

CAS in energy management: an innovative continuing education program as a tool to market transformation

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Abstract

Energy management can be defined as effectuating organizational, technical and human actions in order to improve an organization's energy performance. Since June 2011, the new ISO 50001 norm has provided a framework for requirement for establishing, maintaining and improving an energy management system.

One major aim of the new University of Geneva continuing education program, the Certificate of Advanced Studies (CAS) in energy management (whose 2nd edition will start in January 2014), is to teach its candidates (mostly professionals with a technical profile active in the field of energy) how to implement an ISO 50001 energy management system in organizations. However, another possibly even more important aim of the program is to produce professionals with strong marketing capabilities, able to more successfully sell energy-efficiency projects.

In order to achieve this aim, the unique features of the CAS in energy management are the following:

- Integrating organizational, human and technical aspects of energy management.
- Teaching techniques designed to influence individual and organizational behavior and decision-making (change management, negotiation).

- Teaching the (basics of) principal tools of business management: strategy, risk management, corporate finance, project management.
- Teaching a conceptual framework designed to include the non-energy benefits of energy-efficiency in energy-performance projects and investment calculations.
- Using a new pedagogical tool to help the candidates to integrate and apply the methods and concepts taught: the serious game.

Based on these characteristics and content, this new program not only helps to build a standard for energy professionals but also represents a new tool to overcome the barriers to energy-efficiency in organizations and to transform the market towards more sustainable energy use.

The aim of the present paper is to describe the program and its market transformation potential in further detail.

Introduction

Research has shown that organizational and human barriers¹ play an important role in preventing or slowing energy performance improvements in organizations (Cooremans, 2011,

1. "A barrier is a postulated mechanism that inhibits investment in technologies that are both energy efficient and (apparently) economically efficient" (Sorrell, *et al.*, 2000:11).

2012 a, 2012b).² On the organizational side, barriers include the following factors: energy is not easily visible, in physical terms and also in managerial terms; energy-efficiency investments are perceived as non-strategic and therefore they lose the competition for human and financial resources; energy management level is often very low; energy managers (and, more generally managers responsible for physical resources) have less power compared with the three “heavily-weighted” departments (finance, marketing, and sales and production). On the human side, the most important barrier is the fact that energy managers (or, more generally, engineers trying to promote energy-efficiency projects in organizations) lack the management skills and languages needed to drive positive decisions on energy-efficiency projects by powerful non-energy managers.

These barriers explain why even highly cost-effective projects often remain undecided by profit-seeking companies. Energy management offers a way to overcome this situation, as it creates a favorable internal context to energy-efficiency measures and investments in companies. Still, energy management is low in many large energy consumers and there is a lack of professionals in the field.

Based on this context, in 2011, Université de Genève decided to launch a new continuing education program in energy management. This program would be located, at least during the first stage, on the lower level of the harmonized European continuing education scheme, *i.e.* a Certificate of Advanced Studies (CAS) corresponding to 15 ECTS credits.

This paper is organized as follows: its first part describes the most important features of the CAS in energy management. The second part briefly describes the lessons drawn during the first edition, the prospects for the second edition and some further developments of energy management teaching in Switzerland.

In conclusion, we briefly emphasize the market transformation potential of the CAS in Energy Management.

Description of the CAS in Energy Management

The Certificate of advanced studies³ in Energy management was formally approved by the Université de Genève in June 2012, concluding a lengthy approval process through several layers of hierarchy. Within the Université de Genève, the program is under the double authority of the Faculty of sciences and the Institute for environmental sciences.

The program comprises six teaching modules, corresponding to 170 hours of teaching. The theme of each module is the following:

- Module 1. Energy and management: basic notions and issues at stake.
- Module 2. Managing projects and driving change.
- Module 3. Assessing energy performance and defining an action plan.
- Module 4. Strategic and financial approaches of energy-efficiency projects.
- Module 5. “Learning by doing”.
- Module 6. End of studies work.

Time spent on homework is about 280 hours, of which 140 hours are dedicated to the end of studies work, a 50–80 page document which must be written on a subject agreed on with the program director before starting.

The program aims at working adults with at least three years of professional experience, a university or high school degree, or with a lot of professional experience compensating for a lower academic degree. The maximum number of candidates admissible per year is twenty-five. Energy courses are given by specialized academics and professional experts; management courses are given by business school professors. The program fee is CHF 7,800 (which is equivalent to about €6,250).

The program aims to educate adults working in the field of energy, mainly on the demand side, as employees of user companies or as consultants advising these companies, or adults wishing to convert their professional experience to be able to work in this field. The program fees may be paid by employers or by the employees themselves. Two unemployed people registered in each of the 2013 and 2014 editions.

