"ReMo Green" -
A new way of developing Standard Environmental Software

Andrea Meyer

Abstract
The introduction and application of energy efficiency systems and their methods according to the DIn EN ISO 50001 standard is still inhibited by many different factors in small and medium sized enterprises. Firstly, it is a lack of monetary resources in most cases. That includes asset costs as well as costs for particularly educated employees and all follow-up costs such as support, further developed software versions and updates. A SME cannot act and invest like one of the bigger enterprises or a concern - that is a fact. Secondly inhibiting is the already established structure of processes and working resources that have to be broken trough. That means an alteration at least or even a total change of business flows. It can only be handled by an optimally skilled management base, which is unfortunately hard to be found in SME. Different researches and analyses have shown that. All that implies, that well developed IT-solutions have to be brought right to this point. Well developed means, there has to be a comprehensive research about the special needs of SME and further collaboration with these companies while developing an IT-based tool for energy efficiency support, that can be offered and established as an optimal standard environmental software tool which is developed and improved by their own users. The advantage of providing standard software instead of individually developed solutions is clearly and mainly a factor of costs. Ready made software products are mostly cheaper, because they do not run through a long and complex developing process which demands consideration and decision from experts and users within the enterprise. But its still a question of the viewpoint. Individual software on the other hand has an high customize level which means that it does not keep a heavy overload of unnecessary functionality thats useless, expensive and disturbing for most users. There has to be found a middle ground between those two approaches. „ReMo Green“ is taking care of all of the points above and expands it with one simple, but important component - the enterprise itself.

1. Introduction
All companies are asked to do their contribution in environmental matters to stop or slow down environmental pollution and the beginning shortage of resources. Further reasons is safeguarding all legal compliance issues such as effective law, obligations and other official orders. Another reason is a risen interest of clients and other stakeholders, who prefer to choose their suppliers and products by ecological viewpoints. Missing transparency and a lack of information often means a lost of faith nowadays. Finally there is a good possibility to save taxes when a company decides to introduce an environmental management system or, and thats just fixed by the German Federal Government, to apply an energy management system. That fact is most important for small and medium sized enterprises (SME) in Germany - about 99,5% of all companies here. They are heavily influencing the energy situation, but energy saving or even the application of an energy management system is still not on schedule. There are many reasons for the lack of interest and investment in environmental and especially energy related issues in SMEs in Germany. The biggest factor is of course is the lack of a proper investment base. In SMEs theres almost no monetary resource to apply any changes of the daily routine of the company or even to make bigger investments such as environmental and especially energy efficiency technologies and methods and the resulting savings are mostly not obvious and almost not considered (Theres an average cost saving of up to 20% possible in SMEs).

IMBC GmbH, Institut für Informationsmanagement, Chausseestraße 84, 10115 Berlin (Germany);
email: andrea.meyer@imbc.de, internet: www.imbc.de
Another barrier is the lack of human resources and educated personnel. Due to the usually low number of employees in SMEs it is rather difficult and rare to find well educated environmental managers or even someone who has distinguished knowledge about environmental management methods or energy saving potentials. SMEs see the application of environmental methods as an unbridgeable kind of effort - mostly not knowing about that big amount of environmental management tools and informations systems for effective IT-based assistance. With standard software its possible to simplify tasks and to get a clearer overview about all processes in the company.

The way of applying software especially in SMEs is still a complex and difficult procedure. First it means an investment and when the newly introduced software is not showing its full potential, it mostly stem from the fact that there’s a lack of employee training and support. Not unusual that software tools are over dimensioned because it tries to cover every seldom case in business flow and also tries to be valid for most branches and scenarios. That’s usually unnecessary and expensive and a point where individual software may be an alternative.

2. **Standard Software vs. Individual Software**

Individual software is cheaper when its about support and documentation because those applications mostly run on a limited number of desktops. Another advantage is a lower grade of standardization. That means only the needed functionality is included and only one specific hardware environment needs to be considered. Also points of bug fixing and licensing of individual software are considered as cheaper than standard software. Facts like almost not existing marketing costs and that kind of closer connection between client and contractor influence the software price in the end. Beside the cost factor, individual software is highly customizable, means adjustable to any needed case in a company. Standard software is limited to a specific environment and not as flexible when its about changes like individual software.

Though, the big advantage of standard software is its widely spreading and an usability know-how included with that. Its also known as the product with a higher quality, because a whole team of mathematicians, designers and communication experts took part in the developing process. That also means that there are many tested and improved versions and a lot of experience as well as a whole community in case of support. That counterparts with the fact that standard software is still no 100% solution, because something is always missing or just keeps a heavy overload of functions that will never be used. Companies that introduce standard software are totally reliant on the software developer. Theres no flexibility unless its been decided to add or delete features. Also straining is the whole process of searching, finding and choosing, introducing and working with the new standard software. Individual software on the other hand can be customized in any way not to meet those issues.

That shows that the best case of introducing software in a company is to take the middle way. To offer something that is tuned on the needs of a company or at least a branch with same processes and work flow, a software thats additionally extendable by modules. But most important is a long term gradual increase toward the software need, functionality and usability - reached trough involvement by the user themselves at most starting at the software development process. Thats what the project „ReMo Green“ does.

3. **ReMo Green - Energy Efficiency for Berlin-based SMEs**

Missing awareness of environmental issues and their solution of SMEs on the one hand and the problem to introduce SMEs to the right software product to support their tasks and to find a middle way between standard and individual software is a particular project of „ReMo Green“. ReMo means reference model and is meant to find a standardized base of developing software together with the companies and experts
from universities and appropriate business departments that is valid for a particular number of companies
within a particular branch. Around that task its planned to build a whole corporate network with the goal
of getting those companies engaged in energy efficiency methods.

