

Smart-meter based energy advice-system for households on a software basis

Power supply based on renewable energies can be supported by adaptive households: due to the temporally fluctuating feed-in from renewable energy, households should be integrated in the stabilization of the power supply. We developed a software-based consulting tool as prototype that helps to realize both, energy reduction and adaptation to the current feed on the basis of household processes.

Objectives and Methods

The objective of this project was to clarify prospects of the mission statement "adaptive households" in terms of its technical as well as behavioral and household-managerial consequences in a combined social science and computer science-based access. It is assumed that the hitherto often unreflective use of electrical energy in households must convert in favor of a reflected, "smart" electricity consumption. To this end, a direct reference should be made to housekeeping tasks based on smart-meter technologies. This approach goes for a solution beyond popular device-specific consumption information-systems which lead predominant to efficiency-optimization (i.e. by substituting devices with energy-saving). Sufficiency and consistency in adaptation often needs a rearrangement of household processes (or a waiving of specific services).

Detecting home appliances and services

The challenge is to detect household processes by interpreting traits of current and to formulate alternatives of service production in households. Different devices produce different performance changes with which they can be basically distinguished. The automatic assignment of such switching events to devices or device groups requires a classification method i.e. based on artificial neural networks.

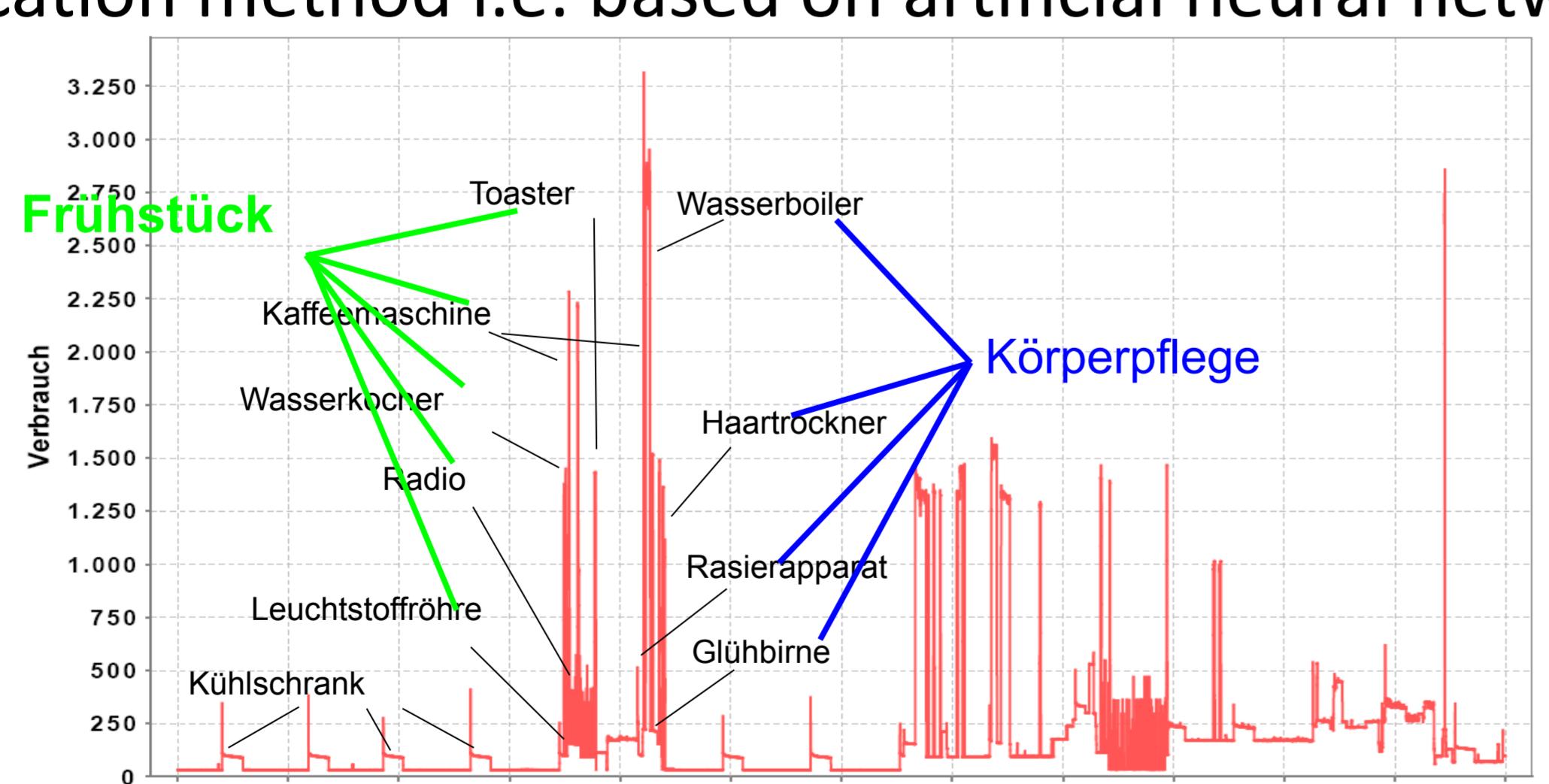


Figure 1: Device detection and mapping of household services

Literatur

Raabe, T., Sonnenschein, M., Beenken, P., Hüwel, A., Meinecke, C. (2012): Energieberatung in Haushalten auf Basis des Smartmetering. In: Ökologisches Wirtschaften 1, S. 46-50

The software-based consulting tool

By linking concrete actions with each resulting power consumption promises to achieve the greatest success of adaptation (eg Ueno et al. 2006). An intuitive user interface was designed to visualize current consumption and provide alternative options for the underlying household-processes in a specific and flexible way (Fig. 2).

