

G20 End-use Data and Energy Efficiency Metrics Initiative
Uncovering the role of digitalization for energy efficiency indicators

Mafalda SILVA | Ebio VITOR

G20 End-use data and energy efficiency metrics initiative

Main goals:

- Developing international cooperation on energy end-use data and energy efficiency metrics
- Harmonization of energy end-use data and efficiency indicators to track energy efficiency progress (not available in energy balances).

2019 work plan

- 3rd Workshop: *"Uncovering the role of digitalisation for energy efficiency indicators"*
- Survey on the use and role of digitalisation for end-use data collection in G20 countries
- Paper including good examples of traditional data collection methodologies across sectors & the development of new technologies/digitalisation for end-use data collection

Next steps

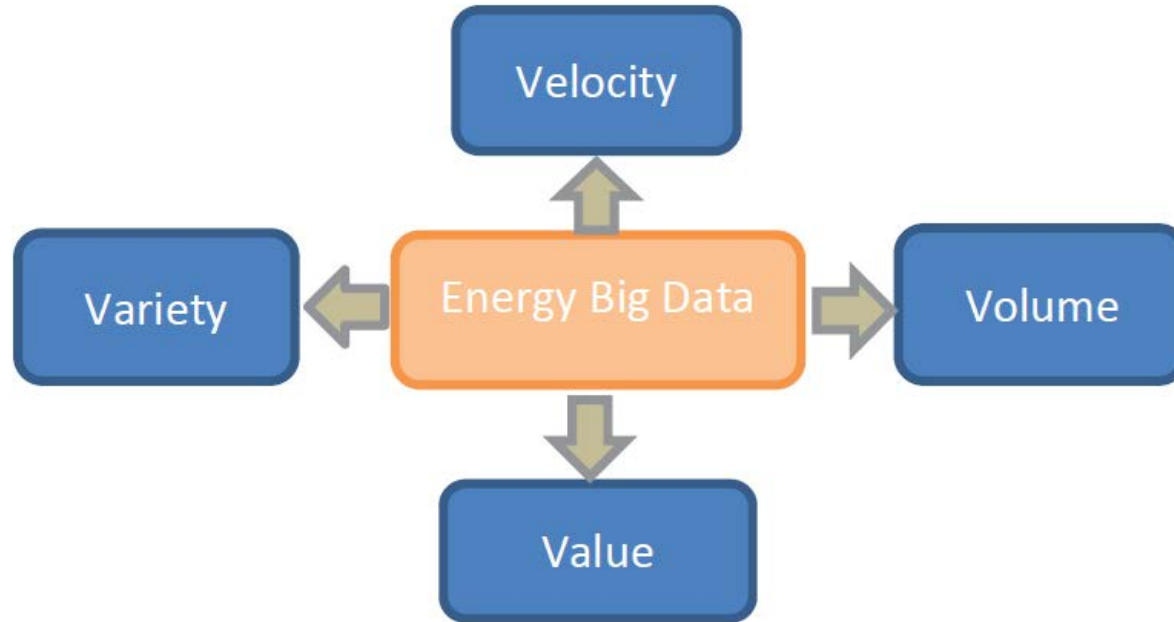
- Research & Outcomes of the workshop will serve as inputs for the paper.
- At the end of the workshop we will try to identify tangible next steps for the initiative and countries.

Digitalisation and end-use data collection

- **Digitalisation:** Increasing interaction between the digital and physical worlds (IEA, *Energy efficiency* 2019)
- **Increasing amounts of data generated:** Good opportunity to fill data gaps (given barriers are overcome)
- **Energy end-use data collection** → historically challenging due to high granularity
- **Some challenges:**
 - How to structure the scattered data collected and make sense of it
 - Data (digital) security
 - Privacy/ confidentiality issues
 - Accessibility, affordability and social acceptance

