

Designing and implementing an energy regulatory framework in a transition economy: the opportunity of the demand side

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1 SYNOPSIS

This paper presents orientations and identifies barriers for integrating demand side management options within the legislative framework in countries undergoing an economic transition.

2 ABSTRACT

Demand side management is increasingly applied in developed countries. In parallel, a majority of international projects for restructuring energy network sectors are implemented, comprising legal and regulatory reforms, financial and economic sustainability and modifying the structure and the ownership of energy firms. Those reforms usually respond to the preoccupation of efficiency, safety, quality of service and tariffs as a signal to consumers. In a majority of cases, competition is introduced at the level of production. However, considering the natural monopoly situation of network energies, the competition, which is one of the conditions for efficiency, is difficult to apply in this activity. And yet, energy network operators are in direct contact with consumers.

The internationally funded projects offer an opportunity to include DSM options within a consistent legal and regulatory framework in a consistent way, thereby defining the responsibilities and obligations of each actor.

Western European experiences give a wide panorama of necessary conditions and consequent implementation schemes. In the light of these experiences, characteristics of economies in transition bring to the conclusion that the inclusion of DSM within the legal and regulatory framework, and further, the inclusion of energy end use efficiency within the government's attributions is a promising option,

3 INTRODUCTION

Demand side management is a series of actions towards the end user which aims at modifying the consumption pattern and level in order to avoid meeting the demand by capacity investments. It is therefore the notion of integration of demand options within energy planning which is new as regards to previously implemented energy saving actions where the viability of a project depended on the profitability from the consumer's point of view. Demand side management was first applied to the electricity sector. However, it is relevant for all network energy supplies. Some specific issues exist when the supplier is in a situation of geographical monopoly (low voltage electricity, gas, heat).

Emerging markets mainly in eastern Europe are confronted with state-owned, mono-bloc and vertically integrated energy firms. In parallel to the deregulation process in the US to a certain extent and later more thoroughly in Western Europe, restructuring of energy sectors is the aim of a great number of internationally financed project. Rising environmental concerns and cost-effectiveness search imply widening the scope of restructuring to include demand side management. However, this topic is often covered within dispositions related to energy saving and therefore in a separate legal set up than that of energy supply.

This paper presents an analysis of strength and weaknesses of the inclusion of DSM within legal and regulatory framework in western Europe and proposals for integration within energy legal framework in economies in transition.

4 CONDITIONS AND POSSIBLE ACTORS FOR DSM - WESTERN EUROPE

4.1 General conditions for implementing DSM

To successfully implement DSM, the entity needs to comply with the following conditions:

- Give a high priority to DSM actions because it is part of obligatory attributions or because it is an objective and rational response to economic, financial, environmental or/and political constraints.
- Find a financial motive or, at least not suffer from implementing DSM.
- Know the demand. In many cases, demand of electricity, gas and heat is well known in terms of quantity and power (not always at individual level) but very few data traditionally exist on the repartition per type of use (lighting, hot water, heating, appliances, etc.) These data are very useful to determine potentials and correctly evaluate DSM actions.
- Know customers criteria of decision in order to design and implement successfully DSM at least cost, which implies social type activities, very remote from traditional activities of energy sector's actors.
- Dispose of means of action such as human and financial means, network of distributors, media supports for information campaign, analyzing and project running capacity.

4.2 Review of possible entities responsible for DSM implementation

The most commonly known example is that of the US where utilities implemented DSM as a consequence to tariffs increase control, contradictory process and obligation to carry out DSM studies at their own expenses.

In Europe in general, energy saving agencies and in some cases governmental bodies such as ministries or local authorities are participating to DSM in collaboration with utilities. Traditionally the utility has means and responsibility to implement and evaluate cost effectiveness of DSM actions. This is the case in Denmark (advice to consumers), Great Britain and the Netherlands for instance. However, in some cases the implementation and the evaluation is subject to common agreement between the utility, the energy saving agency and local authorities (France) or utilities and the ministry (Spain). The financing is also different from one country to another. However, due to general reduction in public spending, the utility usually supports investments costs. It seems logical since it is the utility which will benefit from cost reduction in the long run,

Whether governmental bodies participate to DSM implementation, energy distributors, which have direct contacts and knowledge with consumers, the technical know-how and financial resources play a major role in DSM implementation. They seem to be the adequate actor.

4.3 Identified barriers to DSM

The following barriers usually appear for DSM implementation

Technical barriers:

- The utilities main activity is traditionally to operate plants, networks, etc. and is concerned mainly with quality and safety of supply.
- It is always more risky and less profitable in the short run to act in order for the consumer to save energy than to sell energy.
- The decision to take action is left to the end user whom is not always well informed or/and has decision criteria different from economic rationale.
- Assessment of DSM impact is a complex task.
- The type of actions required are very diverse; from social studies to publicity.

