Residential Electrical Equipment Use and Energy Management Attitudes In Post-Communist Hungary

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This paper presents findings from a study of 1000 Hungarian households, and indicates how the information was used in the development of an effective demand-side management (DSM) strategy for the Hungarian electricity industry. DSM has become increasingly attractive as the Hungarian economy changes, and to offset reductions in electricity imports. The study included the first-ever survey of Hungarians regarding their electrical equipment use patterns and attitudes, finding that residents are likely to be amenable to DSM approaches. The survey addressed potential areas for DSM in the residential sector, as well as some key attitudinal facilitators and obstacles to achieving this potential.

Introduction

In its years as a Communist country, Hungary placed considerable emphasis on developing heavy industry. Consequently, Hungary relied heavily on the use of electricity in its development after World War II. (The Economist Intelligence Unit, 1990.). Between 1951 and 1990, primary transmission lines increased from about 900 to nearly 6000 kilometres, including 268 kilometres of 750 kV lines (MVMT, 1991). As well, starting in the early 1950's, Hungary undertook a massive program of electrification and, by 1990, 99.8% of all buildings had electricity (MVMT, 1991). Not surprisingly, average annual household consumption of electricity rose from 139 kWh in 1951 to 2100 kWh in 1991, an increase of nearly 1600% (MVMT, 1991). Between 1985 and 1989 alone, average per household electricity consumption rose nearly 10%, but overall per capita consumption remained only half or less of that in the United States or Canada (United Nations, 1990). The demand for electricity is expected to grow considerably, particularly beyond the year 2000 (Perkins, 1992).

Between 1951 and 1990, the electricity system peak load increased from about 500 MW to over 6500 MW. Demand has been met by a mix of generation, mainly coal in the post-War years, but later including oil, natural gas and, in 1984, nuclear. Hungary has also relied heavily on imports of electricity: from 1969 to 1989, about 20% of the load was met by importing electricity from the former Soviet Union (MVMT, 1991).

Hungary determined to move away from its Communist past, and began a relatively "quiet" transition to a democratic government in 1990. Although still in its infancy, the new government intends to dismantle the old, centrally planned economy and create competitive markets for as many services and products as possible.

The electricity industry in Hungary is organized as one large national utility, the Hungarian Electricity Board or MVMT. It is responsible for nearly all the electrical generation (3% is produced by industry and municipal heating plants), and for all transmission and generation facilities. MVMT is a "trust" comprised of headquarters and a large number of subsidiary companies, the most important of which are the transmission company operating the national grid, 11 companies operating 22 power plants, and six regional distribution companies.

The Hungarian government has announced its intention to make MVMT a self-financing enterprise, operating in a regulatory framework that allows for privatization where possible or desirable. The new corporate formations are expected to be announced by the end of 1992. Several arrangements are possible, but forecasting and planning for future demand in the current economic climate will be highly uncertain.

One way for MVMT to become flexible enough to deal with uncertainties is by developing and implementing a national DSM strategy to meet a number of contingencies. The largest risk MVMT is likely to face involves electricity imported from the east. The current generation mix is about 1/3 nuclear, 1/3 thermal and 1/3 imported electricity, mostly from the Soviet Union. In 1991, the contract for imports from the Soviet Union was revised downward from 1850 MW to 1100 MW. More recent disassembly of the Soviet Union has further jeopardized the imports.

Contingency plans include imports from other neighbouring countries, an emergency load shedding plan and other approaches. However, constructing the next major baseload plant (most likely nuclear) is not expected before the turn of the century.

DSM is one new measure adopted by MVMT in its attempt to be more flexible (Perkins, 1992). A target of 500 to 600 MW has been set for demand reduction by the year 2000, representing 8% of the existing system peak of 6500 MW (MVMT, 1990).

MVMT engaged the services of a large Ontario electric utility in early 1991 to assist in its development of a strategic plan for DSM. The utility was selected because it had the expertise in DSM and practical experience in implementing such programs in its own jurisdiction. In November, 1991, the utility team submitted its report, which included a situation assessment, a marketing strategy, a five year plan, a scientific process to screen and develop new programs, and an identified set of "quick start" initiatives, including a competent public relations program, that would get MVMT started and demonstrate its commitment to DSM (Ontario Hydro, 1991b).