New technologies and digitalization open a world of *big data*

- The advantages



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

Examples of applications for the residential sector



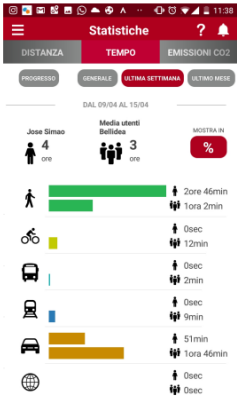
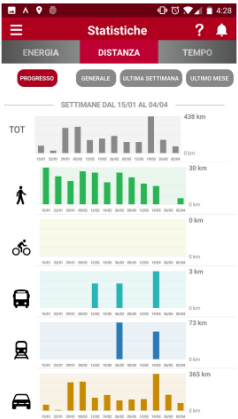
Photo: PSMA Australia Photo: Geoscape - PSMA Australia

All of Australia's 15.2 million buildings have been mapped

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



Examples of applications for the transport sector

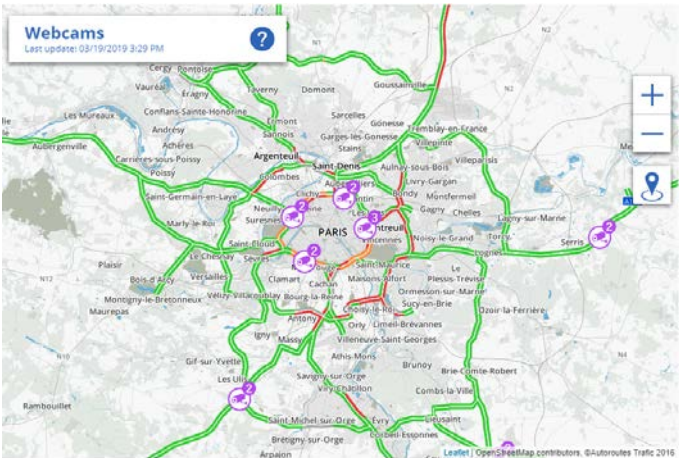


From left to right: weekly evolution of kilometers travelled; weekly share of transport modes and comparison with average Bellidea users; weekly evolution of points.

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



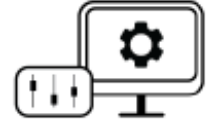
Source: <https://www.autoroutes.fr/en/webcams.htm>

Three main applications of new technologies

Data collection – The process of acquiring and gathering a number of data sets, either by implementing a new data collection system or by updating an existing one.



Data management – Includes any required pre-processing and structuring of the data (example deleting null entries, adding/removing fields in databases), and data storing and retrieval without performing an in-depth analysis



Data analysis – The process of checking and examining the data in order to describe facts and trends, identify patterns and understand drivers. This may also include data quality checks, statistical analysis, modeling, and interpretation of results.



A specific technology may serve different purposes – the categories below may be fluid

Paper outline

1. Introduction

Main goals:

- Present an overarching introduction to the relevance of robust energy statistics and of end-use data.
- Frame the main data collection needs and trade-off between level of detail and effort.
- Explain the context of this paper under the G20 initiative and refer to its main goals

2. Energy end use data collection methodologies (including description, discussion on advantages/drawbacks and examples of practices selected from the IEA Energy Efficiency Indicators: Country Practices Database)

- Describes well-established data collection methodologies in line with the IEA efficiency indicators manual, as well as their respective advantages and drawbacks.
- Examples of practices will populate the sub-sections below based on research and input provided by countries.

Classification of traditional data collection methodologies:

- Administrative sources
- Surveys
- Metering and measuring
- Modelling

Paper outline

3. New technologies and their role

- Introduce and describe the main categories of new/digital technologies by: I) discussing their role and potential contribution to end-use data collection, considering energy consumption and activity data, II) how it could generate good data representativeness, and III) how they can be used in conjunction with traditional methods.
- Highlight respective advantages and drawbacks of each technology based on research and input provided by countries.
- For selected technologies, practical case studies will be provided.
- Discuss the barriers for implementation in the case of new technologies as well as evaluate their use for policy evaluation after proper data analysis.

