

How to collect the data needed? Introduction to main data collection methods for developing efficiency indicators

Mafalda Silva and Charles Michaelis

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- Overview of main methodologies for collecting energy efficiency data
- The role of new technologies in data collection
- Experience across the region: group discussion



Example of efficiency indicators: industry and services



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Example of efficiency indicators: buildings





Example of efficiency indicators: transport



> Administrative sources

- before starting new data collection
- data-sharing across organizations, identifying data gaps

Surveys

- representative sample (cost, time, accuracy, detail)
- possibly expanding existing surveys

Metering and measuring

- costly but very effective for monitoring specific equipment efficiency
- identifying specific energy-uses (e.g. energy audits, smart meters)

> Modelling

 complementary to surveys or stand alone to build complete set of indicators which can be provided in a timely and stable manner.



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Schematics of a transport model: source, output and validation



Collecting and checking energy efficiency data

Two general principles:

- Collect what is needed focus on **priorities**
- Research already **existing** sources (e.g. transport ministry)

• How to check the data?

- **Coverage:** sub-sector boundary (ISIC), annual time-span, net calorific values
- **Internal consistency:** data coherence and summation, revision of historical data (changes in definition, sources, classifications, methodologies, etc.)
- **External sources consistency**: figures in national statistics or energy balances, publications from related authorities
- Plausibility: zero vs not-available, reasonability within expected range of values

1.5

M]/tkm

More

Number of countries

1.5

M]/pkm



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More

Data and sources: Example for the residential sector



Table 4.2 Summary of the main data needed for residential indicators and examples of possible sources and methodologies

Data		Source	Methodology
Energy data			
Total residential consumption		National energy balance	Administrative sources Modelling
Energy consumption by source		National energy balance Utilities	Administrative sources Modelling
Activity data			
Floor area		National statistics offices Real estate Regional governments Taxation registers	Administrative sources Surveys
Number of dwellings		Land registry National statistics offices	Administrative sources Surveys
Heating equipment		Building registers Manufacturers/Vendors Subsidy registers	Administrative sources
Number of appliances		Manufacturers National statistics offices	Administrative sources Surveys

IEA Energy Efficiency Indicators: Fundamentals on Statistics, 2014

Administrative sources: using existing data that fits your purposes



Pros	Cons
Typically less expensive than a new data collection process	Boundary issues : potential mismatch between existing and needed data
Relatively quick availability	Challenges in establishing and keeping institutional communication
Increased synergy between institutions	Possible costs (e.g. purchase data, change data formats)
Raise profile of energy efficiency among different services	Time investment in research to find the right sources

The importance of establishing a framework





Pros	Cons
Relatively cost-effective , given extensive information collected	Potentially high absolute cost
Ad-hoc design of items collected based on purpose	Time consuming and requires trained staff
Representativeness / statistical significance	Need for further estimation (e.g. extrapolation between years)
Usually comprehensive and good quality data	Risk of incomplete responses, biases, sampling errors

Leveraging on national statistical capacity (NSO) and existing surveys

IEA database on country practices for data collection

21 results found

Perform another search

(Tip: sort columns by clicking on the column header)



- Practices in surveying, administrative sources, modelling and metering across sectors
- Questionnaires and other material available
- Links to various national administrations work

Filter: Administrative S/Ad/04 Hong Kong, China Services sources S/Su/08 Germany Services results, report S/Su/09 Hong Kong, China 🎫 Services Surveying Administrative I/Ad/09 Turkey 🚾 Industry sources I/Su/24 Thailand 🚍 Industry Surveying Turkey 🚾 Surveying questionnaire methodology I/Mo/03 Germany Modelling report Administrative Brazil 📀 Transport T/Ad/03 Brazil 📀 T/Mo/01 Transport Modelling report Turkey 🚾 Surveying China 📕 I/SU/31 Industry Surveying R/Su/33 Belarus Residential Surveying questionnaire R/Su/36 Thailand 🧮 Residential Surveying