The consulting utility's report tried to help Hungarian utility planners to understand that DSM involves adopting a marketing approach. Not unlike their North American counterparts, MVMT staff thought mainly in terms of a public of consumers who would accept whatever the utility gave them. The notion of a market, and of having to convince customers of the benefits of a product or program, were unfamiliar. Needing to research rather than assume customer response was a novel ideal after 40 years of the previous system.

DSM means approaching a market. A successful DSM program depends on how interested and motivated customers are which, in turn, depends in part on how effectively the requirements and benefits of DSM are communicated to them. Effective communication requires a knowledge of and sensitivity to customers' energy needs and attitudes, as well as their decision criteria and the factors that affect these. Consequently, one of the first tasks undertaken by the consulting team was to urge MVMT to conduct a study of the equipment use and attitudes of its electricity customers. The remainder of this paper focuses on the survey and the implication of survey findings for DSM in Hungary.

Methodology

Survey Of Hungarian Residential Customers

A residential customer survey was undertaken in the summer of 1991. The survey, using face-to-face interviews, was carried out by a Hungarian market research firm. Surprisingly, a number of these firms exist in Hungary; most are privatized offshoots of government research bureaus, such as the one that conducted the MVMT survey, or new arrivals from the west.

The residential survey required close cooperation among the MVMT staff, market researchers and the consultants. Survey research concepts were new to the MVMT staff, while the DSM and technical concepts were foreign to the market researchers, and all were a mystery to respondents. Consequently, considerable care had to be taken in the design and wording of the interview schedule. MVMT staff and the market research firm jointly developed the schedule and the questions to be asked, with help from consultants based on their own in-house studies (Ontario Hydro, 1988).

Telephones in Hungary are not as widely available as in North America, so trained interviewers conducted in-home interviews throughout the country within a three week period during July, 1991. The refusal rate was remarkably low by North American standards--about 8% overall. This was higher than the research firm had expected, and they ascribed it to a growing fear to admit strangers into homes. This was the first time anyone had asked residents for their opinions about energy matters,[1] and the market research firm, which was itself excited about being part of the inaugural effort, indicated that survey respondents were cooperative, interested and motivated to provide good information.

A sample of 1000 households in 50 pre-selected locations was drawn to represent the Hungarian population distribution. There are about 10.5 million people in Hungary, living in about 3.8 million households; households are concentrated in Budapest (23%) or in one of five smaller cities (about 13%). Smaller urban centres, make up about 24% of households, with the rest (40%) villages or rural areas (The Economist Intelligence Unit, 1990; Kozponti Statisztikai Hivatal, 1990). For each of the 50 sampling

locations, a random sample of households was selected. The size of the sample for any one location was proportional to that location's relative size in the whole population. This procedure resulted in a representative sample of the residential population of the country and permitted regional comparisons for consideration by distribution company planners. The confidence interval for proportions for a sample of this size is approximately ± 3%, 95 times in 100.

Results

Residents' Use of Electrical Equipment

Electricity is not a major fuel for space heating in Hungarian homes (Table 1). Dwellings are heated mainly with natural gas (37%), coal or wood (29%) or, mainly in urban areas, through district heating (24%), that is, steam generated in a central location and distributed through large pipes to nearby homes. Electric space heating is reported in only about 3% of households.

Water is widely heated with electricity (Table 2). About one-quarter (27%) of households use gas to heat water, but nearly half (47%) have some form of electric water heating, especially in rural areas of the country. Most electric water heaters are controlled by mechanical timers or by a ripple control system which is currently being installed throughout Hungary. That is, most of the water-heating electricity load has already been shifted to off-peak periods.

The dominant lighting device in residences is the traditional incandescent bulb (Table 3). An average of about 13 light bulbs is used per household; this is about 1/3 the number in an average household in Ontario (Ontario Hydro, 1991a). Fluorescent lamps appear in about 15% of homes, and only in relatively small numbers. Compact fluorescents are fairly widely known, but rare. About 34% of residents report knowing about them, but they appear in only 3% of households.

Electric appliances are quite common in Hungarian homes. Many are manufactured in Hungary but a large number come from Eastern Europe and tend to be relatively inefficient (Table 4). Washing machines are widely distributed, but only about half are the automatic kind that incorporate water heating devices. The older type of machines that lack built-in water heaters are more common in rural areas.

Most Hungarian households (88%) use gas for cooking, but 13% have electric stoves, about the same number (11%) have microwave ovens, and a sizeable proportion (25%) have grills, about half of which are electric. Refrigerators are commonplace, though many (55%) are quite small, and freezers are also widely used, especially in smaller centres.