The former mentioned energy efficiency network is different than most established networks of that kind.
Where conventional networks reduce their collaboration just by pure energy consulting, ReMo Green goes
farer. Within the project its also important to show companies the effects of efficient software for energy
controlling and to identify energy leaks in their production processes and facilities by measuring and
analyzing. It is also planned to apply comprehensive trainings to create a more sensitive awareness for
environmental and energy issues.

4. Reference Models for Energy Controlling

Most companies are less versed when its about their energy consumption. They barely know their energy
bills, but cannot derive where energy dissipates and what is a propitiate level of energy consumption.
Thats why it is important to give companies a tool, that makes it easy to manage (record, organize, analyze) all energy data, just like master data, results of measurements and also reports and related invoices. The approach realizing this software based on a reference model is explained through the fact that the final product preferably can be adapted to many branches with only minor changes.

Developing the reference model and the software is described in several phases. Each of them will end with a fully functional module of the software and can be used right away. That ensures that all companies find their way in using the software from the beginning. First phase is like an initial step where all companies have to be visited for the first time to collect all needed initial data such as identical facts like size of the company, number of employees, location and technical environment. Members of the network will be able to view their own profile data with all collected information and later with the analysis results.

Phase 1 is also the first step of creating the reference model. While visiting all the network companies it is planned to get all necessary information for the current state analysis which is a base for the needed typification. The second phase is the visual inspection of invoices and all other related reports in the companies to abstract the needed information as a pool of data that also important for typification and goal structuring. At this point first decisions about the reference data model respectively the indicator system can be made. The third step is to determine the actual state in the companies by detailed measuring right at the machines and facilities. That shall be the last component to create a final reference data model and to make conclusions about the structure of the energy controlling tool.

5. Software Development Collaboration

Once a base of data is established, the software development process can be initiated. Planned is a collaboration on that with all network members so the software gets on a high usability level and gains more relevance to its users. The three energy efficiency networks are separated by three different relevant local branches. That's the printing business on one hand, the metal working branch and a network with process oriented enterprises preferably from the chemical industry such as pharmaceutical products and cosmetics on the other. It is planned to hold regular network meet-ups where the problem and the idea will be introduced. Different workshops, interviews and questionnaires will help to determine problems with software application, introduction and usability in general.

While working with the network it is planned to successively build a prototype of the application. Successively, because the order of developing the reference model and determining the companies data needs to be kept and will be applied step-wise too. That ensures a slower and deeper approach with the project and an optimal familiarization and sensitization for the network members. So the first phase here is going to be a network management application where every member keeps its personal profile with

Figure 2
Procedure of Reference Model Data Type Construction
identical facts as well as all the data determined in the first visit. That construct serves as an initial network management tool where all data will be kept. A second step is to bring functionality and a appropriate data structure based on the first collection of data such as invoices and other reports.

At this point companies are able to get aware of their energy consumption and the connected costs from the last 2 years. It is planned to get those results evaluated by experts to give a more detailed insight in impacts and monetary effects of energy consumption for members of the network. The next step is to structure and add all data to show the results of the internal measuring related to a specific concept of measuring that was developed before. After that, the functionality of adding data from energy meters will be activated. Network members are now responsible to insert data on their own.

Figure 2
„ReMo Green“ Collaboration and Software Development Process

At this point they have to be aware of the benefit of a platform like this. The recording of energy data needs to be continued permanently. The whole process of planning, developing and introducing the software will be constantly evaluated, by experts and the network member companies. As a fourth step it is possible to add a smart meter functionality to the software so the manual recording of data will not
apply anymore. That kind of add-on requires investments from the partners and its rather an optional task. It can be realized as kind of pilot project within „ReMo Green“ to show off its effects.

6. Reference Technology Platform

Within ReMo Green it is planned to increase the awareness of energy consumption for SMEs. That can be done by trainings on one hand but also through practically application on the other. Part of the project is also a reference technology platform - a collection of state-of-the-art methods, technologies and management tools to support in-company energy efficiency. It is planned to connect this platform to the software functionality. This way the software and a database behind stores all previously determined energy indicators from the enterprises such as total energy consumption, specific energy consumption, energy carrier proportions, typical branch energy indicators and many more. To give a better overview these indicators have a specific given value that marks an optimum of energy consumption. Once that given value is exceeded the user will be warned.

Though, due to low capacities and resources in SMEs it can’t be enough just to warn the user in case of exceedance. There has to be a guide to lead the user through this process and give advices on how to lower the value of specific indicators. That’s where the reference technology platform sets in. It provides, beside the actual message of exceeding, further information about the consequences (monetary or environmentally) of this state and also provides methods and matching technologies to lower that specific value again. That ensures that users get a tool that goes beyond bare monitoring and provides methods to get in action.

7. Conclusions and Outlook

This article describes the project ReMo Green and especially the software developing component from an early point of view. It shows the different steps of developing an energy controlling software in collaboration with Berlin-based SMEs. The project „ReMo Green“ is way to motivate small and medium sized Berlin-based enterprises to do their part in energy efficiency and to pioneer the whole process of developing branch-oriented software. At the end of the project stands a comprehensive and optimized software product that will be made available for all network members for free as well as a matching reference model for adaption to other branches.

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