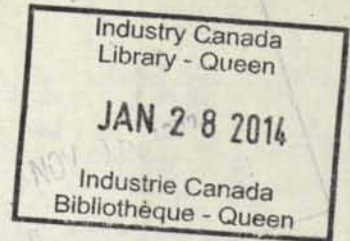


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Some preliminary sources of data for
phase I (b) of the Consumer Behaviour
and Energy Conservation Research Program

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Some Preliminary Sources of Data
for Phase 1 (b) of the
Consumer Behaviour and Energy Conservation Research Program

There are seven major areas in which the consumer makes decisions directly related to the consumption of energy forms. These are space heating of the home, water heating in the home, major appliance use, minor appliance use, lighting, transportation and recreation. In order to determine the availability of data on energy use by product and service groups and the potential for voluntary reduction of that energy use, some preliminary investigation was made of data sources. These sources included manufacturer's associations, standards and testing agencies, other government departments, utilities and Statistics Canada. The basic conclusion from a preliminary examination of these sources is that much work remains to be done in establishing a matrix of products and uses. Below we will discuss our findings to date in the seven areas mentioned previously where the consumer has control of a decision over the use of energy.

Space Heating: Space heating has been estimated to account for between 50 and 68 percent of the home's energy use. The data are available from a variety of sources and seem to be available in a reasonable form. The Statistics Canada catalogue 64-202 (household facilities and equipment) contains annual estimates of the stock of dwellings by the type

of heating equipment. The decennial census of Canada, especially that of 1971, contains diversified information on dwellings by principal heating equipment as well as principal fuel used for heating a house by type of dwelling. These data can be correlated with various other population characteristics available in the census. Ontario Hydro and Quebec Hydro, for their market areas, have undertaken various surveys and studies of electricity used. However, the problem of separating the amount of electricity used for space heating in a dwelling from total electricity used in that dwelling has not been solved. A study at the National Energy Board on electricity used in single dwellings for space heating has yielded some preliminary estimates. The Canadian Electrical Association (CEA) is currently working on an end use breakdown. However, at this time, no hard data exist on specific end-use of electricity in the home. The utility studies mentioned above are estimates based on limited sample surveys.

It should be remembered that electricity is 100% thermally efficient in heating a house. Accordingly, aside from keeping the thermostat down low or turning off rooms that are not being used, little can be done by the consumer with electric base-board heating. The area in space heating where there is great potential for voluntary energy reduction is in those homes heated through forced warm air i.e. by gas or oil furnaces.

According to the Office of Energy Conservation little work has been done in measuring the potential for retrofit devices for gas furnaces. Presently the OEC is tabulating results from an oil furnace survey and hopes to within one month from now certify the first unit(i.e. retrofit) for installation on oil furnaces. Charles Ficner of the OEC estimates that the scope for energy saving in space heating can range as high as 20% of energy currently being consumed for that purpose. According to Ficner, it is nearly impossible to obtain data on the efficiencies of various types of furnace by manufacturer. **Manufacturers** apparently have tested the furnaces but are reluctant to release that information to the public.

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One of the issues which is most puzzling is that in the choice of home heating equipment, it is more often than not the decision of the builer to install a certain type of furnace i.e. gas or oil, and that decision to purchase will be based on usually just one thing - price. To circumvent this problem, the OEC is trying to get the certification requirement for oil furnaces so that all new furnaces will comply with certain efficiency standards. If that program is a success all furnaces on the market will be satisfactory and energy efficient and the purchasing decision will not be against the consumer's interest. For existing furnaces, the OEC intends to begin a wide spread campaign on the potential for retrofit and energy savings.

The Central Mortgage and Housing Cooperation (CMHC) commissioned Scanada Consultants Ltd. to investigate Canada's domestic heating equipment and its energy resources. Scanada, in turn, produced a survey of current practices in heating installation, the choosers of facilities, deciding factors in choice of equipment and the immediate outlook regarding domestic heating equipment and fuel use across Canada. In addition, they assessed the potential for convertibility of equipment fuel to fuel ie, oil facilities to gas facilities, by province in order to determine the potential for upgrading the present heating facilities in the country.