Classification according to purpose:

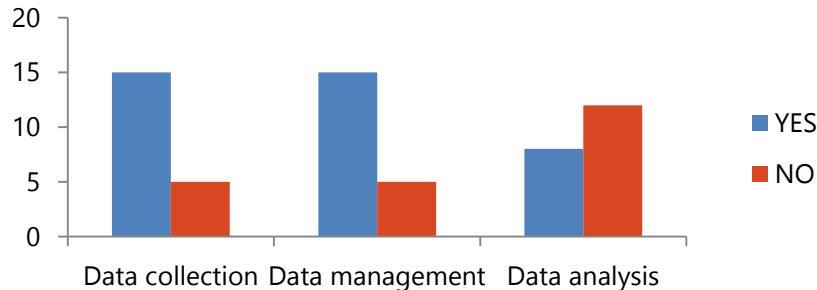
- **Data collection** (e.g. GPS, smart meters, smart lighting, smart thermostats, wireless sensor networks – slightly overlapped with Section 2)
- **Data management** (e.g. online data management platforms, databases)
- **Data analysis** (e.g. smart data, artificial intelligence, machine learning, deep learning, data mining)

4. Discussion

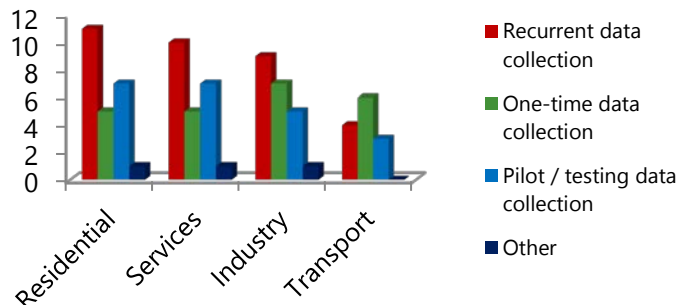
Summarize the key findings from the paper and recap the role of traditional data collection methodologies.

Survey results

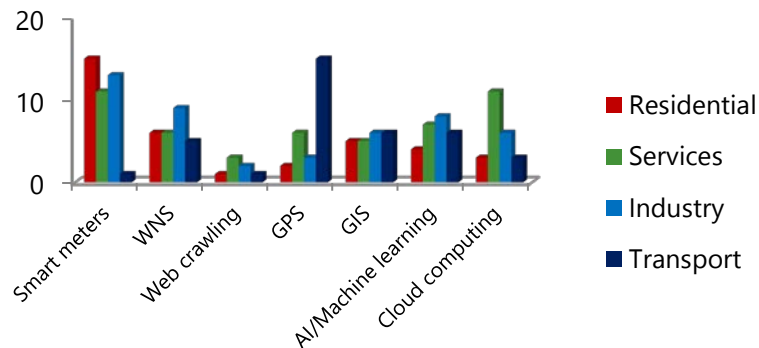
- Which of the three main energy data applications of digital /new technologies below have been applied in your country?



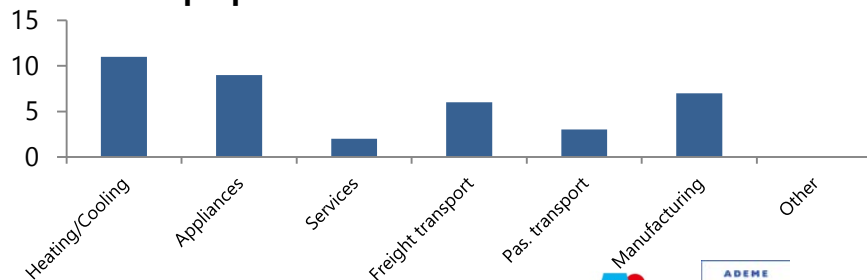
- In your country, what are the sectors in which digitalisation for data collection has been deployed?



- To your knowledge, what digital technologies have been applied in each sector?

