

STRATEGIC MARKS IN THE BEHAVIOURAL MODELING OF ENERGY DISCHARGE

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Abstract: According to the latest evolutions of energy market and mostly the consumption trend, a new managing philosophy for used upon energy discharge and renewable sources exploitation is imperiously required as a strategic objective and major concern in nowadays economical and political context. The increasing interest of companies and population in rationalizing their consumption is prevalently justified by the circumstances of sustained demand growing and ascending tendency of price equilibration. Following this course of events, the study of behavioral modeling, by choice those regarding the energy discharge in emerging economies, becomes essential in achieving certain performance indicators and economic revival. So far, the applied models relieved the continuous growth of energy consumption along with incomes and saving rate decession as a direct effect of consumers' needs satisfying, but also due to an inadequated concern in increasing effectiveness.

However, the requisitions of technological performances and commissioning service at industrial scale of green energy sources cannot be exclusively targeted through actions aiming the producers, practically the improvement of their behavior and attitude towards consumption without considering in this view the consumers' resources. Accordingly, the accomplishing of this intercession is claimed by the energetical and climatic reality, taking into account that the behavioral changes betide after long comparative periods.

The essay is proposing, in this respect, to identify a few strategic marks in the implementation of structural behavioral models, as a way to carry on a rational and efficient employment of energetic resources.

Key words: energy consumption, efficiency

1. OVERALL CONSIDERATIONS

The apparent inclination to the quantitative side of economic performance and tributary to the qualitative aspects of the current energy production and discharge systems is proven by the prevailing concerns to productivity and operational efficiency. This effect is mainly the consiquence of an increasing demand for energetic products, insofar the oil and its derivatives, but chiefly the electric and thermic energy, the nowadays

emerging market economy stage justifying such evolution. The economic agents' energetical appetency and that of institutional and civilian consumers determined an energy market strategic approaching in the terms of a continuous profitability, minifying and neglecting on long-term the consiquences of such behaviour. Sometimes, even the retaliative measures aiming the ecological and environmental infringement, by choice those framed on the impact of emisions upon environment, didn't achieved their goal precisely because the insignificant level of influencing the technological and performing capability of producers, distributors and, not lastly, consumers. Operational inefficiency manifested itself even in the design phase, aiming primary the performances of equipping or technological endowment and, subsidiarily, the efficiency of their energetic consumption. Under such circumstances the need of extending the ecodesign application requirements for energy related products, be they plant, equipment, machinery or household appliances, becomes imperiously in setting a coherent policy of rationalizing the energy consumption behavior. A strategic approach to this problem involves the deployment of certain human, financial and logistic resources in the governmental sectoral policies supported by programs of measures aimed at influencing the consumption optics on specific energy products and the consumers' behaviour. [1÷4]

Although there are numerous programs aiming at streamlining and more efficient energy consumption, the objectives are partially achieved, in most cases by invoking, be the inadequacy of means, be the inertial aspects of an inappropriate consumption behavior. Starting from this fact it can be concluded that the development and implementation of an operational system for modeling the energy consumers' behaviour are badly needed, having in view both the historical issues in the field, but especially, the global challenges looming in the future.

2. STRATEGIC APPROACH OF ENERGY CONSUMPTION FROM THE EFFICIENCY AND DURABILITY PROVISIONING OUTLOOK

2.1. Essential motivations and reasons

If on the petroleum products and natural gas markets the level and competitive intensity are economically

affected by the rules imposed by international organizations and government agencies in the field, and not least by the levels of service and deliveries of the major producers, the electric and heating energy are by excellence price tagged. Under these circumstances, the administrative law building of certain oligopolistic economic structures that works in fact for several years through agreements and understandings bi-and multi-lateral may engender the lack of production costs transparency, the abridgment of the sectoral competition and even its annihilation, but especially the distorted valorization of specific energy giants with big financial problems.

Moreover, the control of sales prices, the fixing and imposing them in the transactional area resulted in an operators' formal alignment to the desiderata of promoting green energy programs, the consumers being practically deprived of the opportunity product-price-quality choice between the alternatives offered in the market. To this is added the fact that the higher price of green energy to the consumer, compared to the conventional sources energy, causes an inertial consumption of the latter which will continue, especially under conditions in which people's and companies' income will be affected by the phenomenon of economic crisis. In fact the consumer may perceive the qualitative differences of energy product within the extent of its supply parameters are standardized and meet specific desires.

