Jožef Stefan Institute

Session 3
Calculation of SRI based on Re-Co activities and extracting energy efficiency and flexibility measures

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Cyprus Energy Agency

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List of potential energy efficiency measures in buildings

Heating system and heat consumption:

- ✓ Change of energy source (introduction of RES)
- ✓ Replacement of old boilers/heat pumps
- ✓ Insulation of heating pipes
- ✓ Hydraulic adjustment
- ✓ Improved and continuous heating control and setting of heating parameters
- ✓ Energy monitoring and management system
- ✓ User motivation, energy book keeping, controlling
- ✓ Insulation and window replacement (combination of financial instruments and grants)

Water saving measures

Electricity and power consumption:

- ✓ Lamp replacement
- ✓ Lighting control
- ✓ Efficiency equipment (refrigerators, freezers,...)
- ✓ Reduce electric heating
- ✓ Energy efficient pumps

Ventilation and air conditioning:

- ✓ Heat recovery system
- ✓ Insulation of air ducts
- ✓ Improved control systems, continuous adjustment of control parameters
- ✓ Re-commissioning, maintenance, introduction of energy bookkeeping

The story about Smart Readiness Indicator

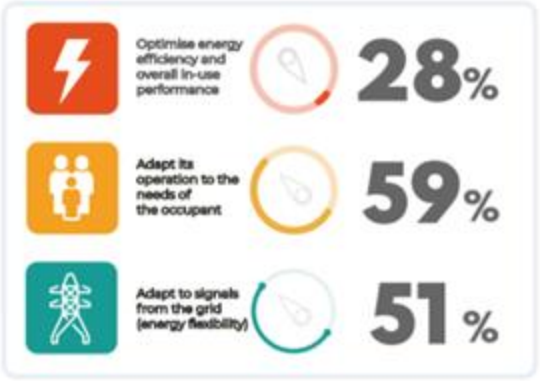
- **The story about Smart Readiness Indicator (SRI) started in 2018** with the revision of the European Energy Performance of Buildings Directive (EPBD) where the **potential of smart technologies in the building sector was heavily emphasized** and the concept of a SRI was introduced

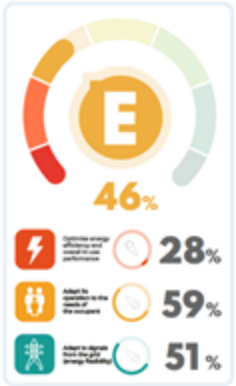
- It was recognised that **there is a need to systematically evaluate smart dimension of buildings and to connect it in the EPC**

- The main purpose of SRI is **to analyse the readiness for implementation of smart technologies** in a building and **to enable personalized energy efficiency advice on saving energy by implementing smart technologies**

Automatization in buildings

- It is important to align the evaluation of the SRI and the Building & Automation Control Systems (BACS) according **to EN ISO 52120-1:2022**
- We are evaluating 9 technical domains: **Heating, Domestic hot water, Cooling, Ventilation, Lighting, Electricity, Electric Vehicles, Dynamic Envelope, Monitoring & Control**
- 7 Impact Criteria **(Energy savings, Maintenance & fault prediction, Comfort, Convenience, Information to occupants, Health & wellbeing, Energy flexibility & storage)**





Smart Readiness Indicator and its purpose

One overall score express how close the building is to the maximum smart readiness

1

Optimise energy efficiency and overall in-use performance

- Energy efficiency
- Maintenance and fault prediction

2

Adapt their operation to the needs of the occupant(s)

- Comfort
- Convenience
- Health, well-being and accessibility
- Information to occupants

3

Adapt to signals from the grid (energy flexibility)