Financial barriers:

- The utility implementing DSM will often, but not always, encounter a temporary surcharge. In order to overcome this barrier, a possible solution is to cover this surcharge by price increase. Evan Mills from University of Lund and Nils Borg from Uppsala University in Sweden showed that on 10 utilities of 5 western European countries (Denmark, Sweden, the Netherlands, Italy and Germany), DSM programs had to mean either a price increase or an additional burden for the utility and often a mix of both. The estimated net loss per kWh saved is ranging from 0 to 50 mECU/kWh and, in the majority of cases, between 20 and 30 mECU/kWh saved.
- The energy saving agency usually has a reduced budget and is submitted to budgetary logic.

4.4 Associated legal and regulatory provisions

The French case:

France energy sector is characterized by a mono-bloc organization for the network energy activity. The electricity utility represents 96% of distribution and 92% of production. For the gas sector three companies exist, but the national gas utility has the monopoly for transport and, to date, for distribution.

Within the energy supply legal and regulatory framework for electricity and gas, no provision is made for DSM. The obligation of supply and the quality of supply are present without the notion of energy service. During many years, energy saving programs have been carried out by the energy saving agency on individual voluntary agreements basis with in many cases governmental grant schemes. However, the lack of automatic and constant contacts with consumers and difficulties to obtain relevant data did not allow to apply DSM programs. Furthermore, traditionally, and very logically, the energy saving agency and the utility had little if not conflictual working relations.

Recently, a convention was passed between the utility and the energy saving agency, serving as a frame for local implementation conventions including local authorities as well. The new initiative can be analyzed as the result of external pressure: "everybody is talking about and implementing DSM" and environmental concerns postponing or jeopardizing utility's planned investments projects. However, due to over-capacity, the tendency of the French utility seems to be to adopt a slow pace in programs in order to reduce their costs.

The Norwegian case:

The Norwegian electricity sector is composed of 300 enterprises which are either production, distribution or vertically integrated locally implanted enterprises. The Norwegian government felt it necessary to pass a new law on energy in 1991 including the following principles:

- Least cost and security for the supply of the energy to the consumer.
- Market oriented structural and organizational reform.
- Rational use of resources.
- Minimum environmental impact.

The result is a separation of the transport, which stays public, the production, with the common carrier and the distribution. The obligation is imposed on the electric utilities to inform and advice their consumers on energy efficiency. This is financed through a price surcharge.

Critics of this law, by Norwegian utilities themselves are that energy saving potentials are not exploited because of the lack of definition of responsibilities and financing mechanisms in the law. Utilities clearly state that the diminution of sales and DSM programs do not interest them because it is too risky and imply temporarily higher costs. Increasing exports to maximize the use of overcapacity is considered to be a more promising activity.

The Danish case:

Actions towards DSM in Denmark are based on the Energy 2000 act giving national targets for the country in terms of CO₂, NO_x and SO_x emissions by 2003 and recommendations from parliament to the utilities. As a result, apart from the interesting technology procurement and other projects carried out by the Danish Energy Agency, most of the utilities have built up internal advice and auditing capacities which are usually provided free of charge to their clients.

Legal provisions seem to be efficiently replaced by national commitment.

5 CHARACTERISTICS OF THE ENERGY SECTOR IN ECONOMIES IN TRANSITION

Most developing countries are in an economic transition. This is the case for most of Latin American and Asian countries and in many of those countries, an internationally financed project aims at energy sector reform, development of independent power producers, etc. Eastern European countries are in a very specific position since they undergo not only an economic transition, but also a political and social transition. In addition, the transition pace is fast and reforms adopted mean drastic changes in all above mentioned aspects. Therefore, and whilst the following could apply to any economy in transition, we will focus on Central and Eastern European countries.

5.1 Importance of energy on the state budget

External prices readjustments to costs and global economic and financial crisis undergone by economies in transition is bringing often imported energy to the first line within the state budget. In addition, due to social constraints, prices are not reflecting costs for network energies, the state budget also serves to subsidize network activities. At last, borrowing capacities have to be dedicated in a great proportion to rehabilitation and investments in energy supply run down installations. This makes DSM options even more economically attractive as a result of the weight of energy spending in the economies of those countries.

