

Environmental analysis in building energetics sector from aspect of micro- and smallenterprises

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Abstract

Based on a model approach regarding the structural, relational and environmental features of the building energetics sector the article at first gives a concise and general view on the main conditions influencing the consumer market segment. After that, research results will be presented and commented concerning how Hungarian micro- and smallenterprises (MSEs) realize and evaluate these conditions from the point of view of their position, competitiveness and opportunities.

Keywords

building energetics sector · energy consumption · energy saving · environmental analysis · Hungary · micro- and smallenterprises.

1 Introduction

Especially due to the rise of the energy prices and the need for a higher comfort level the importance of energy saving is continually increasing with users. Many of the users focus their attention on finding opportunities for decreasing the dependence of their power consumption from centralized channels and for establishing and operating their own energy centre, e.g. a decentralized channel. In the realization of these tendencies micro- and smallenterprises (MSEs) offering building energetics products and related services have a big share in the Hungarian energetics sector. Enterprises need to adjust their offers to macroenvironmental conditions, professional requirements, and to the special features of individual projects, respectively.

MSEs in building energetics sector have to work under conditions being made more and more difficult, in which energy prices, applications for subsidies, economic situation, social attitude and uncertainties of the building industry take an active part. Building energetics enterprises need to analyse their own market and reveal their existing problems for a better strategic-, functional-, and product planning in order to reach energy-saving and conscious energy consumption goals.

Purposes of this article are to research enterprises' environment in building energetics sector and to classify factors as parts of systems and models. Environmental analysis consists of three main steps. At first I identify the features of building energetics market and sector. Secondly I examine the main external factors, which have a direct effect on changes of building energetics market, while an indirect effect on enterprises and their relation to the energetics sector on the basis of secondary research and analysis method. Thirdly I present the influences of environmental factors explored by personal interviews with leading managers of building energetics MSEs. These factors as conditions effect their own business activity, and they consider them as threats or as opportunities, respectively. At last I briefly evaluate how the global energy efficiency purposes and the local conditions are viewed and I also summarize the idealized solution from the aspect of enterprises.

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2 Characteristic of building energetics market

In order to explore the characteristics of relations as well as the structure in the market, an investigation of the market, identification and characterisation of the main participants (sellers and buyers), identification of market demand and related offer are essential steps. In the following article I analyse the building energetic market through these aspects.

2.1 Main market participants: sellers and buyers

The seller is a person or an organization in the building energetics market offering goods and services for sale at a given point of time and at a given price that can result in energy saving or conscious energy consumption. Sellers are mostly MSEs, who are specialised in this energy-saving field, as well as playing the role of manufacturer, trader or implementer on this market. The buyer is a solvent organization or a person in the building energetics market who buy goods and services in this market that could result in energy saving or increase comfort.

The market is divided into three main parts considering buyers and their characteristics, which are shown in Table 1. These buyers have common characteristics concerning their goals although their motivations and available financial resources may be different so that MSEs have to pay attention on reaching their target groups and the treatment of expected problems. Opportunities and limits of their resources determine the difference in their quotations and process of projects, and may cause different problems.

Furthermore in this article I examine the building energetics market solely from the aspect of business to consumer (B2C) market, where the conditions of purely competitive environment could most of all be realized. In our analysis building energetics market means energy-saving projects where enterprises design, implement and install new equipment, renew or repair works in new or existing residential buildings for consumers / households, respectively.

2.2 Needs, wants and demand in building energetics market

Need is a state of feeling deprivation. Need is the form that a human need takes as shaped by culture and individual personality. Demand is a human want that is backed by buying power.

Demand for energetics products or for services arises from building new property or from building the renovation of used property (about every 20-25 year). At first, expectations are needed to identify the opportunities of energy saving in B2C market, and all domestic energy consumption points where power consumption and comfort feeling could be optimized with the complex application of building energetics technologies. Consumer energy consumption wants can be divided into two main parts: electrical energy and heat energy, related to satisfying basic human needs. Fig. 1 summarizes all the energy consumption points where MSEs can offer complex technological solutions because buyers do not intend to buy a new product

but want to cover their needs at higher comfort level.