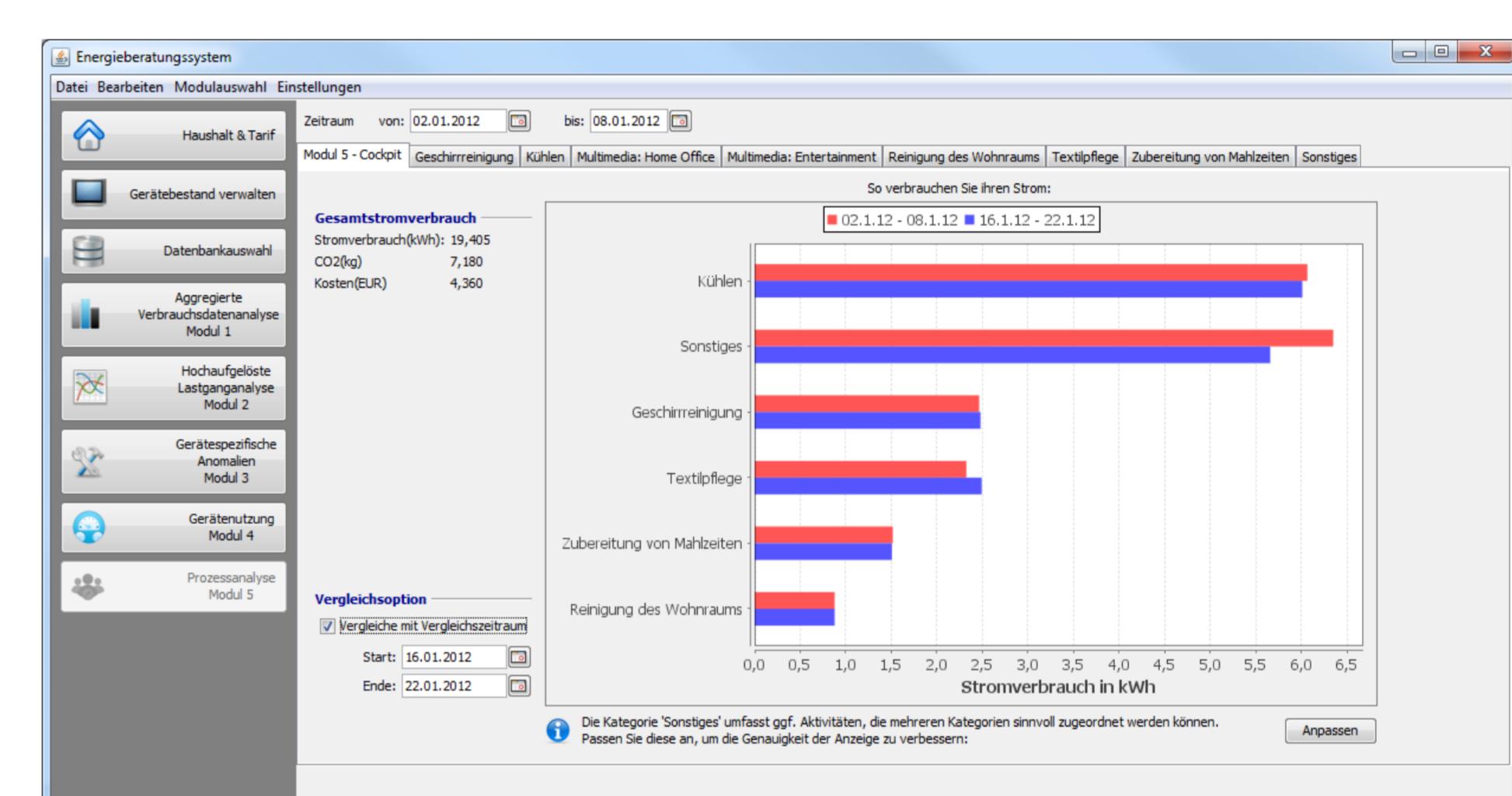


Figure 2: Design of the software-user interface

Conclusions

The project revealed the possibility of promoting the vision of adaptive household by smart-meter-based technologies. There remain a number of methodological problems as in the isolation of in time overlapping household processes, which still requires considerable research effort. Also central issues of data protection must be considered to ensure a successful implementation.

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Further Research Topics

- Cultural approaches to sustainability research (alimentary cultures)
- Sharing Concepts (Carsharing outside agglomerations)
- Sustainability brand culture
- Resilience in socio-technical systems