5.2 Organizational structures

Most of economies in transition have inherited and have to dismantle a control-and-command centrally planned economy. The energy sector is no exception. Energy network enterprises are in a majority of cases vertically integrated, centrally planned and directly attached to the ministry in charge of energy. Operation is based on physical performances, in theoretical accordance with often out-of-date norms. Financial or quality of service criteria are not integrated within the decision-making process yet. One can notice that in terms of structure, a similarity exists with western European countries such as France and Italy.

5.3 Breakdown of responsibilities

Network energies are usually considered as public service in Central and Eastern Europe. Due to financial links with the government for subsidies and to past heritage, the clear division of responsibilities between the utilities and government officials is not yet achieved. This is reinforced by the fact that, in many countries, a severe energy crisis justifies the intervention of government officials in the management of the network energy enterprise as an emergency measure. This situation allows the network energy supplier to concentrate his action on technical improvements of it's installations and postpone economic efficiency and customers oriented action. On the other hand, government officials, confronted by the day-to-day technical difficulties, cannot play their role of regulator. And yet, this public service is exploited by private entities or plans are so. This raises que question of breakdown of responsibilities between governmental bodies at national and local level and the operator.

6 SOLUTIONS IMPLEMENTED TO IMPROVE THE EFFICIENCY OF ENERGY SUPPLY

6.1 Disintegration of utilities

In most cases, the legal and regulatory reform include a disintegration of the energy utilities in order to implement real prices, based on costs, between these new entities and to provide room for competition. The solution where the distribution of electricity, gas or even heat, is still public-owned but left to concessionaires or directly privately owned while a competition process is installed at the production level of electricity, is very common, and allows decentralization of decisions and increased flexibility and adaptability of the new structures.

Each activity has it's own characteristics and calls for different provisions. Clearly, competition will be effective to improve energy production, the transport activity will remain national for technico-economic reasons and the distribution activity will involve local decision-makers and will have to get closer to end users.

6.2 Restoring financial sustainability

In order to alleviate the state budget and, at the same time, cope with rational use of energy issues, tariffs reforms are widely, but slowly implemented in economies in transition. The tendency is Long Run Marginal Costs based tariffs. This does have a drastic impact on the energy demand, but not with an equivalent service. This is to say that reduction of electricity and gas demand is in many cases motivated by severe economic recession and family budget constraints. In addition, heat consumption reduction due to consumers decision is, in most cases, impossible to achieve for lack of individual regulating devices.

It is widely admitted that prices reflecting costs is a necessary condition to rational use of energy. However, lack of information, lack of funds, lack of motivation from all sides, does not allow to exploit the existing demand management potential benefits.

6.3 Clear breakdown of responsibilities

Defining more clearly respective responsibilities of each actors allows to realize savings in terms of costs, to improve internal efficiency of energy firms and is a key factor to sound functioning of any business. Generally, in proposed energy sector reforms, the government is made responsible for the implementation of laws and by-laws in the energy sector with two levels: the national level and the local level. Utilities are responsible of energy supply and end use of energy is left to consumers responsibility with an eventual control by an inspection body. At last, national energy saving agencies are responsible for energy conservation implementation.

6.4 Change of ownership

Privatizing network energy enterprises is envisaged or applied in a number of countries undergoing an economic transition. The aim to orientate those enterprises towards profitability. However, without entering in the debate of public or non-public service, the fact is that, the very existence of network, often costly to install and maintain, creates a geographic monopoly. Privatizing can increase internal efficiency of the firm but will not necessarily mean a lesser cost of services for the client. The particular interest of the privatized firm in maximizing its profit is to increase its activity while prices are usually controlled by government. It is less risky and more profitable to sell energy than to act in order for the consumer to save it. In addition, financing investments can represent a financial burden but will not be a real issue as long as the investment is needed to ensure security of the network. The implication of private actors in energy network business alleviates the state budget but does not imply more rational use of energy unless specifically part of the private firms obligations.

6.5 Impacts of reforms

Envisaged and implemented reforms of the energy sector make room for competition, especially for production, while end use management is left to end users informed and controlled through a separate set of energy conservation measures. In brief, one can say that, in general terms, reforms care for efficiency of the supply but do not imply the supply of a service at a least cost for the consumer and the society. The consumer is confronted with rising energy prices, without matching income or wage increase and has inherited poor performances buildings and appliances. His poor knowledge of existing possibilities and financial constraints prevent him from rationally using energy. In parallel, an offer for energy efficient appliances, equipment and materials does not locally exist.

Therefore, legal and regulatory provisions for rational use of energy as part of the government's attribution and inclusion of DSM implementation as part of the network energy suppliers attributions appears to be the most directly and efficiently applicable solution.