Great emphasis is put well-considered and complex energetics design to identify the necessity points in the future, in order to influence the comfort level and quantity of energy consumption. Certain needs could be satisfied by the same energy source too, where the choice among energy sources is determined by customized design.

2.3 Product and product related supply

Supply means a variety of products and services for sale at a given price. In order to meet the demand of energy consumption customized products and technologies should be offered at available prices. Different technological solutions could ensure larger energy saving and reaching a level of higher energy efficiency in every household, as well as remunerative energy-saving projects.

Building energetics products can be divided into the following parts from the aspect of application field and applied technology Table 2 presents a systematic approach concerning the main categories of equipments or application fields to which projects and household (consumer) investments may be oriented. Building energetic offers are becoming ever wider due to the worldwide research, development and economic activity. Products and technologies are ever more able to offer complex and customized solutions (both common application of renewable and fossil energy sources, and technological and natural way of solutions). Buyers' choice from among products and technologies could be ideal after the exploration of unexplored needs and individual customization.

3 Main characteristics of environment and market changes

Most events in the world market influence the Hungarian building energetics market too. These events based on their effects could be divided into five main parts that are consistent with Kotler's macroenvironmental factors [4]. Environmental effects and their connections help to understand these market mechanisms, changes and future tendencies. Fig. 2 contains all fundamental information in chronological order by energy consumption and by energy savings. This figure gives a picture about supply and demand, directions of technology development, social acceptance and (energy) political decisions in building energetics market: the tendencies that could be expected and the events that occur these days or might occur in the future. Chronological overview should be started from the industrial revolution, because most events that could be attached to the current energy market structure are dated from that time. This energy market structure is characterized by limited energy sources exhausting at an accelerating pace, as well as by the use of low efficient current technologies, growing environmental pollution and by the goals of reducing energy dependence.

The assurance of strategical control over energy sources and the reduction of energy dependence stand in the background of

Tab. 1. Buyers and their characteristics in energy-savings projects, source: own table

Buyers	Organizations		Consumer (Households)
	Non-business / Public	Business	
Goals	Reduce functional and maintenance costs	Reduce functional and maintenance costs	Reduce overhead costs
	Increase comfort level is a communal interest	Increase comfort level is employee and buyers interest	Increase comfort level is personal interest
Main motivations	EU requirements	Environmental consciousness Social responsibility	Prestige Environmental consciousness
	1. Own financial resources 2. Competition 3. Government sources (4. Credit or ESCO financing form)	1. Capital 2. Competition 3. ESCO (and Credit) financing form	1. Financing resources 2. Competition 3. Credit (and ESCO) financing form
Request for quotation	Public procurement tenders	Quotations Tenders	Quotations
Process of projects	At first the investor enterprise has to compete for the public procurements, and then it has opportunity and interest to detail the plans. Disadvantage of public procurements is that enterprises have to implement the won work from predefined sum. So investor often has to carry the risk from implementing and current price fluctuation of currency. Tenders over market value appear in public works, as well as corruption and a chain of debts can be found in this area. Legal background of communal organizations is the reason why energy-saving projects implement hardly in ESCO ¹ form.	1. Classic quotation on business tender is when business participant invites to tender more expert enterprises about the necessary works. 2. Other form of quotation, when business participant conducts a competition and it offers opportunities for competitors to survey its energetics system and estimate its wants. So this business buyer can make a grounded decision on the best price-value. If the investment goes through in ESCO form then the competitor becomes interested in good designing, implementing, operating, and real saving.	The classic model of consumer purchasing decision making process works here. They ask quotation from those enterprises that intrigue their interests in the period of information collecting. Households – depending on buyer's segment – make decision from different viewpoints. 1. Most consumers have not so deep technical and economic knowledge in this field, so they make decisions based on subjective and personal impressions. 2. Consumers ask offers from those enterprises who can do complex designing and implementing activity. These offers often contain finance suggestion based on credit or ESCO.
Problems	<ul style="list-style-type: none"> • Energy efficiency can not be realized because of the legal characteristics and inflexibility of the public procurements. • Expensive • Risk of corruption. 	<ul style="list-style-type: none"> • Risk of corruption. • Low price could be coupled with low quality. 	<ul style="list-style-type: none"> • Interest of buyer could be injured. • If product with unsuitable quality and capacity is built up, expected scale of energy saving and comfort level are not realized. • Low price could be coupled with low quality.

