

ETH-NSSI

From visions to action

Novel approach to linking energy visions with energy scenarios
and assessing the consequences



Lack of a strategic, integrative perspective in local energy planning

Current energy systems in towns, cities and regions are challenged by high and fluctuating energy prices, concerns about supply security, and pressure to mitigate greenhouse gas emissions. Multiple options for energy-use efficiency improvements and energy supply are available as a response to these challenges. However, these options are rarely reflected from a strategic, integrative perspective. Even if a strategic discussion is initiated, it often appears on a visionary level, e.g. an energy self-sufficient, 2000-Watt or 1 ton CO₂ energy system is aspired to.

Such visions are meaningful, but incomplete guides for action. For wise decisions, energy visions need to be complemented with analytical knowledge about available resources and technologies, about technically feasible portfolios and their potential consequences.

Novel approach

A novel methodology (Fig.1) facilitates the envisioning process and then 'translates' visions into energy scenarios (portfolios), which show options in implementing these visions. The whole spectrum of technically feasible scenarios is scanned in

order to understand the various options. The consequences of the visions and the implementation options are then appraised by, e.g., stakeholder-based multi-criteria assessment or other methods. The preferences of the relevant stakeholders and the public can be integrated in the envisioning process, scenario construction and assessment.

Why is this approach useful?

The envisioning process with the relevant stakeholders stimulates strategic, integrative discussion about the future energy system. The feasibility of the visions, the essential and optional decisions required for implementation, and the potential consequences can then be assessed analytically. The latter information probably leads to an iterative process because several visions can be compared with each other, revised and the final vision agreed on. In the end, the optimal and acceptable ways to implement the final vision can be identified.

Possible applications

- Towns, cities, regions;
- Electricity, heat and mobility sectors (separately or jointly);
- Especially suitable for stakeholder involvement.

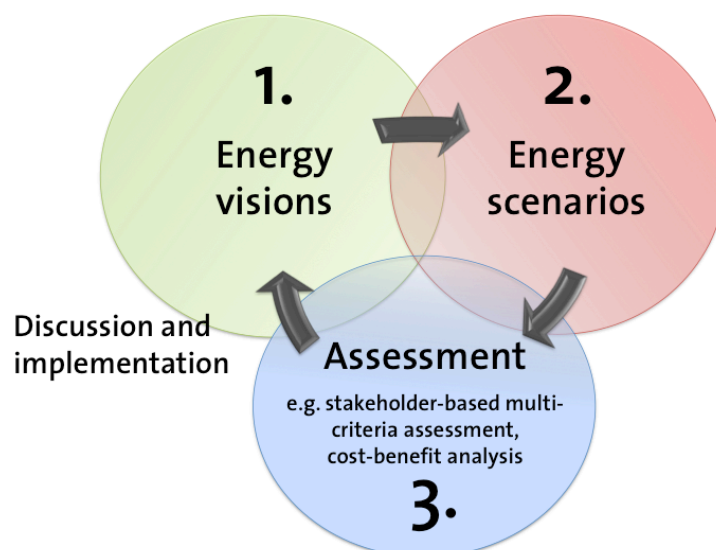


Fig. 1. Methodology

Example of application: Energy visions in the small community of Urnäsch

Urnäsch is a rural, pre-alpine community with around 2300 inhabitants in the Swiss canton of Appenzell Auser Rhoden. In 2009, the transdisciplinary case study was conducted there by the ETH Zürich team as part of the CCES project ClimPol. This study dealt with potential strategies for Urnäsch to improve its heat and electricity sectors in the next 25 years.

In total, six energy visions were elicited from the relevant decision makers, stakeholders and academics. For example, the "Energy independence" vision aimed to supply the community's annual energy demand using local resources. The "Efficient supply" vision aimed to reduce the life-cycle use of primary energy and to prepare the community to become part of the 2000-Watt society.