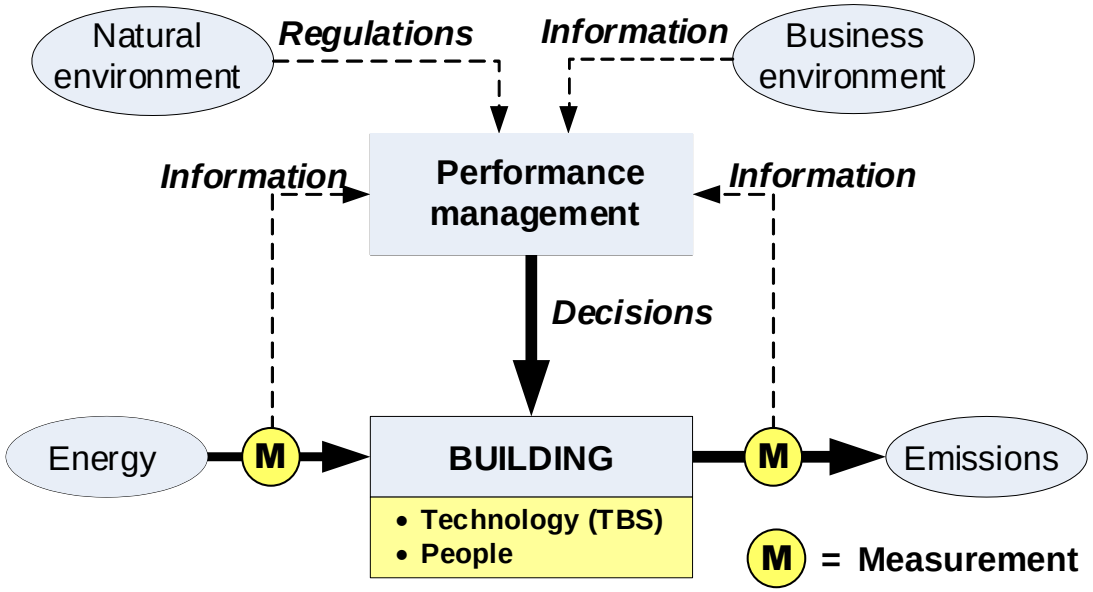
- Energy flexibility and storage

Energy management systems vs Process control systems

- In many modern buildings **different monitoring and control systems are used**, but majority of them are **not directly connected with the energy consumption optimization**
- The reference architecture of any energy management system evolved from the traditional management structure, **plan-do-check-act model**
- Process control systems provide the **energy data but also contextual information about energy use** – key element for proper decision making
- Building Automation and Control System (BACS) evolved from the **merging of different areas of automation**, for example **Energy management system** and **Process control system**

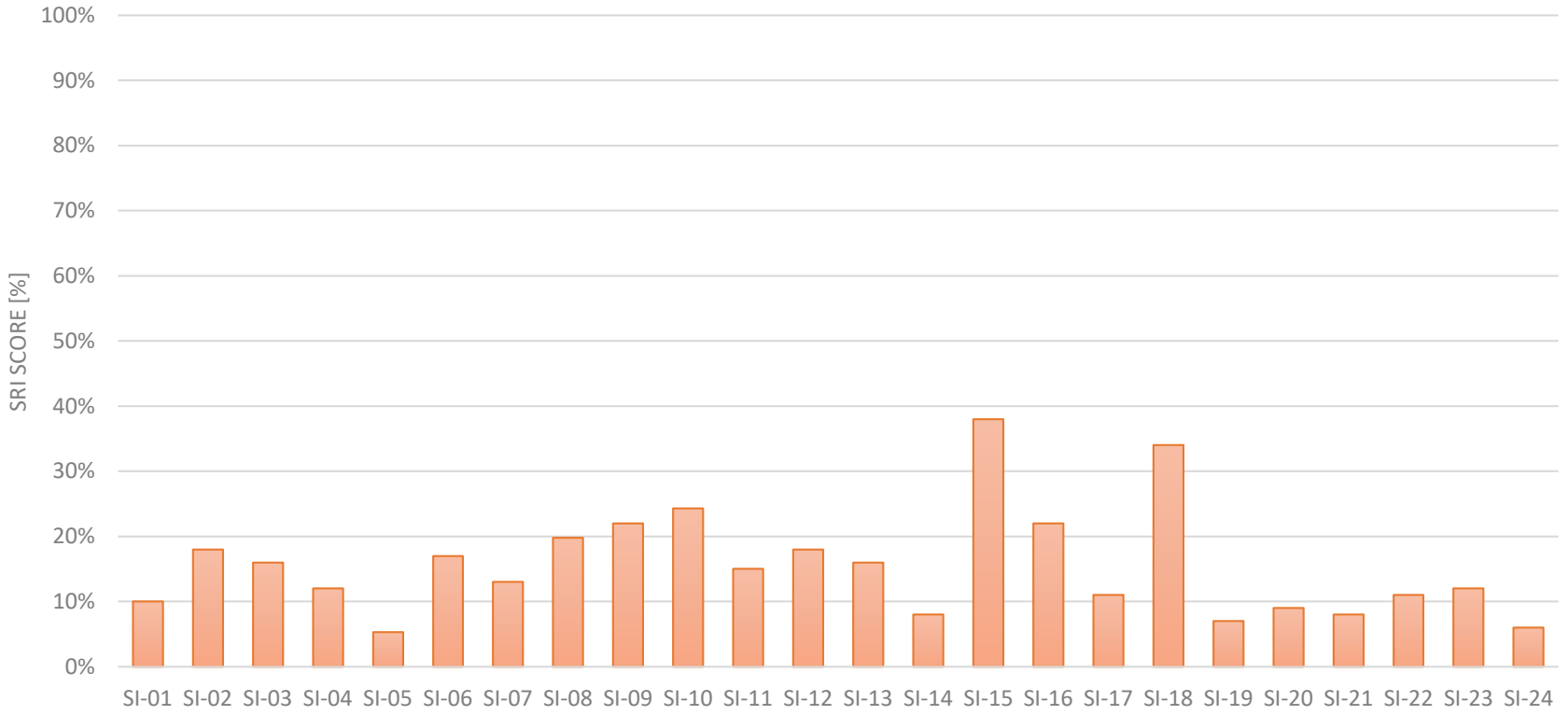
Wider context of performance monitoring system