most events in world politics. Increasing energy needs in the developing countries strengthen these occurrences. Our present era may be called energy economy because of central role of energy. Energy price is influenced by the world political games, by power conditions and by the alternative opportunities available in all times (Fig. 3).

Efficiency of energy consumption can be increased by energy saving, adoption of modern technology and products in the future, where social, political and economic pressure will convince shareholders about this fact.

¹Definition of ESCO (Energy Service Company): A consultancy group engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner.

4 Estimation of environmental changes at Hungarian micro- and smallenterprises

Industrial environmental effects show opportunities and threats in building energetics sector and conditions that enterprises can not influence. Knowledge of conditions, opportunities and threats can help enterprises to be able to adapt their activities to their markets.

The requirement of energy saving is one of the central factor of changes in building energetics sector and in its environment. I explored the macroenvironmental effects – based on Kotler's model – with personal interviews as a research method. Investigation was conducted among small and microbusinesses' owners or leading managers and complemented with additional information delivered by experts in building

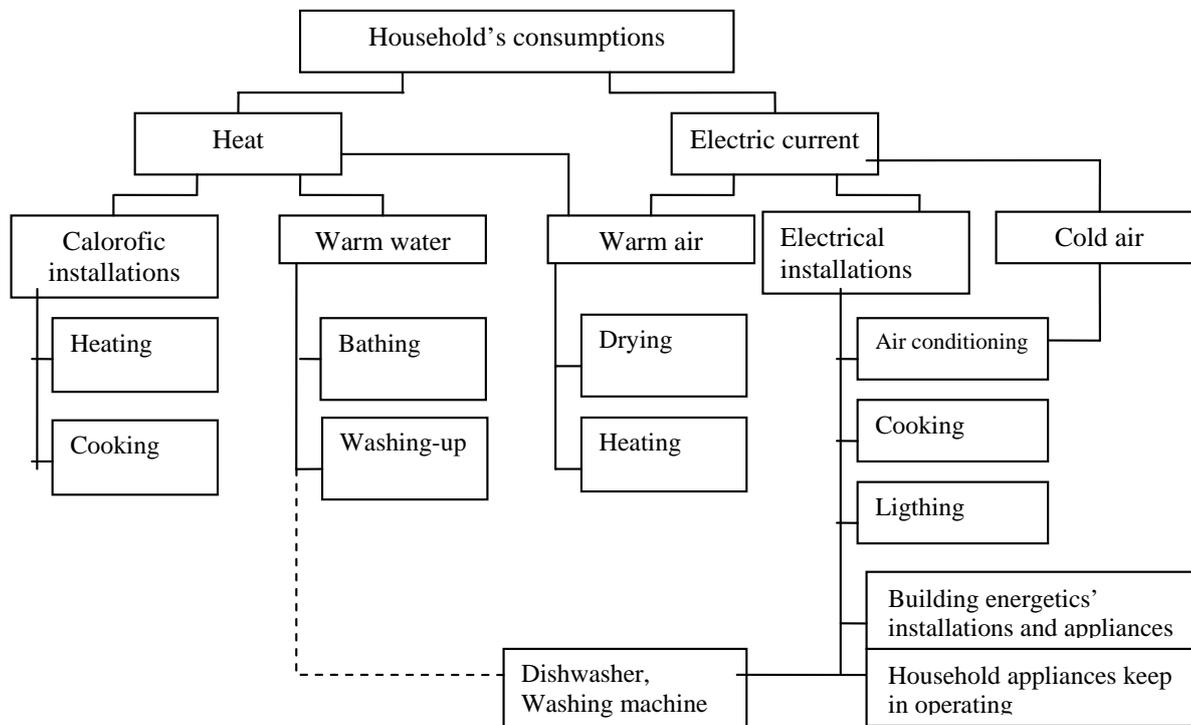


Fig. 1. Energy consumption points of households, source: own figure. Used up: (Glücklich, 1989 [2])

