



Canada's data collection strategy -Residential Sector-

*Expert Round Table on Energy Efficiency
Indicators in the Residential Sector*

Moscow

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Natural Resources Canada



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Outline of Presentation

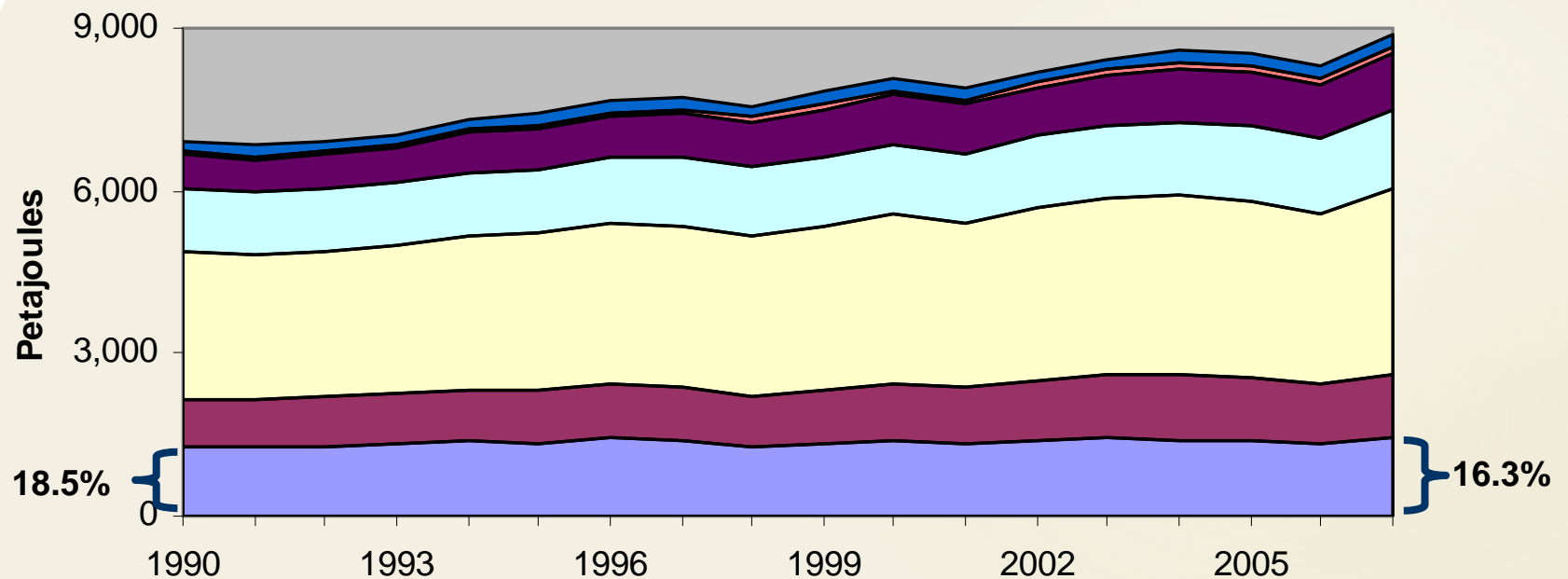
- Background and Context
- Data Strategy Development
- Data Collection Activities
- Survey of Household Energy Use
- Next Steps
- Conclusions





Background and Context

Final Consumption of Energy by Sector



- Residential
- Commercial/Institutional
- Industrial
- Passenger Transportation
- Freight Transportation
- Off-Road
- Agriculture

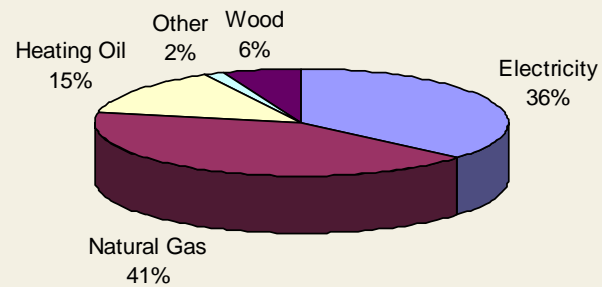




Background and Context

Residential Energy Use by Fuel Type

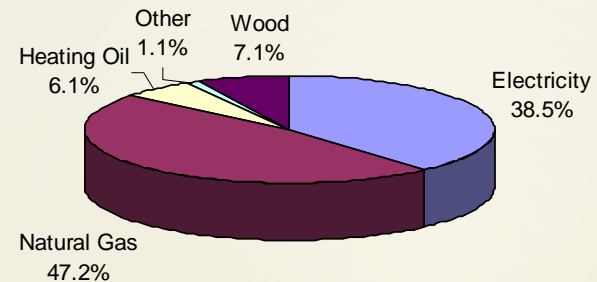
1990



Accounted for 18.5% of the energy and 15.7% of CO2 emissions.

