are assessed, GHG emissions and the benchmarks used for evaluating the simulation outcomes.

Afterwards, the participants were assigned a number of individual tasks to conduct their first simulations using the tool, as well as investigating the results and presenting them through various visualization techniques. Following this step, the main project of the workshop was introduced, in which 274 buildings in the center campus area of the city of Zurich were to be analyzed. The participants were organized in 3 groups and were presented a number of future scenarios for the city quarter to explore the impact of occupancy, varying climates and retrofitting existing buildings and energy sources. However, they were given flexibility to add, modify or choose new themes to work with. All simulation results were compared to the Swiss 2000-watt-society targets.

The participants demonstrated both the capability to work with the tool independently as well as expanding the proposed scenarios with considerations of urban densification and energy mixes, thus going beyond the workshop's original expectations. Following the scenario development and simulations, each group presented their results, consisting of 4 to 10 scenarios per group and 4 to 8 full simulations per participant.

At the end, participants were asked for feedback on the workshop and the toolbox itself. While the theoretical content of the workshop was generally considered adequate, a large number of participants expressed interest in a longer workshop, in which a third day could be used to analyse the calculation methods in detail. Regarding the toolbox itself, a majority of the participants rated the tool's user friendliness and their likelihood to use the tool again with 7 or more, though some participants expressed that they would like to see the tool being further developed in order to expand its usefulness and importance.

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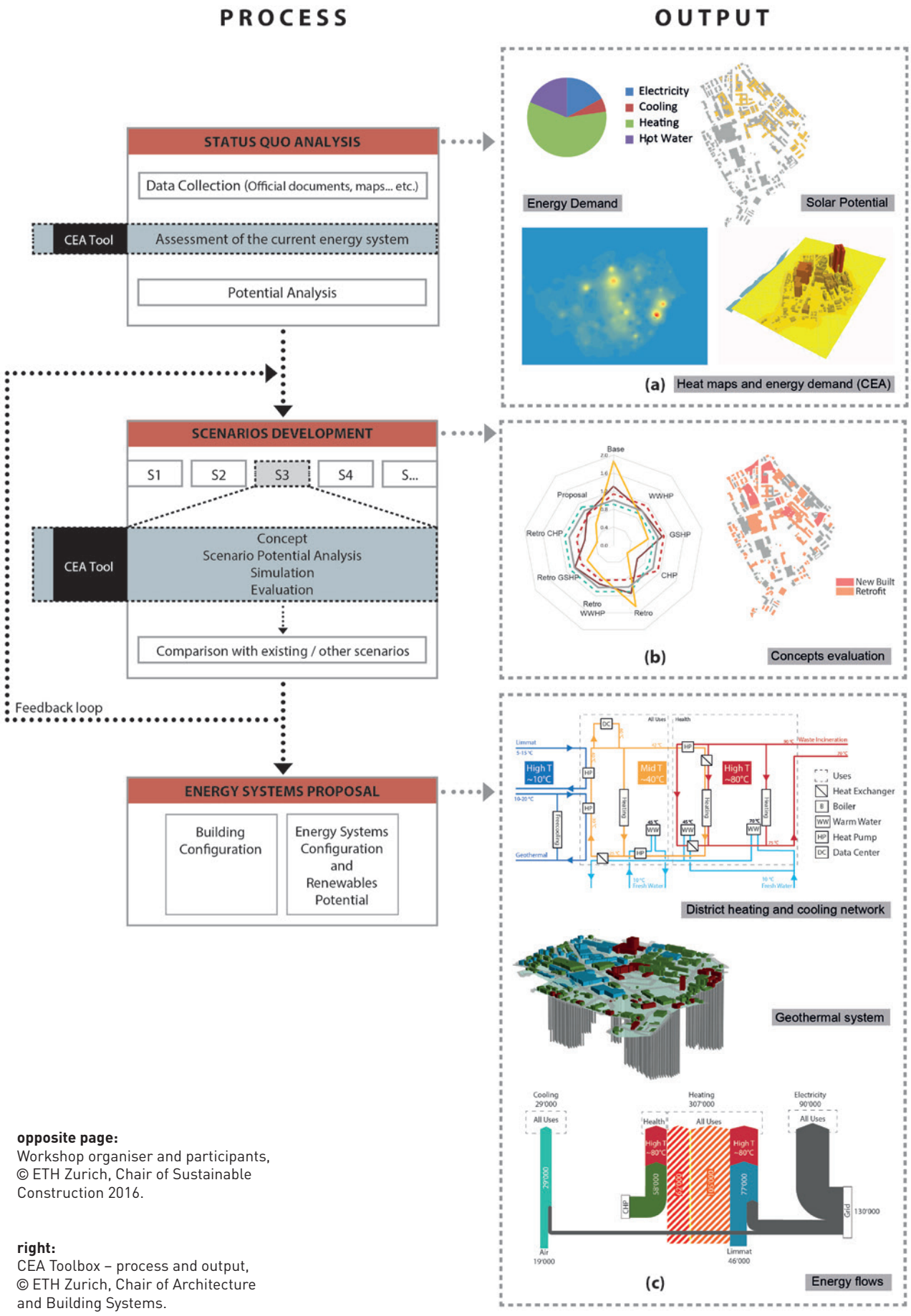