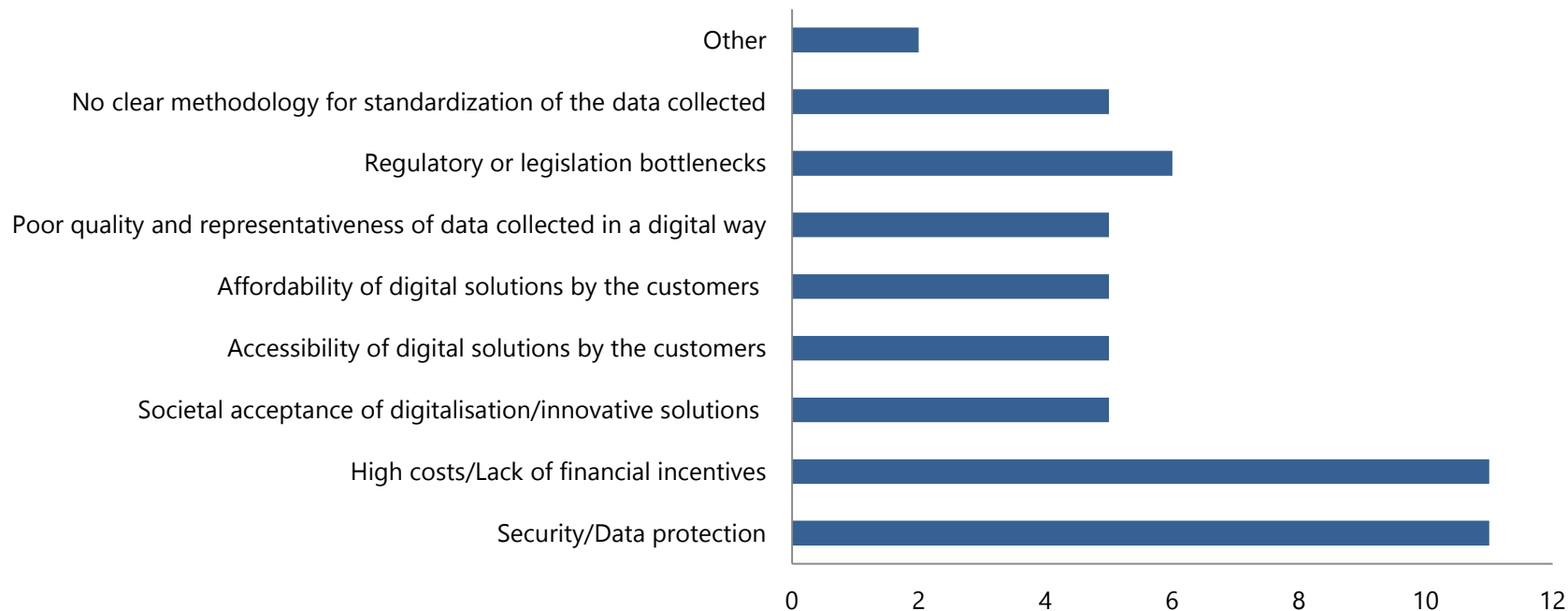


- At a more disaggregated level, what are the two sub-sectors in which digitalisation could be more practical for end-use data collection purposes?



Survey results

- In your country, what are the major constraints in using digital technologies for data collection/management/analysis?



Final remarks

- **Digitalisation** and new technologies as a good opportunity for improving end-use data collection – ***better use it than ignore it.***
- A number of barriers/ challenges to be overcome – good opportunity for G20 countries to address them together.
- According to the survey, **smart meters** (residential/industry) and **GPS** (transport) have been broadly implemented across countries – low hanging fruits?
- Major concerns seem to be **data security** and **high costs**/lack of financial support to develop new technologies.
- The workshop discussions will feed a paper – **input welcome!**



For discussion

- Q1.** What are low-hanging fruits for digital technologies? What sectors could it be used for?
- Q2.** Is there a good practice in overcoming barriers in your country?
- Q3.** What can be the role of this initiative?

This initiative could be a good platform to leverage on existing national efforts and develop a harmonized framework