Household +31.2%
Total floor space + 43.5 %
Residential energy use +12.9%

2007



Accounted for 16.3% of the energy and 13.7% of CO2 emissions.

Success largely driven by going beyond the energy balance and drilling down into the details.
How did it happen?



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Background and Context

Natural Resources Canada (NRCan)

a federal government department responsible for the sustainable development and use of natural resources

Office of Energy Efficiency

a branch of NRCan mandated to renew, strengthen and expand Canada's commitment to energy conservation and energy efficiency

DPAD

a division of OEE created to improve knowledge and understanding of where and how energy is used in all sectors of the Canadian economy

Programs

OEE proactively promotes energy conservation and efficiency in all sectors

- Transportation
- **Residential**
- Commercial
- Agriculture
- Industrial





Background and Context

Residential Sector



- Surveys (energy and economy)
- Canada Energy Supply/Demand



Detailed Residential Energy Demand

(Database: collection of all information through time)



- Indicators by: Dwelling type, End-use and Fuel type
- Information on: Energy, Activity, Prices and behaviour



Understanding where and how energy is used

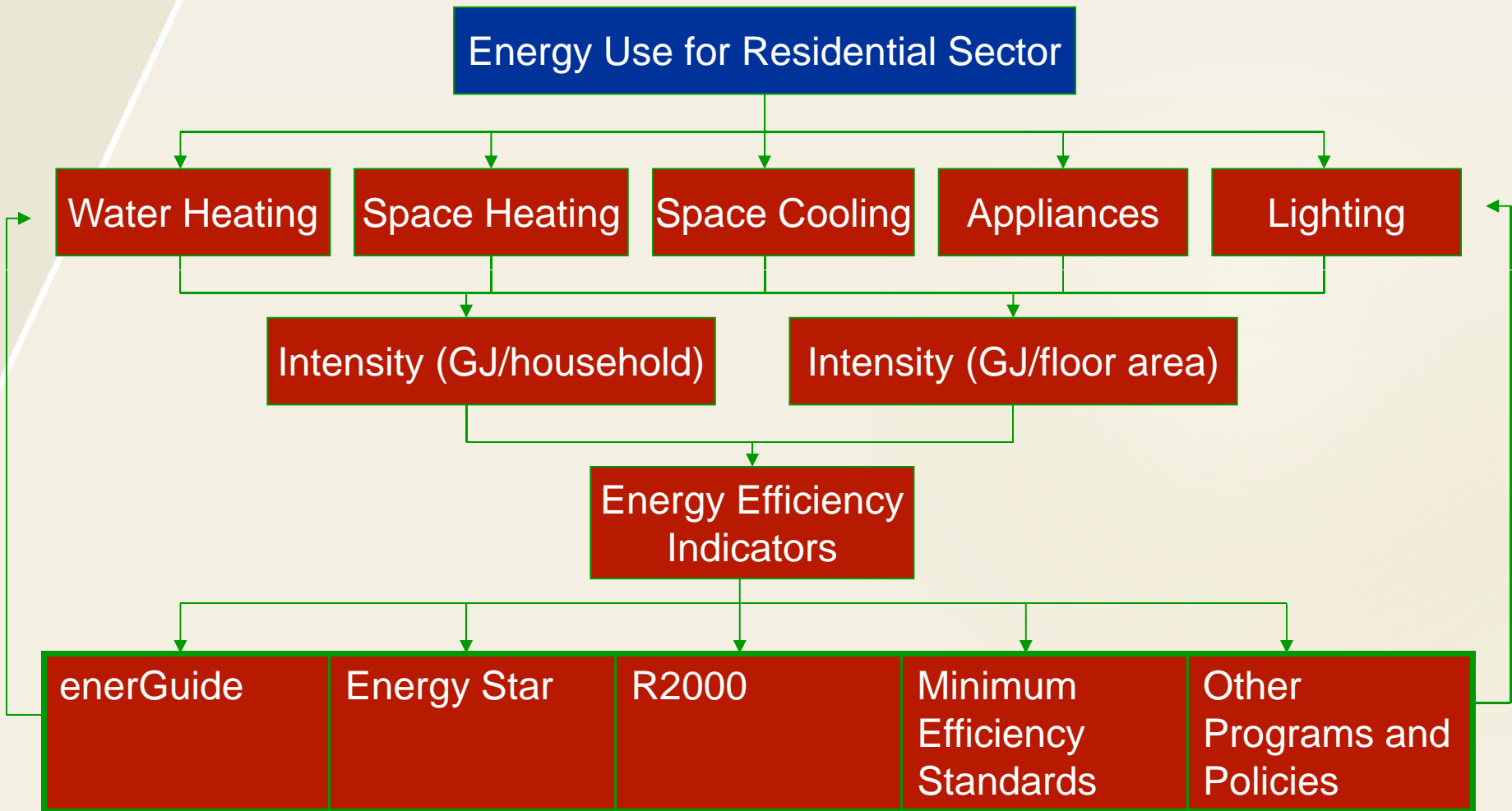


- Monitoring
 - OEE index
 - GHG emissions
- Strategic outcome
 - Where to spend
 - How to spend





Background and Context





Data Strategy Development

At the beginning:

- Statistics Canada disposition surveys of energy sales data provided energy data at sector level (including residential) :
“Report on Energy Supply and Demand”
- Statistics Canada also collected some relevant data on household energy costs / use; *examples:*
 - Survey of Household Facilities and Equipment,
 - Survey of Household Expenditures,
 - Census of Canada, Building permits etc.





Data Strategy Development

Faced new requirements:

- Energy balance was an essential starting point for the understanding of the energy market in general. However,...
- ...insufficient for the support of policy objectives aimed to influence the delivery and consumption of energy services
- OEE wanted/needed the capacity to identify end-uses opportunities, track progress and set future expectations