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Workshop organiser and participants,
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CEA Toolbox – process and output,
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Management Game of a Building Material Supply Chain
June 14 / 14:00 – 17:00

Description: Building material supply chains form part of the complexity of built environments. They involve multiple actors and a constant flow of material and information between them. This system dynamics management game involved a supply chain with four companies and the respective material and information flows. Participants took the role of a company and decided – based on their inventory situation and customer orders – how much to order from their suppliers. All companies had a common goal: Minimizing costs for capital in the supply chain by maintaining low stocks but managing to deliver all orders. The players experienced decision-making and coordination problems as well as the pressure that emerges from other actors and from 'the system'.

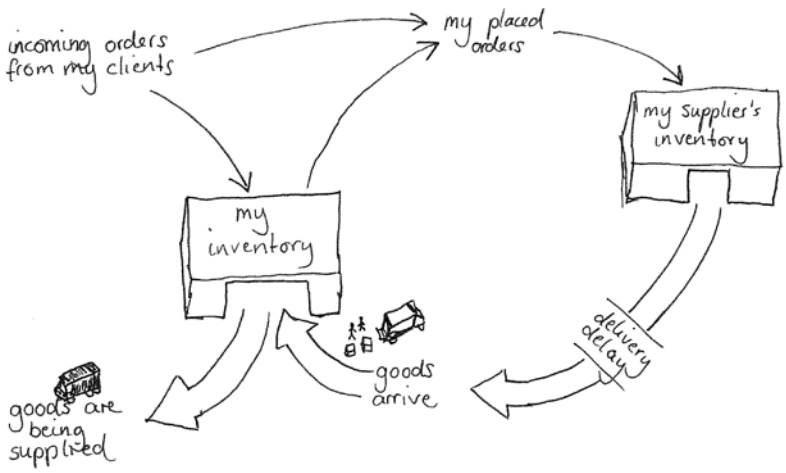
This exercise enhances general systems thinking capabilities. Players are introduced to important concepts of systems thinking and causal loop diagrams.

Organiser: Nici Zimmermann (Institute for Environmental Design and Engineering, University College London (UCL), The Bartlett)

Review by Organiser: The players experienced all the ups and downs of managing a complex supply chain. They were engaged and eager to keep their inventories within reasonable bounds, but they had to cope with backlogs of up to 100 items, caused by an increase in demand of only 4 items per week.

These difficulties are a typical outcome of this learning experience, of tool and even commodity supply chains. We used the concrete experience to discuss the structure of supply chains in general and how its information and material delays create ripple effects and the so-called 'bullwhip effect'. We also explored how we can change the underlying structure, e.g. by linking the retailer's information directly with the factory that is many kilometres and organisations apart. Then we discussed the ability of transferring insights from the very lean automotive supply chains to the housing construction context, limited e.g. through a different distribution of power across organisations and through the transient nature of project-based construction supply chains.

It was an exciting and successful workshop!



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System diagram.