The CAS in energy management is officially recommended by the Federal Office of Energy (FOE) and by Cantons of Geneva and Vaud. Other active partners support the program: the local Geneva utility, Services Industriels de Genève (SIG), the Swiss Society of Engineers and Architects (SIA) and HEIG-VD (Haute Ecole d’Ingénierie et de gestion du canton de Vaud). We have established solid contact with International Standard Organization (ISO, located in Geneva), whose Marketing and Communication Director (Mr Nicolas Fleury) made a presentation at the introductory course and a speech at the diploma ceremony.

MAIN FEATURES

The CAS in energy management’s most important features are briefly described in the following sections. These features, individually and collectively, make the program unique compared to other education programs in Switzerland and in Europe (and probably elsewhere, but we did not make an extensive survey outside Europe).

Integrating organizational, human and technical aspects of energy management.

Energy management is not a concept with a single general accepted meaning. In the field of energy use, energy management is often defined around the concept of “energy measurement.” The following Wikipedia definition reflects this dominant view: “an energy management system (EMS) is a system of computer-aided tools used by operators of electric utility grids to monitor, control, and optimize the performance of the generation

2. As the researcher having developed the conceptual framework described above, I was commissioned by University of Geneva to develop the program content. In a second step, I have been hired by the University of Geneva as a co-director of the program, in which I also teach investment choices (the basics of capital budgeting analysis) and the myths and realities of investment decision-making (strategic and cognitive approaches).

3. European Credits Transfer and Accumulation System (ECTS) aim at making programs and the performance of students of higher education more transparent and comparable European-wide and to replace or complement the different local (national) standards within Europe. By completing a course, seminar, module etc., a student gets awarded with ECTS-credit points. Every ECTS credit point stands for a certain amount of work load: at Université de Genève one credit corresponds to 25–30 hours of academic work for a student. Typically, one full-time year corresponds to 60 ECTS-credits. <http://www.unige.ch/formev/Archives/bologne/ects.html>

and/or transmission system ... Energy management systems are also often commonly used by individual commercial entities to monitor, measure, and control their electrical building loads. Energy management systems can be used to centrally control devices like HVAC units and lighting systems across multiple locations, such as retail, grocery and restaurant sites. Energy management systems can also provide metering, sub-metering, and monitoring functions that allow facility and building managers to gather data and insight that allows them to make more informed decisions about energy activities across their sites.”⁴ In 2011 the norm ISO 50001 Energy Management Systems (full name: ISO 50001:2011, Energy management systems – Requirements with guidance for use), a specification created by the International Organization for Standardization (ISO), enlarged the definition of energy management. It provides “public and private sector organizations with management strategies to increase energy efficiency, reduce costs and improve energy performance. The standard is intended to provide organizations with a recognized framework for integrating energy performance into their management practices”⁵ and to follow a systematic approach in achieving continual improvement of energy performance. The CAS in Energy management, although it refers to the ISO 50001 methodology in several courses, has adopted an even broader definition of energy management as “the process of organizational, technical or economical actions enabling organizations to use energy in a more efficient way and to reduce energy consumption in a profitable way.”

The program considers energy management as a kind of yearly project management, continued several years, until it gets the ISO 50001 certification. For instance, first year would be dedicated to 1) kick-off (energy policy, and energy management team), 2) assessment of your organization's energy performance and 3) conception/planning of the first action plan. Second year would be dedicated to implementing the first action plan and to improving global energy management. Third year would be dedicated to reviewing the first action plan and implementing the second action plan (if any). At the end of each year, progresses are evaluated and goals are adjusted.

There are many continuing education programs teaching energy management in Europe. Most of them reflect the still dominant technical approach to energy management. On the contrary, the CAS in energy management adopts a tri-dimensional approach by teaching, throughout the entire program, the human, organizational and technical aspects of energy use and energy performance.

Teaching techniques designed to influence individual and organizational behavior and decision-making (change management, negotiation)

The human dimension of energy use is crucial. Not only because of the influence individual behavior has on energy consumption, but also because people buy-in is indispensable to ensure successful implementation of energy management action plans.

Module 2 focuses on the human dimension of energy management by teaching the candidates how to always take into account, in their action and communication plans, people and their particular mind-sets and cognitive filters. Two days of module 2 are dedicated to change management and negotiation basics. The importance of the human dimension and of the necessity of gathering acceptance by people at all organizational levels is also emphasized throughout all the program modules.