Energy Efficiency Indicators Statistics: Country Practices Database

An example of how to benefit from each other's work

http://www.iea.org/eeindicatorsmanual/

Belarus: household survey example



	Background		
Country	Belarus	УТВЕРЖДЕНО Постановление Национального	
Sector	Residential	статистического комите Республики Беларусь 16 07 2014 № 98	
Methodology	Surveying		
Organisation	National Statistical Committee of the Republic of Belarus	ГОСУДАРСТВЕННОЕ СТАТИСТИЧЕСКОЕ НАБЛЮДЕНИЕ	
Name	Survey of Energy Consumption in Residential Sector	ВЫБОРОЧНОЕ ОБСЛЕДОВАНИЕ ДОМАШНИХ ХОЗЯЙСТВ	
Purpose	To collect characteristics of households members To collect data on distribution of household appliances in residential sector To collect data on energy expenditure in residential sector To determine energy consumption in residential sector To determine norms of energy consumption for heating, hot water supply, cooking, lighting and household appliances for one household member and for one unit of dwelling	КОНФИДЕНЦИАЛЬНОСТЬ ГАРАНТИРУЕТСЯ ПОЛУЧАТЕЛЕМ ИНФОРМАЦИИ	
Samela dasian	Data collection	ВОПРОСНИК ДЛЯ ОСНОВНОГО ИНТЕРВЬЮ из 20 г	
Sample cesign	Survey of Energy Consumption was carried out as part of the annual household survey on the standard of living by including additional questions in the annual and quarterly questionnaires. General population: households living in the Republic of Belarus according to the final data of the population census of the Republic of Belarus of 2009.		
Sample/Population size	6 000 / 3 873 000	Форма 1-дх (основн Код формы 0617- го ОКУД 0617-	
Response rate	100% – annual questionnaire, 85% – quarter questionnaire		
Time to complete	Interview – 60 minutes; self-registration in the diary – during the year	1 µas 8 i ug	
Mandatory	No		
Incentive	For participation in the regular survey of households on the standard of living, respondents receive a monetary reward	Запланированная дата проведения опроса: число Ш месяц П год 20	
Survey respondents	Households	Фактическая дата проведения опроса: число Ш месяц Год 20	



The role of new technologies in data collection

Gamification of surveys

 Gamification provides motivational affordances that produce psychological (e.g., user experience, emotion, fun) and behavioral (e.g., participation, performance) outcomes

Source: Harms et al (2015) Gamification of Online Surveys: Design Process, Case Study, and Evaluation



b) Map for navigating between survey areas







h) Medal ceremony as a thank-you page



New technologies and digitalization open a world of big data



Source: Koseleva and Ropaite (2017) Big data in building energy efficiency

The advantages of big data

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Examples of applications for the residential sector









Photo: PSMA Australia Photo: Geoscape - PSMA Australia

All of Australia's 15.2 million buildings have been mapped

https://www.domain.com.au/news/ai-machine-learning-helped-acanberra-company-map-every-building-in-australia-779281/

Examples of applications for the transport sector









From left to right: weekly evolution of kilometers travelled; weekly share of transport modes and comparison with average Bellidea users; weekly evolution of points.

Source: Cellina et al (2018) Outcomes of a smart city living lab prompting low-carbon mobility patterns by a mobile app









Source: SmartComm Electronics Pte Ltd



- Data ownership
- Confidentiality issues
- Security issues
- Data standardization and treatment : easier to get in than out
- Best methodologies to process the data?

What is your experience?







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Group discussion Priority sectors, and data needs and challenges to monitor and evaluate energy efficiency policies

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- 1. What are the priority sectors in your country?
- 2. What indicators and what data do we need for energy efficiency policy tracking?
- 3. What are the challenges that you face about energy efficiency data?
- 4. What is your experience?



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