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Workshop in progress,
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Sustainable Hybrid Building
June 13 / 9:00 – 19:00

Description: *A multidisciplinary approach to mixed-use buildings in small urban districts.* The demand for high density together with the demand of maintaining the diversity of services, retails, cultural facilities, and social mix raises the question whether mono-functional buildings are still adequate to provide resilient sustainable solutions for the city of tomorrow. A hybrid building combines several programs in one fabric. It could be managed by public-private partnerships and could be accessible 24/7. The workshop discussed the design of small to medium size hybrid buildings as one of the possible responses to the shortage of housing land, to reduce transport carbon dioxide and energy consumption in urban areas, to preserve resources and to reduce operating costs. Mixed-use, hybrid buildings foster integrated approaches to energy and resource efficiency.

Organisers: Paola Tosolini (HEPIA Geneva/ HES-SO University of Applied Arts and Sciences of Western Switzerland), Jessen Page (HEVS Valais-Wallis/ HES-SO), and Ricardo Lima (HEPIA/HES-SO)

Review by Organisers:
The 1-day workshop was organized in two sessions, – one including theoretical input on hybrid building design, the other with group work on a case study in Grand-Sacconex - Geneva, in a sector near the airport. Participants identified and defined synergies among different buildings programs that can improve the sustainability of the building. Reduced energy consumption, preservation of natural resources, and social cohesion are some of the issues that have been discussed.

The workshop paricipants first identified the best strategic location for the hybrid building in the Susette Sector and then sketched it by defining a program based on a multidisciplinary approach. They considered local urban needs, evaluated the potential range/degrees of interaction among program spaces, defined the thermal zoning of the building, and finally explored and combined energy demand profiles of the diverse programs in order to optimise energy efficiency and renewable energy consumption.

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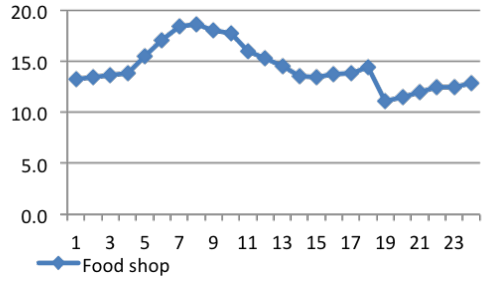

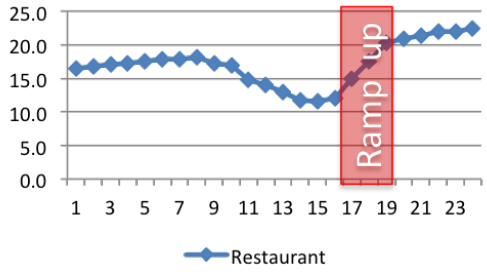

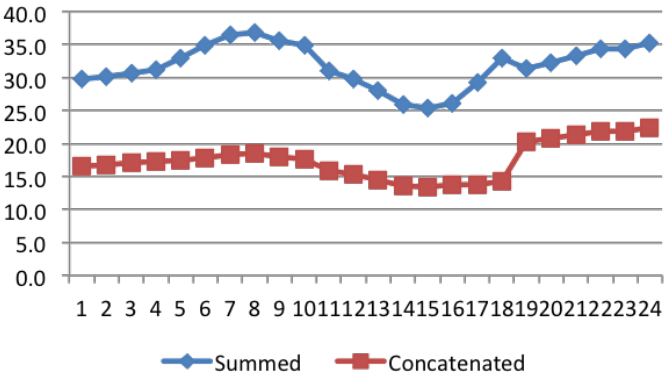

above:
More efficient use of heating/cooling systems due to concatenated demand.

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Workshop organisers and participants, © ETH Zurich, Chair of Sustainable Construction 2016.

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Sustainable Building Operation
June 14 / 15:00 – 17:00

Description: What means "sustainable operation"? Several guidelines, norms, certification schemes etc. are available for sustainable construction, but few are dealing with sustainable operation. And those who address the issue have different structures (e.g. product or process orientated), approaches (e.g. performance or qualitative orientated) and viewpoints (planner, investor etc.). This leads to the following sub questions, which were to be discussed during the workshop in order to arive at a common, further understanding of the topic:

- Which approach is useful for a description and assessment of sustainable building operation?
- What are the linking points of contact between sustainable planning and construction and sustainable operation?
- How should the different responsibilities and roles be distributed?