After detailed evaluation of the energy demand, efficiency improvement measures, local energy resources and related technologies, a number of energy scenarios were constructed for each vision (Fig. 2). Analysis of these scenarios reveals the prerequisites and options for implementation of the visions. For example, given the current state of technology, the "Energy independence" vision in Urnäsch requires at least 3 wind power plants.

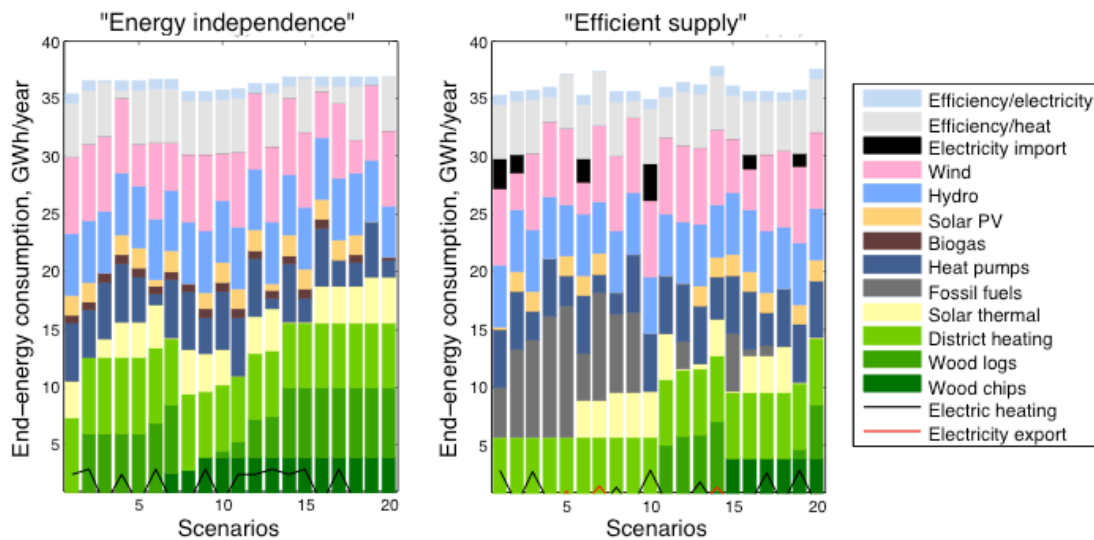


Fig. 2. Energy scenarios for the visions of "Energy independence" and "Efficient supply" in Urnäsch

The consequences of the different visions were then appraised by stakeholder-based multi-criteria assessment. The criteria-by-criteria performance of the "Energy independence" and "Efficient supply" visions is shown in Fig. 3.

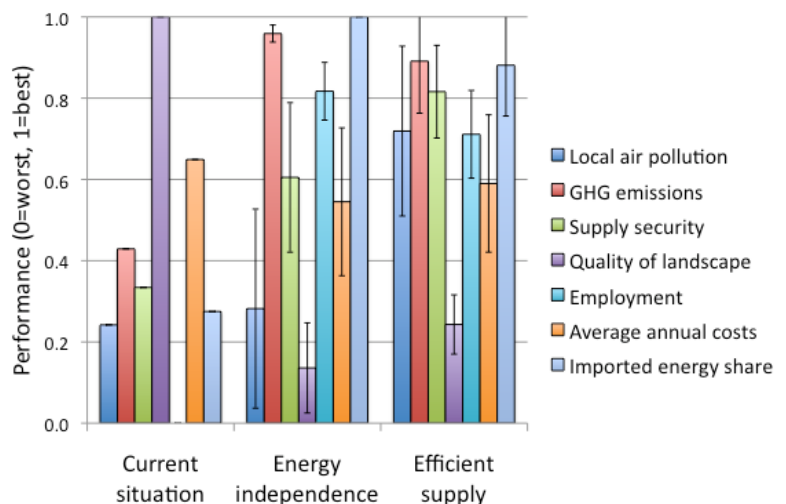


Fig. 3. Criteria-by-criteria assessment

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