Other common electric appliances are vacuum cleaners (reported in 95% of homes), hair dryers (87%) and electric tools (22%). Dishwashers and clothes dryers are virtually absent because these were not readily available until recently and because of their relatively high cost.

Attitudes Related to Conservation

Hungarians are well aware of what they pay for electricity, but not how much they actually use (Orsody and Pinter, 1991). Unlike residential customers in North America, nearly all those in Hungary (over 80%) recalled

Table 1. Hungarian Residential Survey, 1991 Primary Space Heating Fuel[a]

	Natural Gas	Coal or Wood	District Heating	Electricity	Other[b]	
Budapest	50	10	29	5	6	(100%)
Other Urban	38	11	40	4	7	(100%)
Villages	28	55	6	3	8	(100%)
Total	**37**	**29**	**24**	**3**	**7**	**(100%)**

(a) Data are percentages of households reporting use of specified fuels.
(b) Includes: oil, propane, tile stoves, peat and "other, not specified."

Table 2. Hungarian Residential Survey, 1991 - Domestic Water Heating Fuel[a]

	Electricity	Natural Gas	Central or District Supply	Coal or Wood	Other[b]	None	
Budapest	30	37	34	1	2	3	(105%)
Other Urban	25	36	37	2	2	3	(105%)
Villages	75	13	5	5	1	5	(104%)
Total	**47**	**27**	**23**	**3**	**1**	**4**	**(105%)**

(a) Data are percentages of households reporting use of specified fuels. Multiple mentions were accepted, so percentages total more than 100% of respondent base.
(b) Includes: oil, peat and "other, not specified."

the amount of their last electricity bill (Ontario Hydro, 1988). This suggests that Hungarian residents pay close attention to their household expenditures. Least likely to recall the amount were inhabitants of Budapest, where meters are read and bills delivered using a more complicated system than elsewhere.

At the same time, like their North American counterparts, few Hungarian residential customers are aware of how much electricity they use, except to say not a great deal.[2] Nearly all respondents (about 85%), both those who know the details of their electricity use and those who do not, think that electricity is too expensive.

The survey indicated a "cautious pessimism" among Hungarians about the future of their electricity supply; they are aware that funds for new generating capacity are scarce. About one-third of residential customers believe that the supply situation will worsen and only 8% say it will get better. Not surprisingly, then, about 98% of all Hungarian residential electricity customers believe that energy conservation is important (Table 5). A majority (56%) believe conservation to be extremely important, particularly those with more appliances in their homes. Asked who should be responsible for implementing energy conservation, however, Hungarian residents responded that primary responsibility lies with equipment producers and least with the National government.

Table 3. Hungarian Residential Survey, 1991 - Lighting Devices Used[a]

		Flourescents				
	"Traditional" Incandescent	Old Type	Energy Saving	Compact	Other[b]	
Budapest	99	17	9	3	3	(131%)
Other Urban	98	20	7	3	4	(132%)
Villages	100	12	4	2	3	(121%)
Total	**99**	**15**	**6**	**3**	**3**	**(126%)**

(a) Data are percentages of households reporting at least one instance of specified lighting devices. Multiple mentions were accepted, so percentages total more than 100% of respondent base.
(b) Includes: kerosene lanterns and "other, not specified."

Table 4. Hungarian Residential Survey, 1991 - Home Appliance Ownership[a]

	Washing Machine		Gas	Electric	Microwave		Refrigerator	
	No Heater	Heater	Stove	Stove	Oven	"Grill"	Small	Large
Budapest	18	63	85	20	21	35	51	50
Other Urban	43	42	90	12	11	29	50	49
Villages	60	34	89	9	6	16	63	35
Total	**47**	**44**	**88**	**13**	**11**	**25**	**55**	**44**

	Freezer			Clothes	Vacuum	Hair	Electric
	Small	Large	Dishwasher	Dryer	Cleaner	Dryer	Tools
Budapest	26	28	4	(b)	96	89	28
Other Urban	25	28	1	1	95	90	16
Villages	20	41	1	(b)	95	85	24
Total	**23**	**33**	**2**	**1**	**95**	**87**	**22**

(a) Data shown are proportions of households in Budapest, Other Urban and Villages, respectively, reporting presence of specified equipment. Multiple mentions were accepted, so percentages total more than 100%.
(b) Less than 1%.