The workshop followed the *World Café* format – short impulse presentation by organisers, 3-4 tables for discussion (stakeholder views) with 1 moderator per table. For each sub question, the results obtained in the groups were summarized in a document, including a photo protocol which was presented at the conference.

Organisers: Carsten K. Druhmann (ZHAW – Zürcher Hochschule für Angewandte Wissenschaften, head of «FM digital», Institute of Facility Management) and Stefan Jäschke (ZHAW, Institute of Facility Management, Energy Management)

Review by Organisers: The workshop started with a brief introduction of the participants; the most represented profession was architecture. So a short introduction to Facility Management and Building Operation was given by the organisers. It was followed by an introduction to sustainable building operation, information about the pre-project *Standard Sustainable Operation Switzerland*, including an insight into existing assessment systems. This led to a lively discussion around two central topics:

- How to involve users and tenants of buildings in sustainable operation or encourage them to support it instead of counteracting sustainability optimised buildings during operation (keywords: e.g. green lease contracts, performance gap).
- The certification of FM service providers was considered, important so that companies, like certificates for sustainable buildings (e.g. SNBS, DGNB), can provide proof of meeting their sustainability goals. Sustainable building operation would be best applicable if the triad of owners, users / tenants and service providers works.

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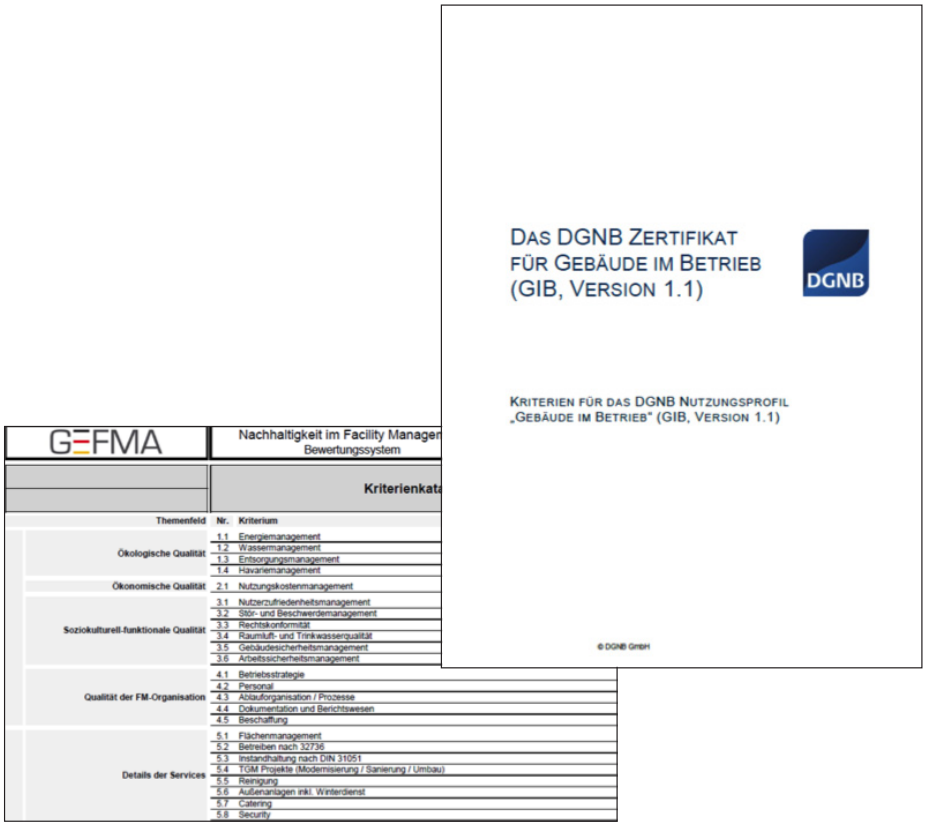

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Building operation manuals and certificates.

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