Data Strategy Development

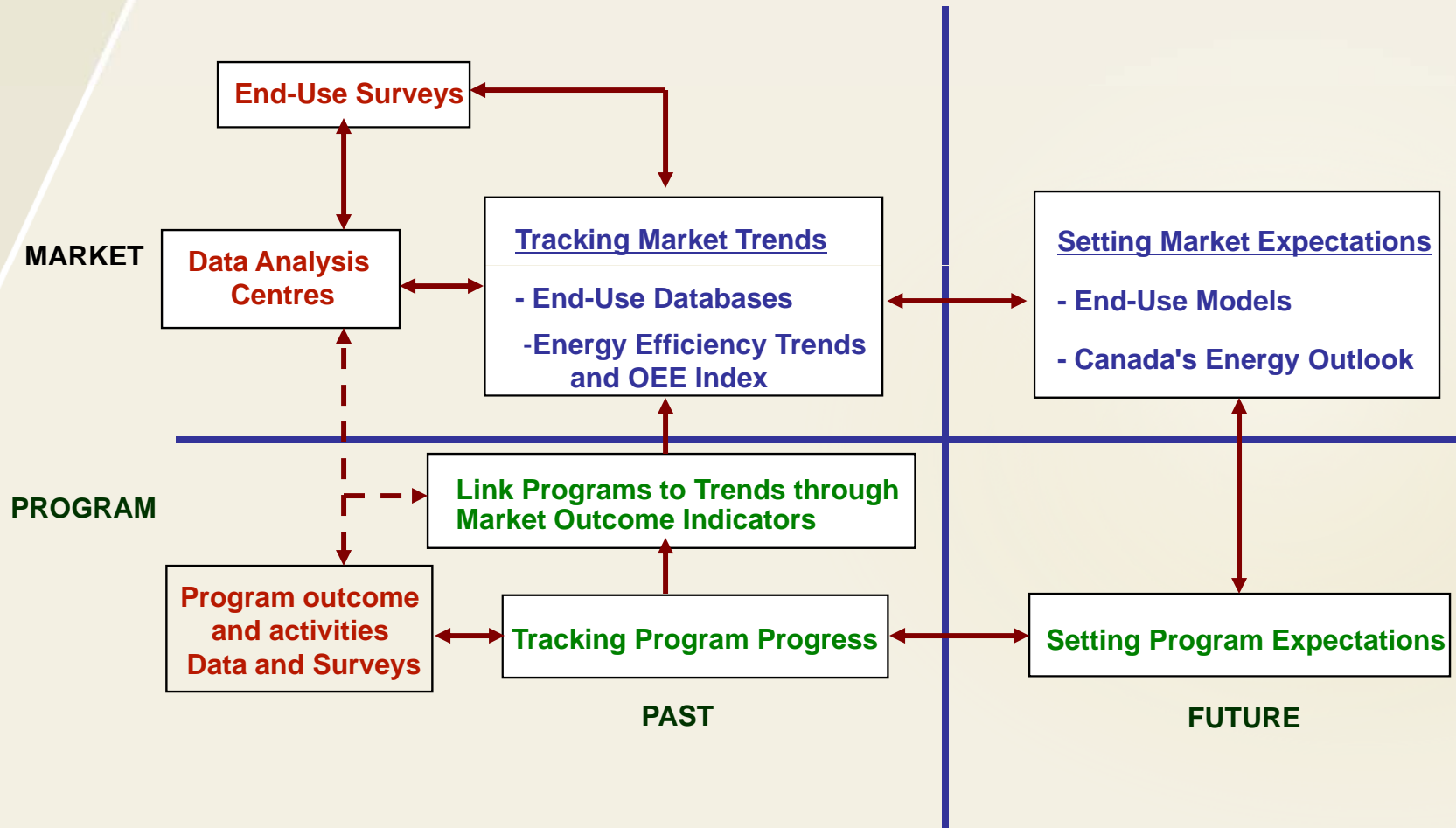
Questions we had to ask ourselves

- What else is available?
e.g. National Research Council, Canada Housing and Mortgage Corporation, other Agencies, Home Builders Associations, Universities...
- What more do we need?
Level of details driven by our policy/program objectives
- What time frame?
Not all indicators needed on the same time horizon
- What are the cost options to collect existing/new data?
New survey, add-on to an existing survey, piggy-back to existing/new program activities, partnership with other policy agendas...
- Where will funds come from and for what purposes?
Some base funding + sponsorship from programs





Data Strategy Development





Data Collection Activities

New

Engaged Statistics Canada to:

- collect detailed energy use and household/dwellings information
 - Survey of Household Energy Use (SHEU): 1993, 1997, 2003, 2007
- performed other surveys
 - 1994 – Survey of Houses Built in Canada
 - 1994-1995 – Survey of New Household Equipment Purchases
 - 1994-1995 – Home Energy Retrofit Survey

Created Data and Analysis Centres at universities across Canada

- data warehouses for information, data revision and analyses from all sources (e.g. National Research Council...)

Worked with industry to collect information

- Energy Consumption of Major Household Appliances - shipment data from appliance manufacturers linked to rated unit energy consumption data from programs





Data Collection Activities Building on Existing

Built on Statistics Canada existing activities:

- Household Facilities and Equipment Survey (additional questions)
- SHEU survey frame developed and running from an existing survey
- Survey of Household Spending...

Worked with researchers and other departments/agencies

- characteristics of thermal envelop & building codes
- performance characteristics of heating equipments...
- Home Owner Repair and Renovation Survey (co-sponsored with Canada Mortgage and Housing Corporation)
- heating/cooling degree days...

Worked on data collection component from new program activities

- e.g.: audit data from retrofit program





Data Collection Activities

Organizing the data

Disposition Surveys
(all sectors)

**Statistics Canada's
Report on Energy Supply
& Demand (Sector Level)**

Survey of Household Energy Use
(SHEU – 1993, 1997, 2003, 2007)

Information from Industry
(Appliance Manufacturer Data)