However, the price is a variable with maximum impact, certainty beyond all other operational considerations forming the basis of the energy mix (40% coal, 19% gas, 29% hydro, 9% nuclear and 3% oil), in which green energy is still below a significant level perception according to the current consumption.

Therefore, its reshaping in the purpose of introducing in the equation of renewable green energy consumption must necessarily consider the consumer, action that aims at building-up a new vision upon his specific behavior. In this respect, the communication efforts, especially those regarding the generation of behavioral changes in each category of consumers involves the achieving of coherent and functional balancing market system based on efforts redistribution and their valuable compensation. The essential reasons relating to the need for a national *strategy aiming more efficient energy use and ensure its sustainability* can be summarized by the following:

- the increasing of consumption efficiency can be achieved more easily, obviously requiring less efforts and therefore is more realistic than improving production efficiency;
- the irrational consumption and therefore the effects of low yields are felt more intensely by those consumers who bear the full incurred costs than the producers, placed in a control position of the market through price and hence their own profitability, as well;
- the modification of energy mix consumption in favour of renewables, less attractive as investment and producing more expensive energy, can be done quickly in the terms of consumers' optical changing, obviously by using financial leverage, essentially the energy price;
- the behavioral influence of producers properly to grow more efficiently and greening their business in order to attract and use such resources is more difficult due to

multiple connections in political and economic area than modeling consumers' behavior as they are determined to circumstantial compliance and opportunism, but more least for optional decision;

- the existing systems of production and consumption lead to depletion of conventional resources and accelerate the deterioration of the environment with uncontrollable effects on short and medium term that redound upon consumers, prompting them to opt for more efficient products, safer and more sustainable in supplying;

- the overall picture of green products in the consumers' mass is strongly influenced by the complex issue of providing them on medium and long term, deeply affected by technological restraints, shortcomings and limitations that are coming into conflict with the expected life standards;

- the consumers' overwhelming majority doesn't act in terms of behavioural models based on procedural characteristics or conditions that can be maintained for indefinite term at the best standards, requiring the imposition of a pragmatic approach aiming, at excellence, the consumption budgets;

- the thinking and behavioural habits of the people are strongly influenced by the inertial aspects of consumption, any change presuming efforts and risks that the targeted consumers are not willing to make in the absence of any serious motivation;

- the concernment at the implications and consequences of energy consumption behavior, seriously affecting the natural environment and global climate, is in sharp decline, the consumers' priorities being the health, choice, safety and comfort, especially in the context of multiple economic constraints that they have to bear up.

2.2. Strategic marks

The elaboration, but especially the implementation of a modeling strategy for energy consumption behaviour, thus requires the development of aimed standards at a range of issues related to its geographical location, socio-economic situation, and not least the features and technical parameters of consumption units functioning.

a) Geographical positioning

The issues of geographical positioning of consumption locations, characterized from behavioural outlook, are mainly circumscribed to the following aspects:

- the physical characteristics of consumption climate area primarily differentiate not only the need and demand but also their temporal distribution. On the other hand a high level of energy consumption on longer may create a strong sensitivity in assuming any additional risk (consumption price increasing, reduced security in energy supplying, lack of optional alternatives, etc.), and consequently, an increased resistance to change;

- the level of economic development, especially the entrepreneurial outlook of geographical area and investment opportunities lead to a given proportionality related to energy demand and supply parameters, strongly influencing the consumers' behavior and, on long-term, involving multiple financial, logistical and human efforts

in order to accommodate the alternative of a new energy production and consumption context;

- the traditions and habits characterizing different geographical areas, adjacently to educational drivers that can influence a greater or lesser propensity for consumption or saving, in this case in terms of energy, exercise a major influence on consumption behavior, especially regarding the inertial stability of its parameters.

b) The socio-economic conjunction

The socio-economic conjunction is certainly a major influencing factor of consumption behavior, broadly speaking, and especially the energetical one, considering the energy products as a priority in the structure of household, industrial or office, manifesting by the following issues:

- the income level and structure exercise a major influence upon energy consumption behavior, encouraging, with their growth, a relaxed attitude and low concerned regarding to the consequences of an irrational and inefficient use both individual and global;
- the attractiveness and entrepreneurial opportunism, even conjunctional, may cause consumerist behaviours and attitudes, partly fueled by the current resources and especially future ones, the financial support of the traditional lenders (banks, non banking financial companies, leasing companies, etc.), in the latter case, being default and essential;
- the regular alternation of growth and economic recession is obviously presuming the reassessment and behavioural adaptation to the general economic context. Those consumers, having a rational approach constantly evaluate their capabilities and resources related to economic status and perspectives, are clearly more chanced to successfully cross the critical periods in contrast to those who show strong inertia in their energy consumption behavior.

c) The quantification and awarding system of energy consumption

Strategic building regarding the energy consumption behaviour is highest degree connected with the characteristics and technical operating parameters of the consumption units, highlighting the following key issues:

- the close link between the level and performances of the consumption units, their yields and consumers' behavioural characteristics. The productivity growth of the key factors is more and more conditioned by energy yields, hence it results the continuous improvement of consumption optics. In this regard, relevantly are the developed economies which prefer to invest in advanced technologies and finance a large part of implicit costs by exporting the obsolete ones to emerging economies, no less considering the high yields and future benefits relating to energy consumption;
- the accelerated technological progress determines a permanent improvement of technical consumption parameters by strongly acting upon the energy consumption behavior, not only by cost elements but also by qualitative performances of the new products, higher competitive;
- the placing of the consumption unit among those energetical intensive and power inefficient faces the risks of repeated legislative and judicial level sanctions which

exerts a constant pressure upon such energy behavior, constantly complaining its revaluation and adaptation.

It follows that the development of certain behavioural standards in terms of energy consumption is a complex intercession which highly depends on the level of mobilized resources and managerial capacity directed toward its deployment and control. In this respect, it must achieve a *system of quantification and payment* by redistributing the efforts upon consumers' mass assemblies, structurally differenced according to a predetermined segmentation. Namely, those consumers who are energetically more efficient will benefit from the subsidised costs as an incentive to continuous improving of consumption parameters, the source of funding these efforts being formed by the penalties applied on those market segments placed below the set levels of minimum performance. The assuming of these *standard parameters as strategic operational elements* is of paramount importance to balance the overall behavior of the market and especially to achieve a fundamental objective: **to consume more efficient and less polluting**.

The essential conditions that must satisfy these criteria are related to:

- the representativeness of consumption behavior, namely the characterization of the consumer in terms of his parameters on how much consumes, as consumes, as invests, how charges;
- the ability of quantifying, respectively the phenomenological measuring applying to energy consumption processes and their comparative reflection, hereby opening the way for standards and assessment grids application;
- the operational consistency, respectively their mating compatibility in a criteria system, applicable to the global level and which doesn't constitute elements of apparently differentiation with anti-competitive effect in relation to specific segments;
- the temporal stability, respectively the capacity of being applied for long periods, contingent corrections might be imposed by technological developments, energy policies or major changes in the economic context (foreign exchange regime, tax system, economic recession, etc.).

In this regard, without excluding the possibility of amending the criteria system and set parameters according to given levels of scale values reflecting the consumption behavior, may be considered at least the following:

a) Consumption efficiency coefficient – C_{rc} (equipment output) determined as ratio between the consumed energy amount (electricity / heat) and consumer's installed power - relation (1):

$$C_{rc} = \frac{Q_e}{P_i} \times 100 \tag{1}$$

where:

Q_e – consumed energy quantity,

P_i – consumer's installed power capacity.

This indicator parameter is an operationally strategic element against configuring the system as a wholly, considering the fact that reflects in the most directly fashion the energy consumption efficiency and being

applicable to all categories of consumers and type of consumed energy.

b) Energy consumption structure coefficient – C_{sc} determined as ratio between the amount of consumed energy from renewable sources and total cost of consumed energy, respectively - relation (2):

$$C_{sc} = \frac{Q_{er}}{Q_{et}} \times 100 \quad (2)$$

where:

Q_{er} – the amount of consumed energy from renewable sources,

Q_{et} – the total amount of consumed energy.