7 PROPOSAL FOR AN INTEGRATION OF DSM WITHIN THE LEGAL AND REGULATORY FRAMEWORK

Rational use of energy is one of the most promising and yet most challenging issue. Consequences are environmental, economic and sometimes social. It is legitimate to include this topic within the State's preoccupation list at the same rank of importance as energy supply and environment protection. This part of the paper tries to provide ground for this and ways to do it. We consider that including this topic within a law, voted by parliament would be consistent with democratic process.

7.1 Grounding for state action in DSM

Within a market economy, the government has without contestation at least three responsibilities:

- To provide services which are of public nature (typically defense and justice).
- Being the warrant for societal interest in cases where the market cannot reach the optimum (typically environment).
- Providing a social safety net in times of transition.

The following items justify a clear commitment from the state towards demand side management as a major contribution to rational use of energy.

- Energy distribution and environment are two areas which do not respond directly to market mechanisms. Market oriented mechanisms have been tested without, to date, a clear success in either field.

- Energy is imported and an increased dependence on this energy represents a risk for the country or energy is exported: it is the property of "the nation" and it represents a resource which needs rational use and minimum waste.
- Network services are often part of a social safety net. This is especially true in those economies where the transition has meant a diminution of comfort.
- Demand side management is beneficial for the consumer who will have access to an equivalent service at a lesser price, and to the society (imports, investments, economic growth, technology pull, better environment). It is estimated that in the majority of cases, an avoided kWh is at least 50% cheaper than investing in corresponding capacity. In prioritized programs, the cost of first avoided kWh can represent up to a third of the cost.

As seen in previous chapters of this paper, DSM will not be a natural component of activity of energy distributors. The government has a role to play as part of its attributions: give the initiative for the inclusion of DSM within global energy laws. This will then allow to adopt by-laws in application of voted laws, at a feasible and workable pace in relation to the country's situation evolution.

7.2 The notion of energy service

The finality of network energy suppliers obligation to supply continuously and securely the concerned energy, with minimum quality requirements, is to serve the consumer. Network energy supply is in most cases considered as a public service in countries in transition and will probably remain so in the future. The introduction of the concept of energy service within the legal and regulatory framework responds to the principle of clear separation of responsibilities.

It allows to include DSM actions within the scope of main activities of network energy suppliers which are logically restricted to their activity due to their monopolistic situation (principle of limitation of activity to avoid diversification).

7.3 Integration of DSM within national energy programs

Energy and environment is becoming a subject for parliament debates. It is a part of state economic planning as well. In many cases, while monopoly firms are in a situation of overcapacity, the reaction is to maximize the use of their equipments. The inclusion of DSM programs within national energy planning responds to the preoccupation to avoid over-investment.

7.4 The openness of energy debates

An open debate serves at least two purposes:

- It allows contradictory approach and facilitate the emergence of innovative solutions more favorable for the society and the environment.
- It participates to the awareness building process.

7.5 The government as responsible for the application of the law

The widening of the government responsibilities to assess and apply the best possible and workable solutions through time, issuing by-laws in application of the general energy law, has to be included within the general energy law, with dispositions related to organization of responsible bodies within the government. An energy saving direction within either the ministry of energy or the ministry of economy or an inter-ministry structure under the prime minister are possible solutions.

7.6 The utilities as responsible for implementation

Distribution utilities and production utilities for big consumers are in constant and automatic contact with end users. They are traditionally responsible for providing network energy service. They are in a position to collect and analyze data. They have the technical know-how and human, technical and often financial resources. Therefore, they are naturally designated for DSM implementation since DSM is part of least cost, best quality, environmentally friendly service. This responsibility is to be clearly included in the legal and regulatory framework within the attributions of network energy utilities as a counterpart for their monopoly situation.

Energy saving agencies should also have a role to play as advisor, coordinator, supplier of advanced technical data and information about similar projects in other parts of the world, leader in research and development, etc. The inclusion of DSM responsibilities within the scope of activities of network energy suppliers should mean an increased collaboration with the energy saving agency or the energy saving department within the ministry in charge of energy.

7.7 The proposed energy law and by-laws

The proposed energy law would set the basic principles for energy sector operation and clearly state the integration of rational use of energy within the scope of the law and DSM as part of the responsibility of the energy sector firms in contact with consumers as far as implementation goes.

By-law will allow to implement DSM programs and be issued only when the country's economic and social conditions can render this implementation feasible.

8 MAIN BARRIERS FOR INTEGRATION

8.1 Government main barriers

In economies in transition, proposition made for such an energy law to decision-makers was received with little enthusiasm. This is explained by the following:

- In many government representatives minds, a law should not include general principles. It should be applicable and enforceable.
- The end use is already regulated through consumption standards and norms controlled by inspectors.
- Industrial consumers will take action to save energy as soon as they operate on market basis principles.
- The general feeling is that incentive mechanisms do not work within their country.