Other Surveys and Data Collection

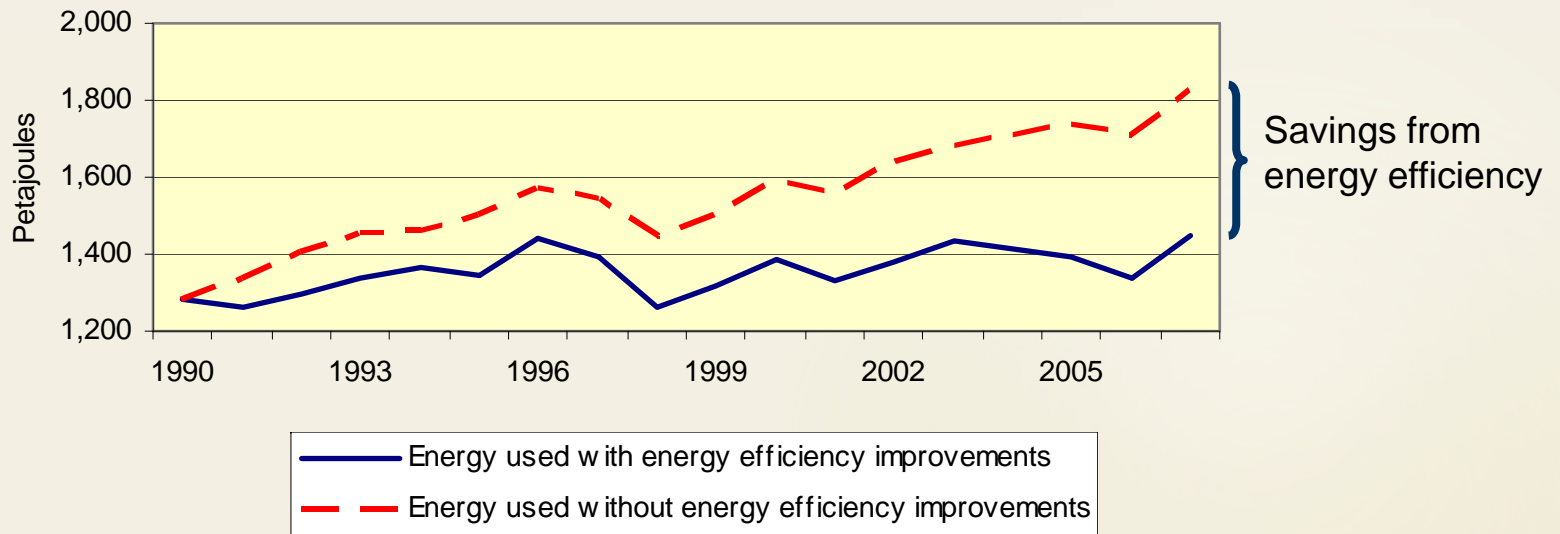
The data from each dataset is feed in to our residential model, to organize the information and get market-level estimates



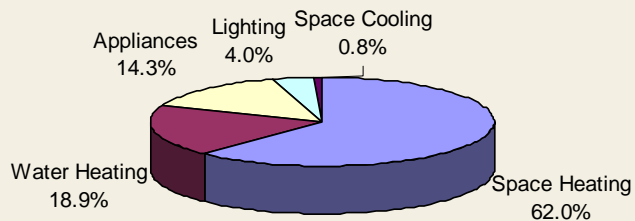


Data Collection Activities Data + End-use Model

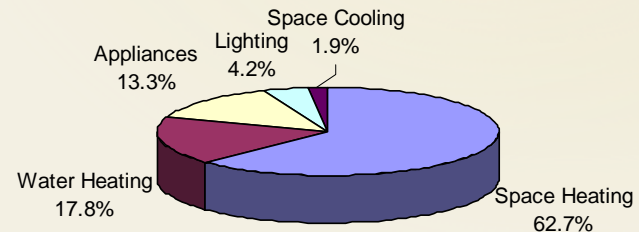
Residential Energy Use, with and without energy efficiency improvements 1990-2007



1990



2007





Survey of Household Energy Use (SHEU)

- Approach was to use the frame of the existing Statistics Canada Labour Force Survey
 - + A well established sampling and survey structure
 - + Avoided some of the development cost
 - + Easy bridging to collected information in the Labour Force Survey
 - + Could rapidly road test pilot questionnaires
 - + Saved time in getting the full survey up and running
 - + Using subset of rotations out provided for well trained respondents
 - Needed to be careful about respondents' fatigue
- Efficiency and Alternative Energy Program was announced in October 1991 and the first Survey of Household Energy Use was run against the 1993 February rotation of the LFS