Teaching the (basics of) principal tools of business management: strategy, risk management, corporate finance, project management

When defining the program content, a general hypothesis was made (based on Cooremans research findings; Cooremans, 2012b) that a majority of participants would have a technical background, low skills in business management and, therefore, a low ability to use the main languages of business management (finance and strategy) to defend their projects, whether internally to their own company's decision-makers, or externally to client organizations.

Understanding the main concepts of corporate strategy is a must, given the influence of strategic considerations in investment decision-making (Cooremans, 2011). Therefore one day and a half are dedicated to strategy and risk management.

However, since individuals and organizations have interpretative filters, and because each organization is different from another, it is essential to be able to understand the myths and realities of investment choices and to analyse corporate business models and cultures. One and a half days are dedicated to these subjects.

Due to their lack of understanding of the main financial methods available to assess investment projects and of their logic, engineers are very often⁶ not fully capable of improving and defending the financial ground of their energy-efficiency projects in front of finance managers. To fill this gap, half of module 4 is dedicated to teaching the basics of capital budgeting, in a simple and applicable way.

Teaching a conceptual framework designed to include the non-energy benefits of energy-efficiency in energy-performance projects and investment calculations

In the field of energy efficiency, the first and generally only argument used to convince energy consumers to implement energy-efficiency measures (EEMs) is a reduction of their energy costs. Unfortunately, as demonstrated by many frustrating situations where highly cost-effective EEMs remain undecided by for-profit companies, this argument is often not powerful enough to entail positive decisions.

Several reasons explain this energy-efficiency gap. The most important one is the fact that firms prefer to allocate their limited financial resources to more strategic investments. Based on Cooremans (2011), the CAS in energy management defines the strategic character of an investment, *i.e.* its “strategicity,” as the positive contribution of this investment to a firm competitive advantage. Strategicity is the most important factor

4. Source: http://en.wikipedia.org/wiki/Energy_management_system.

5. ISO, Win the energy challenge with ISO50001, http://www.iso.org/iso/iso_50001_energy.pdf.

6. This is noticeable, for instance, in energy audit reports, but also in presentations made in conferences and workshops. It has been also noticed by research (De Canio, 1993, Rigby, 2002; Russel and Young, 2012).

driving investment decision-making, and even precedes profitability.

“Competitive advantage is a three-dimensional concept formed of three interrelated constituents: cost, value and risk” (idem). For many firms, energy costs are not strategic, because, in them, it is not the cost, but the value which is the most important source of competitive advantage. For these companies, strategic advantage is thus based on a “superior value” stemming from providing unique benefits and not for offering lower prices.”⁷ As emphasized by Michael Porter: “value, instead of cost, must be used to assess competitive position since firms often deliberately raise their cost in order to command a premium price via differentiation” (Porter, 1985:38). Risk is often the second most important dimension, before cost, with its importance growing in our times of increasing uncertainty.

High strategicity can often be found in the non-energy benefits of EEMs. Non-energy benefits and conceptual tools to analyse them, based on the tri-dimensional concept of strategicity described above, are taught in module 4, together with a method to include them in capital budgeting analysis.

Using a new pedagogical tool to help the candidates to integrate and apply the methods and concepts taught: the serious game

Energy management can be seen as the management of a project conducted yearly in a cycle of continuous improvement. This particular project type necessitates integrating various dimensions (human, organizational, technical, physical) and approaches (managerial, strategic, financial) as well as taking into account actors’ multiplicity. This implies developing a practical capacity to manage complex, multidisciplinary projects, and trying to optimize them under multiple constraints (stakeholders’ needs, budgets and costs, deadlines, feasibility, etc.). The skills necessary to achieve such complex tasks cannot all be acquired in *ex-cathedra* courses.

As far as we know, there was a lack of teaching methods or activities enabling people to approach energy management in a global and transversal way, integrating complex thinking on aspects such as:

- Identification of needs.
- Relationships with multiple shareholders with diverse interests.
- Taking into account changes in the actors involved in each of the project phases.
- Programming, conception (including technical and organizational aspects) and implementation of energy management action plans.
- Global planning of the project.
- Budget management.
- Follow-up of the project’s progress.

Based on previous work which showed the interest of using simulations and active pedagogies for the training of project

management, we have decided to rely on a rather new pedagogical tool to integrate the various dimensions of energy management: the *serious game*. *Serious game* is a software simulation of a management project, which integrates theoretical courses, participative workshops, software simulation and role plays.