8.2 Utilities barriers

Reasons exposed by utilities in economies in transition are resumed in the following:

- We cannot decide of such a program.
- The tasks involved require too much work. Oftentimes, individuals consumptions are unknown through lack of metering.
- The enterprise priority is to improve supply efficiency. There is no resources, human, technical or financial to dedicate to DSM topics.
- Customers-oriented policies are not part of the firms strategies yet

9 STUDY CASES

Internationally financed studies usually treat separately the supply side and rational use of energy. As previously seen, commonly proposed solutions for the energy sector reform does not provide answer to solve energy conservation issues while energy conservation programs give tools for non-systematic, voluntary, cost-sharing agreements. The following case studies illustrate in two cases, the typical energy supply proposed reform and proposes integration of DSM at the level of a network energy law.

9.1 Electricity supply regulatory frame and heat investment project in a Central European country

This country is one of the most advanced Central European country. Price liberalization, dismantling of control-and command system and restructuring of the economy is well underway. In this frame, the country envisage a reform of the energy legal and regulatory framework. To this end, a number of recommendations from the EC 1993 study will allow a more efficient functioning of the sector's actors. Restoring financial sustainability, decentralization of decision, clear breakdown of responsibilities and tariffs reform implementation are the main components of this study. No provision is made for DSM actions and the notion of supply of energy services is not included.

In a similar manner, for heat production and distribution in the capital town, a pre-investment study concluded to the change of fuel from coal to gas to reduce pollution and to obligation of the concessionaire to run the production and network in an efficient manner. No provision was made and no budget planned to be dedicated to DSM actions within the project of concession contract

9.2 An energy services law proposed in one Central European country

A project on global energy legal and regulatory framework, financed by the European Union was carried by a joint venture between a Western European firm and a local partner. Results of the initial dialogue during meetings with government officials in this country clearly showed barriers for an effective integration of DSM within a general energy law. The following reasons were invoked:

- The responsibility of the state is to ensure a reliable and continuous supply of energy through network.
- The emphasis is made to sector restructuring and infrastructure ownership.
- General principles such as preference to DSM actions and providing of a service rather than energy are considered as not having their place within a law by many government officials.
- More often than not, norms and standards are considered sufficient to ensure energy efficiency.

The intermediary project is a very detailed network energy law which provides for tariffs, infrastructures ownership, restructuring the sector, national energy programming and development plans and right and obligations in terms of quality, connection and disconnection. Within this law, the following transformations to the existing law project are proposed to government in a last approval phase:

- Introduction of the concept of energy services suppliers rather than energy suppliers within the law on network energy.
- Integration of end use planning, means of implementation and evaluation within the national energy program.
- Publication of this energy program prior to its presentation to parliament and presentation to parliament together with comments and contradictory studies to parliament.
- Publication of energy plans at national and local level.
- Transformation of the energy price council; independent body, into an energy council, competent for evaluating least cost options.
- Possible obligation made to big energy consumers to prepare energy plans in order to render consistent national development plans and identify energy conservation projects.
- Information circulation as open as possible between actors within the energy network sector and towards local authorities.
- Responsibility given to utilities to include DSM options, cost, means, expected results and degree of implementation within each energy development at each level.
- Responsibility given to the distribution enterprises to provide a service at least economic and environmental cost to their clients and to keep them regularly informed of opportunities.
- Possibility to finance DSM programs through tariffs surcharges.
- Preference given to financing solutions painless to the consumer (third party financing).

11 CONCLUSION

The US and lately western European countries has adapted or interpreted their energy legal and regulatory framework in order to promote DSM programs. The effective implementation was often the result of a network of constraints imposed on the utilities, coupled with an incentive approach. Constraints were existing through tariffs increase interdiction, like in the US and investments constraints like in France and Denmark. Incentives were obtained through image raising, financial support, technical support, etc.

Considering the urgent situation of economies in transition, the weight of the past and rising environmental concern, a new type of energy firms needs to emerge: the energy services supplier. This integrated option would probably reduce transaction and information gathering costs. The legal and regulatory frame is the first tool the state dispose of to guaranty the general interest. Once this is acted, remains the implementation phase. In this area, international cooperation is crucial to avoid error of the past.

We have tried to open a path for inclusion of rational use of energy and DSM in particular within legal and regulatory framework. Should this direction be considered promising, a adaptation of a majority of terms of reference for technical assistance and for industrial investments projects would be needed from funding agencies.

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