Survey of Household Energy Use (SHEU)

1993 edition

- Subset of rotations out of the Labour Force Survey (LFS)
 - sample size of 15182 (out of 73000 for LFS)
 - 5 provinces sponsored increased sampling for themselves
 - data gathered on:
 - energy consuming appliances and equipments (incl. make & model)
 - characteristics and state of dwellings (e.g. renovations)
 - profile of consumers and consumption habits (e.g. # of washes)
 - energy bills and/or authorisation to consult their energy suppliers
- Guide and instructions to prepare for interview sent in advance
- Computer Assisted Telephone Interview (CATI)
- on-site interview for household :
 - where members are 65+ years old
 - with education level of grade 8 or less
- response rate 72,3%
 - follow-up efforts to engage LFS respondents to commit to SHEU





Survey of Household Energy Use (SHEU)

1997 edition

- Subset of rotations out of the Labour Force Survey (LFS)
 - sample size of 7082
 - limited to household residing in houses (no apartments)
 - gathered similar data as in SHEU 1993
 - energy consuming appliances and equipments (incl. make & model)
 - characteristics and state of dwellings (e.g. renovations)
 - profile of consumers and consumption habits (e.g. # of washes)
 - energy bills and/or authorisation to consult their energy suppliers
 - Instructions to prepare for interview sent in advance
 - on-site Computer Assisted Personal Interview (CAPI)
 - higher cost per respondent, but personal interview secures some control over quality of answers
 - response rate 65%
 - approximate cost of 1,200,000\$cda





Survey of Household Energy Use (SHEU)

2003 edition

- Subset of the Canadian Community Health Survey (CCHS)
 - switch to CCHS allowed reduced design effects and sample size
 - in other words, lower the data collection frame cost
 - sample size of 6433
 - added duplex and low-rise apartments (less than 4 storeys)
 - gathered similar data as in SHEU 1993 and 1998
 - no appliances make and model
 - distinction of owner occupant and rented dwellings/condominium
- Instruction to prepare for interview sent in advance
- on-site Computer Assisted Personal Interview (CAPI)
 - telephone interviews for remote location (138 households)
 - more time and embedded crosschecks per personal interviews
 - “walk through” personal interview secured good control over quality of answers
- response rate 75%
- approximate cost of 2,400,000\$cda





Survey of Household Energy Use (SHEU)

2007 edition

- Under the Household and the Environment Survey (HES) umbrella
 - polled resources to covers environment, energy and health issues
 - water quality concerns of households
 - consumption and conservation of water
 - energy use and home heating and cooling
 - use of gasoline-powered equipment
 - pesticide and fertilizer use on lawns and gardens
 - recycling, composting and waste disposal practices
 - impacts of air and water quality on households
 - transportation decisions...
 - SHEU components gathered similar data as 2003 edition
 1. short telephone interview to supplement the CCHS
 2. HES – Energy Use component is a paper mail-back (internet option)
 3. collect energy bills or authorisation to consult their energy suppliers
 - sample size of 21690, but lower response rate 52%
 - paper mail-back provides for lower per unit cost, but more difficult to engage respondent + response burden
 - all data validation done at data processing stage and difficult to correct
 - Cost shared: approximate cost to OEE was 600,000\$cd





Next Steps

Ongoing Challenges:

Data

- Funding for more frequent and detailed end-use surveys
- Consistency issues related to integrating different data sources
- Changing the *status quo*

Analytical

- Drilling down to program analysis using market level estimates

Addressing the Ongoing Challenges:

- Interdepartmental Working Group on Energy Statistics involving key energy statistics users
- Funding for energy statistics
- Continuous improvement to modeling framework as new information becomes available





Conclusions

- **Indicators are used to**
 - monitor and understand where and how energy is being used
 - determine where and how to spend
- **Ideal data situation includes annual, integrated surveys**
- **Ongoing analysis is required in using indicators to support national energy efficiency policy and monitor progress**





Conclusions

“To Measure is to know.”

&

*“If you cannot measure it,
you cannot improve it.”*

Lord Kelvin



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<http://oee.nrcan.gc.ca/>

Under “Statistics and Analysis”

<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/home.cfm>

- **Databases**
- **Publications**
- **Data and analysis centres**



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