Reported buying behaviour appears to reflect careful shopping. About one-third (34%) said that they get enough information about the energy efficiency of electric equipment they intend to buy. About half the residential customers said that when they buy a new piece of electrical equipment they buy the most energy-saving type, even though it may be more expensive. About 10% of residential customers said that they would be willing to trade in their current appliances for new ones, if the new ones were more energy efficient.

Yet getting Hungarians to trade in their current inefficient appliances might encounter some resistance. One-third (35%) of survey respondents would be unwilling to exchange their appliances if they had to put up additional funds to do so or might do so only if there were no additional cost. Another 34% say they might exchange if the difference in the price they had to pay were less than 10%. (Table 6).

Similar findings were obtained regarding replacement of current lighting equipment with compact fluorescents (Table 7). About one-third (32%) were not at all interested if they had to pay more, and about one-quarter (27%) would pay if the difference were 10% or less. In Budapest, however, the reception to compact fluorescents was somewhat more positive. More than half those surveyed in Budapest said they would pay at least 25% more for an energy-saving fluorescent. At the same time, the Hungarian market researchers asserted that considering trade-offs between additional costs and potential savings is atypical of Hungarians' thinking in recent decades. Nonetheless, the survey suggests that a sizeable proportion of residents could be attracted to compact fluorescents or other DSM measures if the price were made acceptable.

Information About Energy Savings

The local electricity supply companies appear to be a credible, but under-used source of information about energy savings. Residential customers regard the service they get from the six regional distribution companies quite positively, despite some concern about outages and voltage fluctuations. About one-quarter said they couldn't offer an opinion about the companies' service, but of those who did, 61% rated the service good and 8% considered it excellent. At the same time, most (88%) said they do not know much about the customer services the local companies offer, such as advice on energy efficiency and information on appliances. A sizeable proportion (38%) said they would welcome information about energy

savings and information from their local supplier of electricity.

Hungarians currently rely heavily on mass media for their information about electricity, mainly television but also newspapers and radio. However, they would prefer to get more of such information from trade allies, that is, from clerks in shops where equipment is sold and from the electricity supply companies.

Conclusions

In Hungary, DSM is seen as a potentially valuable response to growing demand for electricity, reductions in imports from the east, and the long time required before new generation is available. However, to be successful, DSM must be "sold" to Hungarian customers.

The major conclusion from the survey discussed in this paper is that Hungarian residential customers are ready to accept the need for energy conservation, but will require more information and monetary incentives. Few Hungarians say they would be willing to put up significant extra sums of money to purchase energy efficient lights or appliances. In itself, this is not surprising, given Hungary's economic situation and the relatively low average income. However, DSM planners already have an important base for program and communications development.

At the same time, electricity is also associated with aspects of "the good life," which is idealized by many Hungarians, especially younger ones. Nearly all Hungarians use electricity extensively to run their appliances, which are often regarded as status symbols. DSM initiatives will, therefore, be perceived as legitimate, but also a risk being seen as denying access to certain material expressions of economic improvement.

As well, although they are receptive to conservation, Hungarian residential customers will not simply respond to admonitions to cut back on their use of electricity. Nor can they be expected to respond consistently to monetary incentives, despite their low incomes. Although about two-thirds of those surveyed said they might pay more for efficient appliances that would cost less to operate, this trade-off of economic considerations against potential savings is not consistent with the population's way of thinking, according to Hungarian market researchers. The survey data suggest that only combinations of strong monetary incentives and information programs are likely to be effective in encouraging DSM.

An important thread in current public thinking is the desire of Hungarians for autonomy, that is, control over their own affairs including the exercise of thrift. This suggests that DSM activities must provide immediate feedback about savings to participants undertaking energy conservation or efficiency improvements. They must see their behaviour as chosen for a reason, rather than mandated.

At the same time, Hungarians have a long-standing reliance on the state for advice, assistance and direction. This means that direction for DSM should come from state agencies, as well as being delivered through local channels. The public may come to look favourably on a government arm as the major agency in promoting DSM, although the survey data suggests that Hungarians do not currently believe that the government bears primary responsibility for conservation. MVMT could also work to position itself for the task in the future, although survey

Table 5. Hungarian Residential Survey, 1991 - "Do You Think Energy Conservation Is Important?"[a]

	Yes, Very Much So	Yes, It is	Not Very Much	Not At All	
Budapest	66	32	[b]	1	(100%)
Other Urban	57	41	2	[b]	(100%)
Villages	50	49	1	[b]	(100%)
Total	**56**	**42**	**1**	[b]	**(100%)**

(a) Direct translations of question asked and response categories provided.
(b) Less than 1%.