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The Canadian Gas Association (CGA) and the Canadian Standards Association (CSA) are the agencies which approve for the market most heating equipment in the country. Anything which uses gas obviously is under the aegis of the CGA and anything with an electrical component, which includes most oil and gas furnaces with their electric fans, must also be CSA approved. According to the CGA their directory, which is some 300 pages (and which we would be able to obtain) lists heating equipment by manufacturer in addition to input and output Btu's. This information given to us by the CGA seems to contradict what the OEC has told us. However, at this time, we have been unable to obtain a CGA catalogue to check the validity of their representative's statements by telephone.

The Heating, Refrigeration and Air Conditioning Institute (HRA) in Toronto is supposed to be the representative organization for all furnace and air-conditioning manufacturers. We have been unsuccessful in contacting Mr. Sam Cryer, the general manager, who was recommended by another source as an expert on furnace heating and air-conditioning data. Whenever we are able to reach him, we will report any significant findings to those researchers who are interested.

Basically then, the data on space heating, while not abundant, are reasonable enough that certain analysis can probably be carried out to determine those groups of consumers using certain energy forms and the potential for upgrading facilities or proper use and maintenance of existing facilities in order to conserve energy.

Water Heating: In the typical home 16-20 percent of energy use is attributable to a water heater. Most modern water heaters are 40 or 60 gallons capacity with 40 being the most frequent. All gas water heaters are the same efficiency regardless of manufacturer. The gas heaters require virtually no maintenance because a gas-fired water heater does not collect dirt. It remains as efficient as when new for many years. On the other hand, oil-fired water heaters, while slightly more efficient than gas-fired in terms of recovery of hot water when empty, require proper cleaning and adjustment twice a year or will lose efficiency. Electric water heaters are the least efficient of the three major types.

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percent of energy use in the home. Of the minor or portable appliances and home entertainment products ie. consumer electronics, CAMA suggests, that there is little scope for improvement through research and development or through product choice in terms of reduced energy consumption. The only likely activity to have impact for these minor appliances would be that of advertising common sense suggested in the Office of Energy Conservation's 100 ways to save energy and money in the home.

For the major appliances a multitude of studies and surveys exist. As well as the census we have saturation surveys from Ontario Hydro and Quebec Hydro and can probably obtain similar studies from B.C. and Manitoba Hydro. The Canadian Standards Association publishes a complete list of all products safety-approved in Canada. This would have to include everything of an electrical nature.

Each year, CAMA provides a five-year forecast of Canadian appliance saturation ie. major appliances. That is, what is anticipated to be sold across the country by product category. According to a CAMA representative, breaking down sales forecasts beyond the aggregate ie. to model numbers would be next to impossible. In addition, the representative indicated that the manufacturers would be hard-pressed themselves to put together data beyond a general nature. The CAMA representative stressed that once a product is out in the field, the consumer can misuse it to the extent that energy use is highly inefficient. This suggests that regardless of

standards set, for example the new Energuide labelling program, there is a great deal of potential for energy conservation at least within the product class major appliances, by promotion of proper use and maintenance.

It is possible to obtain from the utilities estimates for the average energy consumption of product classes, ie. dishwasher or toaster oven, and from Statistics Canada catalogue 64-202 estimates of the major appliances on the market ie. the stock of those appliances. Therefore it would also be possible to estimate the energy used by product class (but not by brand name) for a limited group of products.

The CAMA representative suggested that manufacturers and retailers are of the opinion that no more than 10% of consumers will respond to the energy labelling program on refrigerators. The information on the label will only be useful at purchase time; after purchase the information may be misleading because the test was carried out under controlled laboratory conditions. The consumer, in his home, may find that the performance of the unit varies widely from the performance level indicated on the label. CAMA agrees that the concept of life cycle costing ie. showing the discounted value of capital and operating costs of the product, will become more important to the public as time passes. However, the simple fact remains that even with these new improved products available the majority of appliances in the

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together some estimates of the number of appliances by type and by amount of energy used. In the case where the appliances are not electric, for example gas cooking facilities, the 1971 census gives a breakdown of the fuel used for cooking. From that some estimates of gas ranges can be derived. Again, for the smaller appliances and home lighting, while some estimates are available of energy use by product, it would appear to be not in our better interest to concentrate on these areas because there is little scope for energy saving in an area which already does not use much energy.