energy-saving projects. Seventeen personal interviews were performed with owners and managers, and five others with experts. The latter interviews have contributed to the identification of a wider enterprises' view. (Research results will serve as the basis for a further survey to be conducted among stakeholders.) The goal of these interview-questions was to reveal the market of these enterprises and the factors influencing their environment. The following environmental analysis (Table 3) contains solely viewpoints of leaders and experts revealed by personal interviews.

Table 3 shows enterprises' opinions in building energetic sector about the political, legal, economic and technological effects that influence the demand for their products and services. MSEs could use the results of this table for the market analysis of opportunities and threats and determine the direction of their potential lobby activities in different fields in the future. However enterprises are powerless now due to the lack of collaboration and weak lobby activity in the sector. They can not influence these environmental factors – except technology factors, because some enterprises have so significant developmental activity – and continuously acclimatization characterizes them. They have strong knowledge in their own professional technological field, however it is not the consumers' motivation but their own interest that dominates in the course of selection and application of certain products and technologies. In the course of the examination of social-demographical environmental elements, we can see that potential customers come from a wide range of social groups, however enterprises can not fulfil the demand of consumer groups with lower income. So, many initiations from consumers seem useless. Enterprises recognize prop-

erly the importance of energy saving and they also communicate it to consumers however sometimes in a threatening way based on economic and natural prognosis. Their prognosis is based merely on only assumptions that can lead to formation of social misbeliefs.

5 Conclusions

Ways and ideas leading to the efficiency of energy consumption can be experienced all over the world on the basis of research, developmental, economic activity. However these ideas can not achieve results without appropriate political, economic and social pressures. In the European Union the political and economic steps have been taken in relation to the above listed conditions that show a perceptible "top-down" pressure. In turn, a "bottom-up" pressure coming from the side of interested costumers, especially in Hungary, is yet barely sensible because of large investment sums, except if investment associates with prestige value. Certain investments demand complex examination and as a result of that, optimal solutions have to be worked out from social, natural and economic aspects, in order to achieve long-term sustainable energy consumption.

Enterprises in Hungary are fairly familiar with environmental influences and know well their market on macro level. This is a good condition as regards market competition, but not enough, because a large part of information is not suitably applied or at all. Additionally many other problems can arise and influence the implementation of projects. In enterprises opinion the solvent demand for their products and services could be increase and enterprises could be offer really remunerative investments for households' consumers if the following conditions could be

Tab. 2. Building energetic products and technologies, source: own figure

Applications goal	Technology solutions	Products and technology
Local (building) energy supply with own installations and own appliances systems (Calorific and heat transfer installations)	Building energetics technologies based on fossil energy sources	Central calorific installations (gas-, oil-, solid combustible heating furnace, electric heating furnace) Special heating apparatus (gas or electric convector with or without ventilator, heating bowl operating with oil, solid combustible gas or electric) Hot water heater installations combined with central calorific installations (combined gas, oil and mixed heating furnace) Central hot water heater installations (flow-, and storing gas or electric boiler) Hot water heater installations (which produce heat in the place of consumption) (wood-heating bath roller, flow- and storing gas or electric boiler) Electric air condition
	Building energetics technologies based on renewable energy sources	Heat pump Solar collector Air collector Iron stove with biomass, heating furnace with solid and biomass combustible, tile stove, wood-heating fireplace
	Other technologies	Long-distance heat transfer system Solar cell Wind engine
Energy saving	Building energetics fields	Saving water appliances Building engineering system modernization: <ul style="list-style-type: none"> • Choose primary energy • Heat transfer modernization • Hydraulic balance creation, tuning • Create variable, measurable system • System examination from aspect of operating safety
	Other fields	Shading technology Insulation Vegetation planting Windows and doors repairing or exchanging Lighting modernization

realized. (The research has been fulfilled before the explosion of 2008’ financial world crisis. So the results show somewhat idealized wishes at this moment.) The most essential conditions are summarized as follows:

- economic stability instead of instability
- growing living standard
- stabilized position of the building industry
- stopping continue to support the use of fossil energy sources
- higher level of calculability of energy-saving’s applications
- stronger environmental consciousness

Arguments specialized in this article strengthen that the importance of building energetics sector and the conscious energy

consumption will grow in the future. So, research of this topic is current and reasonable. Energetic enterprises have to make decisions in an environment that contains many uncertainties. An increasing stress will be made on accent how quick enterprises could react for changes. Further research will be oriented on gathering information about stakeholders groups and their interests for influencing some environmental factors, as well on identifying consumers (needs and wants, attitudes, decision making process, etc.).

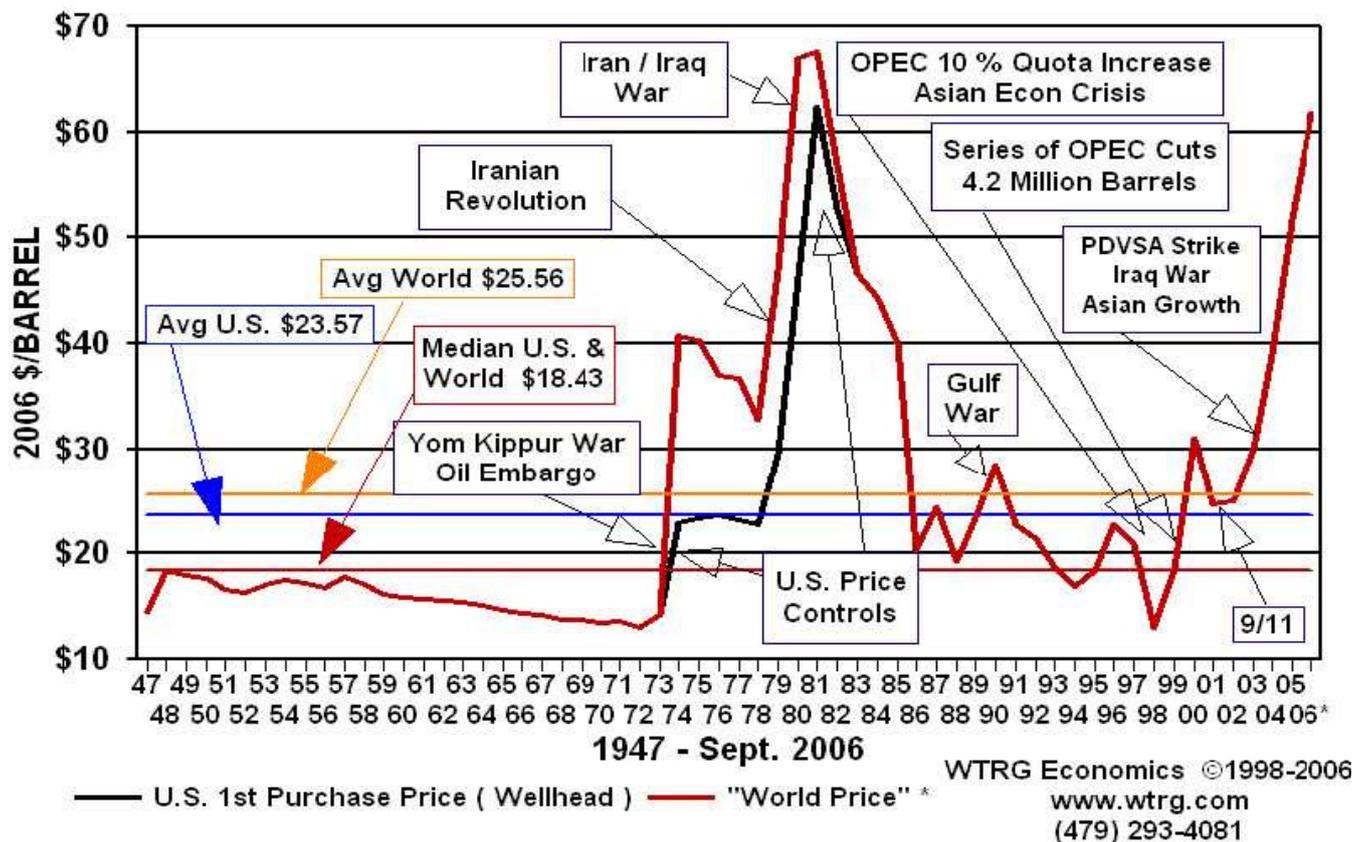


Fig. 3. Development of oil prices between 1947 and 2006, (counted in 2006 U.S. \$/barrel), Source: (www.wtrg.com)

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Tab. 3. Determination of macroenvironmental factors at MSEs, source: own table.

Factors	Effects	Results
Political – Legal	<i>Unforeseeable restrictive provision of government</i>	<ul style="list-style-type: none"> • Consumer demand is decreasing in the building energetics market. • Shortage of own sources is the primary cause that Hungary can not call more of Brussels' financial sources for energy-saving projects. • The building energetics sector can count on participation of financial institution, private financing resources, EU and national funds.
	<i>Law and market process do not contain control.</i>	<ul style="list-style-type: none"> • Enterprises' expectations are inconsistent and uncertain. • Enterprises' situation is threatened by legal and financial uncertainty in the building market which depends on their matters under disputes and (public procurement) legal defenceless.
	<i>Energy-saving application systems are incalculable</i>	<ul style="list-style-type: none"> • Current application system can not support efficient energy-saving projects, because people have still more worth in projects done by illegal works rather than take part in incalculableness application.
Economic	<i>Bad economic situation</i>	<ul style="list-style-type: none"> • Growing cost of living people trouble the energy-saving investments • Nowadays building industry is „inflation-loser” (Building industry can enforce just a portion of rising cost.)