Table 6. Hungarian Residential Survey, 1991 - "How Much Extra Would You Be Willing To Pay To Buy Energy Efficient Appliances?"[a]

	Nothing Extra	10% Extra	25% Extra	More Than 25% Extra	Any Price	
Budapest	32	29	22	13	3	(99%)[b]
Other Urban	33	32	24	8	2	(99%)
Villages	38	39	17	6	1	(101%)
Total	**35**	**34**	**21**	**8**	**2**	**(100%)**

(a) Direct translations of question asked and response categories provided.
(b) Totals do not add to 100% due to rounding.

interviewers reported that few people had heard of MVMT or knew anything about it at present.

Although they are uncertain about what agency should take the lead in this matter, they are open to information, advice and guidance from appropriate bodies. Whatever agency takes the lead in DSM, local electricity suppliers are in a good position to deliver DSM programs and information effectively. The level of information about energy conservation and electric technology is generally quite low among Hungarian residents. In fact, they have little awareness of their energy consumption and energy use patterns. Local electricity suppliers could become a credible source of advice and information about electricity use and conservation, and have a major role to play.

A large proportion of the Hungarian population believes the country is experiencing a period of reconstruction. Many Hungarians see their country as leading the way in the reshaping of central and eastern Europe. Indeed, there is some sense of urgency on the part of Hungarians to accomplish change. Consequently, such changes as DSM could come to be seen as crucial to this vanguard image, although possibly being associated with temporary self-denial.

Specific Recommendations for Actions

Based on the survey information and on an extensive investigation of electricity use in Hungary, the study team concluded that it was both desirable and possible to undertake some effective DSM activities immediately (Ontario

Table 7. Hungarian Residential Survey, 1991 - "How Much Extra Would You Be Willing To Pay For An Energy-Saving Long-Life Fluorescent Tube?"[a]

	Nothing Extra	10% Extra	25% Extra	More Than 25% Extra	Any Price	
Budapest	28	17	23	29	4	(101%)[b]
Other Urban	30	26	22	20	2	(100%)
Villages	37	32	21	9	0	(99%)
Total	**32**	**27**	**22**	**18**	**2**	**(99%)**

(a) Direct translations of question asked and response categories provided.
(b) Totals do not add to 100% due to rounding.

Hydro, 1991b). Survey data indicate that customers would be receptive to DSM initiatives, but an infrastructure for delivery of DSM will be an urgent requirement.

Among residential customers (indeed, among Commercial and Industrial ones as well), lighting appears to be a prime DSM target. The availability and awareness of compact fluorescent lamps will likely provide a good basis for a lighting program. As well, high priority will need to be given to developing and enforcing efficiency standards for household appliances, since this is currently the only growth sector in the residential market.

Whatever DSM initiatives are undertaken, it will be necessary to implement a concerted information and public relations effort to raise the level of customer awareness of the immediate need for DSM activities. This effort must be consistent across sectors and also with existing patterns of social behaviour and attitudes. In addition, more information must be gathered to address gaps in knowledge about energy use behaviour and consumption patterns.

Most importantly, it will be necessary for the Hungarian electric utility industry to adopt a new orientation toward users of electricity in order to implement DSM effectively. Users of electricity must be seen not merely as consumers of electricity but as choice-making customers, who have a relationship with their local supply companies that can be exploited for mutual benefit.

Acknowledgements

The study was the result of a team effort, involving the Hungarian market research firm (Orszagos Piackutato Intezet), consultants from Ontario Hydro and a dedicated group of staff from MVMT and local electricity suppliers, especially Tibor Bertok, Sandor Meszaros, and Arpad Lukacs.

Endnotes

1. An earlier survey of about 1000 respondents was conducted in and around the city of Pecs (Orsody and Pinter, 1991). However, the Pecs survey was limited to opinions about the local electricity supplier and its proposed billing system.

2. In the interest of keeping this paper to manageable length, some potential tables had to be omitted. Full details may be found in the Appendix to the project report (Ontario Hydro, 1991b).

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