As no *serious game* scenario was available in the field of energy management, a joint project between University of Geneva and HEIG-VD (Haute Ecole d’Ingénierie et de Gestion du Canton de Vaud) was launched to create it. This was made possible thanks to subsidies from Université de Genève (Prof. Bernard Lachal), from the Fonds d’innovation académique of Université de Genève and from HEIG-VD (Prof. Daniel Jaccard). The scenario was then developed in four months by a team of four people, thanks also to fundamental help from a five-star hotel in Geneva, which anonymously supplied all data regarding its physical and technical facilities as well as financial and strategic figures.

In June 2013, ManagEnergie, the first *Serious Game* scenario applied to energy management was very successfully used in module 5 “Learning by Doing.”

The features of the CAS in energy management described above make this program unique, at least in Europe and probably in other parts of the world as well (we did not make an extensive survey of programs outside Europe).

LESSONS LEARNED AND FUTURE PROSPECTS

The first edition of the CAS in Energy Management started on January 25, 2013, and closed on September 30, 2013. Diplomas were given to eighteen candidates out of twenty-one, in a formal ceremony on December 5, 2013 (three candidates were granted an additional delay to finish their end of studies work and will receive their diploma in 2014). At the ceremony, a prize was given to one end of studies project by SPG (Société Privée de Gérance), a major international real estate company.

We were correct in our assumption that most candidates would have technical training and professional experience in the energy field. Indeed, only five out of the twenty-one 2013 candidates did not have technical background in any aspect of energy use. These candidates actually enriched the whole group thanks to their different background and perspectives on the issues discussed. Teamwork proved to be stimulating and positive for the quality of the work, and for the exchange of experiences and skills between participants. The proportion of energy professionals and non-energy professionals in the 2014 edition is the same as in the 2013 edition.

The candidates of the first edition were very pleased with their experience and with the course content and atmosphere. Teachers were also generally highly appreciated.⁸

A community of “energy management activists” and friends started to develop not only during the courses but also outside the school. To help the community grow, we organized contact between 2013 and 2014 fellow students. We are also trying to develop a community of companies loosely connected to the program: some of them are interviewed at the occasion of group work in module 4 and, therefore, have heard of the program. Some other companies collaborate with the end of

7. “Superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price” (Porter, 1985:3).

8. The level of satisfaction was assessed for each module by a questionnaire submitted to the participants.

studies work. We invited all these companies to attend the program events during the year.

Several particularly positive facts, although anecdotic, deserve to be mentioned:

- One 2013 participant, unemployed at the beginning of the CAS, found a job in the energy management department of a large and prestigious Geneva clock-maker. He was preferred over other candidates thanks to his energy management diploma.
- This participant, newly employed, was sent by his department to the company's finance department to submit an energy-efficiency investment project. The finance people were very pleased as it was the first time a project was framed according to proper finance methods and described to them in an understandable and interesting way (*i.e.* not only in technical terms but also in financial and strategic terms). The project was approved.
- The Canton de Genève, looking for an engineer responsible for energy management of its buildings portfolio, mentioned the diploma of the CAS in Energy Management in the newspaper ad as one of the pre-requisites for the job.

The prospects for the 2014 edition are positive, with twenty candidates registered for the full program and eight candidates registered for a total of eleven individual modules (modules 2, 3 and 4 can be followed individually). Half of the twenty full-program candidates come from Geneva canton, while the others come from the cantons of Vaud, Valais and France.

The 2014 program will be the same as the 2013 edition, with only minor modifications. Two broad changes are considered for the years to come:

- The CAS (Certificate of Advanced Studies) could become a DAS (Diploma of Advanced Studies), which means more hours of teaching (and more ECTS) and twelve months instead of nine. It would enable development of some subjects in more detail or addition of other subjects.
- Together with S.A.F.E. (Swiss Agency for Efficient Energy Use) Zürich, the Université de Genève was commissioned by FOE (Federal Office of Energy) to make a feasibility study regarding the possibilities to develop a network of energy management teaching in Switzerland, through partnerships between several schools and teaching programs.

Conclusion

The first goal of the CAS in Energy Management is to create a standard of professionals able to spread energy management in companies and to bring them, eventually, to an ISO 50001 certification. The second goal of the program is even more important: it is to enlarge the technical skills of energy professionals with management and communication skills, in order to make them stronger, able to overcome several organizational barriers to energy-efficiency and, therefore, to more successfully sell energy-efficiency projects.

In this way, we actually create not only a new training program, but a new profession, with a high potential of market transformation.

The success of the first edition of the program and the favorable prospects regarding future developments makes us optimistic regarding the realization of our goals and the transformation of the Swiss energy markets towards a better energy performance.

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