

# Chapter 1

## The KEES Project: Energy Efficiency in a Deregulated Market

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### 1.1 Executive summary

The energy and utility industry is facing major changes. The market is liberalized and deregulated, customers get a free choice of supplier, and the rapid progress in information technology (IT) creates new service opportunities in customer homes and offices.

Matters of energy savings and energy system efficiency continue to be important. But the ongoing market and technology changes have a profound impact on how these matters will be shaped in the near future. What is the potential for energy savings and efficiency, not in a monopolistic regional market, but in a competitive international market? How is this affected by the growing IT capabilities in homes and even appliances, connected through worldwide communication networks? How will customers use their increased freedom of choice for making decisions about their energy supplier, about using new technology and services that appear on the market, about energy saving activities?

These questions have been at the heart of the KEES project, the results of which are reported in this book. The KEES project has been carried out in the period January-September 1999 under the supervision of EnerSearch AB (Malmö, Sweden) as part of its international *IT in Energy* R&D programme, and it received financial support from DESS (the Delegation for Energy Supply in South of Sweden), SITI (the Swedish IT Institute), and EnerSearch AB.

The aim of the KEES project has been *to study the potential for energy savings and services especially in a liberalized market environment*, taking into account the many new *market as well as technology changes in the energy and IT sectors*. The focus region chosen for the study is Karlshamn Kommun, a municipality in South Sweden's Blekinge County. In Karlshamn we find a mix of energy users ranging from households, small businesses, service companies, up to large industries, and several competing suppliers, energy producers, and network companies are active in the region. Thus, the total energy and IT infrastructure system of the Karlshamn region has been studied, as a model for a municipality in a deregulated market environment in general. Hence the name of the project, KEES: **K**arlshamn **E**nergy **E**fficient **S**ystem.

The KEES project has been a multidisciplinary investigation, conducted as a collaboration of different university research departments and disciplines. The overall project structure was designed to find answers to the following questions:

1. *What are the impacts of the recent market and technology trends upon the energy sector:*
  - *as seen from the perspective of the customer and market interest in energy saving activities and services.* This market study was carried out by the Business Administration department of Lund University (LU), led by Dr. Rikard Larsson, in cooperation with the University of Southern California, Prof. Michael Driver.
  - *investigating the new IT capabilities enabled by “smart home” technology.* This study was performed by the University of Karlskrona/Ronneby, Department of Software Engineering and Computer Science (HKR-IPD, Ronneby), led by Prof. Rune Gustavsson.
  - *looking at the associated new possibilities for energy management in buildings.* This part of the study was done by the Institute for the Built Environment (KTH-BMG, Gävle) of the Royal Institute of Technology, led by Prof. Urban Norlén.
2. *What can be achieved in energy efficiency and savings in the total energy system now and in the future, given these technology and market trends?* This study was performed by Linköping University (LiTH), Department of Mechanical Engineering, Division of Energy Systems, led by Prof. Björn Karlsson.
3. *How should proposed energy efficiency and saving measures be practically implemented in available and emerging IT infrastructure?* This study was done by the Royal Institute of Technology, Department of Industrial Control Systems (KTH-ICS, Stockholm), led by Prof. Torsten Cegrell.

The overall KEES project management was in the hands of EnerSearch AB, with Prof. Hans Akkermans as project director, and Prof. Hans Ottosson as chairman of the Steering Committee.

For the KEES project, a Steering Committee has been formed whose role it was to oversee the progress of the project. The members of the KEES Steering Committee are:

- Hans-Inge Bengtsson and Krister Karlsson, Karlshamn Energi AB;
- Lennart Fredenberg, Sydkraft AB;
- Sune Ehring, Berg- & MarkTeknik;
- Lars Elmberg, EC-Gruppen;
- Peter Enckel, from the Karlshamn newspaper Commersen;
- Anders Wiberg and Anders Johansson, on behalf of Karlshamn Kommun;
- Hans Ottosson, EnerSearch AB, chairman.

The Steering Committee has met four times at the milestones in the course of the KEES project. During the meetings the project team reported on the progress and deliverables produced in the project, and the ensuing discussions with and feedback by the Steering Committee have been

instrumental in guiding and managing the project. Also, some live demonstrations of smart home technology were shown to the Steering Committee, given by spin-off companies formed partly as a result of EnerSearch project. The broad composition of the Steering Committee reflects the broad set of issues that have to be tackled in this area, and it has enabled the project team to review the research results from many different angles.

The interest of the Steering Committee in the theme of the KEES project showed to be strong as well as multi-faceted, but, according to a separate study by KTH-ICS, the shared top interests are: (1) Get a better understanding and knowledge concerning the IT and energy market and technology issues involved, and (2) Spur new developments in this subject area, especially in the region. We thank the members of the Steering Committee for their active participation, feedback, and encouragement throughout the KEES project.

This book presents the final results of the KEES project. Chapter 2 shows the potential for energy savings and efficiency in a deregulated environment, based on the total energy system simulations done by LiTH. Chapter 3 describes the LU market investigation results, providing empirical data and analyses of the (significant) customer interest in energy saving activities and services, and offering some indications how this market can be segmented for the sake of new business activities. Chapter 4, by KTH-ICS, analyzes what the IT infrastructure capabilities in the region are to provide local access for new IT-in-energy value added services. Chapter 5 gives an overview of current IT developments in networked smart building technology, and reports on the experiences from field tests and application projects carried out at HKR-IPD. Chapter 6 continues this with a description of the “Energy Barometer”, an application recently launched by KTH-BMG exemplifying the new avenues for energy management in buildings opened up by IT in energy. Chapter 7 then integrates the findings from the various subproject studies in Chapters 2-6, and subsequently lays down practical implementation recommendations from KTH-ICS’s systems engineering perspective. The concluding Chapter 8, by EnerSearch AB, summarizes the key conclusions from the KEES study, and points to the directions where future investigations should be headed.

We have produced this book as a help in disseminating the *IT in Energy* knowledge we have built up over the years. As this area concerns a worldwide development in which many fields are involved, there is a clear need for mechanisms giving fast and simple access to the collected knowledge. As a further help, the interested reader will find contact addresses of all authors and groups at the end of this book. In addition, you may turn to our website <http://www.enersearch.se/>. This website is now gradually expanded so as to become a central site (or in web jargon, the “portal”) for the worldwide developments in advanced IT applied to the deregulated energy market sector. Here, you will find many more information sources and links to the fast and exciting developments of IT in Energy.