It can be applied to any type of energy consumer and consumption, in this case directly reflecting the contribution of green energy to consumption structure. The evolution of this parameter indicator may characterize the consumer's behavior and attitudes against the necessity of greening its energy consumption, but not in the terms of efficiency, as well.

c) The clean-technology degree – G_{et} - expressing its ballance determined as ratio of power equipment and/or facilities with less than 5 years old and the consumer's total installed power (%) – relation (3):

$$G_{et} = \frac{P_{i(<5)}}{P_t} \times 100 \quad (3)$$

where:

$P_{i(<5)}$ – power of equipment and/or facilities with less than 5 years old

P_t - consumer's total installed power.

This indicator reflects a part of consumers' efforts to invest and implement clean technologies or falling within the legal limits of harmful emissions, and, secondly, the ethical orientation and behavioural adapting availability to the limitations and restrictions imposed by the current or future energetic context.

d) The share of energy costs in total expenditure of the consumer agent – P_{en} – the indicator determination is effectuated by dividing the consumer's energy costs to its total costs (%) - relation (4):

$$P_{en} = \frac{Ch_{en}}{Ch_t} \times 100 \quad (4)$$

where:

Ch_{en} - the overall energy costs,

Ch_t - the overall costs recorded.

The share of energy costs in total expenditure of the consumer agent is a parameter indicating not only the element of economic analysis of the consumer but also a criterion for its characterization in relation with specific market segments and under standardized calibration on energy consumption efficiency. It should be noted that this indicator has a limited comparability as the technological diversity, logistics and sectoral boundaries are substantially affecting its implementation. The indicator has pertinence in characterizing the directed efforts to more efficient energy consumption, rather

through its evolution than eventually recorded values, while comparability is sectorially restricted. Therefore, its inclusion in a standardized system of quantification and awarding the power consumption behavior should be achieved through an enhanced and rigorous differentiation in regard to the applicability area.

e) The coefficient of energy consumption elasticity at price - $C_{e/p}$ determined as the ratio of energy consumption variation and energy price change - relation (5):

$$C_{e/p} = \frac{\Delta C_{en}}{\Delta P_{en}} \quad (5)$$

where:

ΔC_{en} – energy consumption variation;

ΔP_{en} – energy price change, the rating being made between the ends recorded values in a period of time.

$C_{e/p}$ is particularly important to characterize the consumer's behavior relative to his availability in adjusting the consumption limits based on the variability of the energy market and thus, to choose a cheaper polluting energy source or an ecological one, but more expensive. Criterially applicable, the indicator has an extensiv area of characterizing the energy consumption behavior by jointing with the energy consumption elasticity at income, an enhanced behavioral consumer's sensitivity to energy price changes constituting a penalty reason for him.

f) The coefficient of energy consumption elasticity at income – $C_{e/v}$ – determined as ratio of energy consumption change and consumer's income change - relation (6):

$$C_{e/v} = \frac{\Delta C_{en}}{\Delta V} \quad (6)$$

where:

ΔV – consumer's income change, the calculation being carried out like the previous indicator, is interesting in the perspective and reasons aimed at higher or lower behavioural bias on power consumption compared to his income variability.

The indicator is significant in the context of its criteria application and calibration value scale according to that applied at the price elasticity.

The introduction of these elements into a coherent assessment system must aim not only the punitive side but also the consumers' relief, such achieving a behavioural modeling able to attain its overall strategic objectives. As stated above, the applying of an appropriate market segmentation on the basis of consumers' differentiation is an absolute prerequisite for achieving an efficient operating system.

3. CONCLUSIONS

Therefore, some conclusions obviously come off:
 - the climatic and environmental trends of recent decades generally require a radical shift in human behavior and,

especially to the consumption in particular and energetical as a priority;

- the imperatives technological reform and introducing in the industrial exploitation of green energy sources cannot be achieved only through actions aimed at producers, in this case stimulating their changes of attitude and behavior, without regarding to this perspective the adapting consumer's resources;

- the strategic intercession aiming at swift expansion of green energy sources use and their repositioning in the consumption structure can not be achieved without a quantifying and awarding system regarding the consumers' adjusting efforts, in fact to identify the operational factors that can form the basis of its applicability;

- an effective strategic approach should be supported by a fair and consistent calibration of the used indicators, any their arbitrary application may compromise the overall objectives;

- the completion and implementation celerity of the system is required not only the energy context and current climate, but also by the fact that behavioral and attitudinal

changes occur after relatively long periods of time, primarily requiring financial and logistical resources that can be largely provided by the redistribution thus achieved on market overall.

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