Transportation: In the transportation sector, as everyone is well aware, there have been a myriad of studies on the fuel efficiency of motor vehicles and trucks. In the United States, the Environmental Protection Agency (EPA) has for years been concerned both with fuel efficiency and with pollution. Unfortunately elements which reduce pollution output of cars, namely catalytic converters and other pollution control devices, tend to reduce energy efficiency. Canada has less stringent emission standards than does the United States.

The Road Safety Division of Transport Canada conducts tests similar to those of the EPA to determine the fuel efficiency of all makes and models of automobiles whether manufactured domestically or imported. This fuel economy guide, the latest edition being that of 1978, is readily available at most motor vehicle licence agencies or by mail from that department.

The Statistics Canada catalogue 57-505 (detailed energy supply and demand) contains estimates of total demand for motor vehicle gasoline annually and by province for the years 1958 to 1969. Nearly 80% of motor vehicle gasoline purchased in Canada is used by consumers ie. in the residential sector for automobiles, light-duty trucks, recreational vehicles and "others" which will be discussed in the recreation section below. *Neel's data*

We have been unable to find any Canadian studies dealing with the stock of automobiles. Perhaps it would be possible to construct stock estimates given previous sales statistics.

Recreation: No data seemed to exist on any electricity used in the recreation area, for example tools in the house.

Motor vehicle gasoline seems to be the dominant fuel in the recreational area being used in automobiles, trucks and recreational vehicles, motorcycles, ski-doo's, snowmobiles, chain-saws, lawn mowers, etc. According to demand forecasters at the National Energy Board (NEB) the entire category of "other" (which includes all recreational vehicles, small trucks used for personal purposes, items mentioned in the preceding list) accounts for no more than 4-5% of total motor vehicle gasoline sales.* This estimate is based on the evidence given by Shell and Imperial Oil in testimony during the Northern Pipeline hearings of last year.

According to our source, automobiles account for 71 to 72% of this market (ie. motor vehicle gasoline), buses and

*small outboard motor boats are also included

trucks for 23 to 24% and "other" for 4 to 5%. Of the buses and trucks, Environment Canada in a study entitled Canadian Urban Trucking Study, November '74 concludes that 22% of trucks are for personal or recreational purposes.

Other Studies: In searching through the data, we came across references to research being done at the Ministry of State for Urban Affairs (MSUA). We arranged to meet with them in order to determine if their research has yielded any sources of data which may be of particular interest for our research team. The MSUA files are extensive in the sense that they have many tables on energy use by municipality but nothing by particular product. MSUA has surveyed provincial utilities and has attempted to gather data for their purposes, namely, particular use of energy in municipalities throughout Canada. According to MSUA, the B.C. Energy Commission has some forecast end-use data available in a document entitled British Columbia Energy Outlook 1976 to 1991, Volume II.

In looking through MSUA files, we noticed that the Statistics Canada Urban Family Expenditure Surveys of 1967, 1969, 1972, 1974 and 1976 may yield some interesting results on regional differences in energy consumption patterns. However, the number of cities varies from study to study in this series. MSUA is currently undertaking pilot studies for Ottawa and Quebec city of urban residential energy use. The aim of their project is the systematic development of estimates of urban residential sector energy use for a

number of municipalities at the following level of detail: energy form, (electricity, natural gas, fuel oil); dwelling type; end use (ie. space heating, hot water, lighting, appliances, cooling). The locations for the pilot studies are Ottawa/Hull and Quebec city. The time period for the studies is 12 months over 1976-77.

If successful, MSUA hopes to extend the study to 100 metropolitan areas.

Summary: From our preliminary survey of utilities, manufacturers associations and other sources for energy consumption data, it is apparent that statistics in the exact form we will require are not readily available. However, the existence of performance data, at least by product class, as well as various estimates from Statistics Canada and the manufacturers associations of stocks of various durables provide a foundation for the construction of a matrix of product and user information. Much research is required in order to determine the discretionary portions of energy use as well as the characteristics of consumers likely to respond to programs designed to achieve voluntary savings and it is recommended that research be initiated in these areas.

Any studies or data sources referred to above, in addition to others mentioned in a list of references will be available from the Consumer Research Branch.

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