	<i>Rising energy prices</i>	<ul style="list-style-type: none"> • Growing energy prices bring prompting effect for consumers to reduce their energy bill.
Natural	<i>Changing climate</i>	<ul style="list-style-type: none"> • Nowadays, engineers have to calculate in the course of architectural and energetics plans that may the buildings will be in a changed climate in the next 50-100 years.
	<i>Quality and efficiency of installations and secondary complementary products are not satisfactory.</i>	<ul style="list-style-type: none"> • Some enterprises give incorrect technical parameter for certain products (for example: solar collector), which show irrational efficiency, so the system does not work with its expected capacity. • The quality of installed products (that are in direct or indirect connection with the whole system) determine the long term satisfaction.
	<i>Customization of technological solution</i>	<ul style="list-style-type: none"> • Professional flexibility is even more important to individual conception and conditions aspect of ground-plot, architectural solutions and so on.
Social	<i>Misbeliefs or defective information</i>	<ul style="list-style-type: none"> • Some enterprises make effort to clear up the misbelieves by their selling and teaching method, but this work could come off on the contrary.
	<i>Distrust in new development of technology</i>	<ul style="list-style-type: none"> • Most enterprises leave out of consideration the primary interest of consumer in the course of design and implementation.
	<i>Intensive interest in energy-saving project</i>	<ul style="list-style-type: none"> • Ever more consumers inquire for energy-saving fields previously they request quotation from enterprises in connection with their energy-saving investment.
	<i>Prestige attitude</i>	<ul style="list-style-type: none"> • Prestige attitude appeared in energy-saving investments, so the first priority of these consumers is other than energy saving.
Demographical	<i>Potential consumers are middle-aged and intellectuals.</i>	<ul style="list-style-type: none"> • Enlightened people look for long-term investment with demand on quality and high comfort level.
	<i>People from upper- and middle classes are the main purchasers.</i>	<ul style="list-style-type: none"> • Consumers with higher income can afford energy-saving investment because of the higher cost.