- **Performance monitoring system is part of larger Building Automation and Control System (BACS)** and includes a supportive IT infrastructure and provide a framework for data:
  - Analysis
  - Interpretation
  - Knowledge creation
  - Learning
  - Communicating results and lessons learned



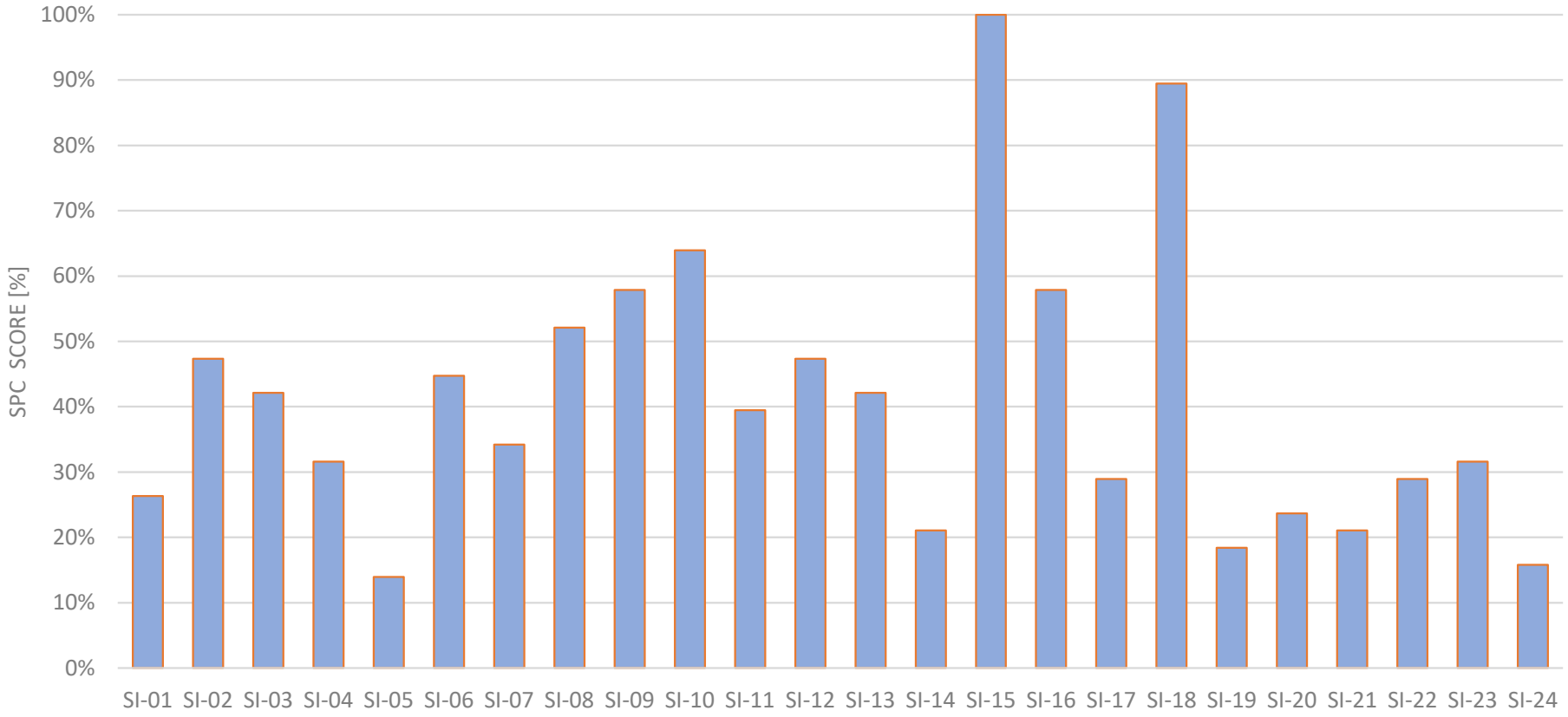
Understanding SRI (1/2)

- Existing buildings (including new constructions) achieve very low SRI values – owner/users/customers are dissatisfied



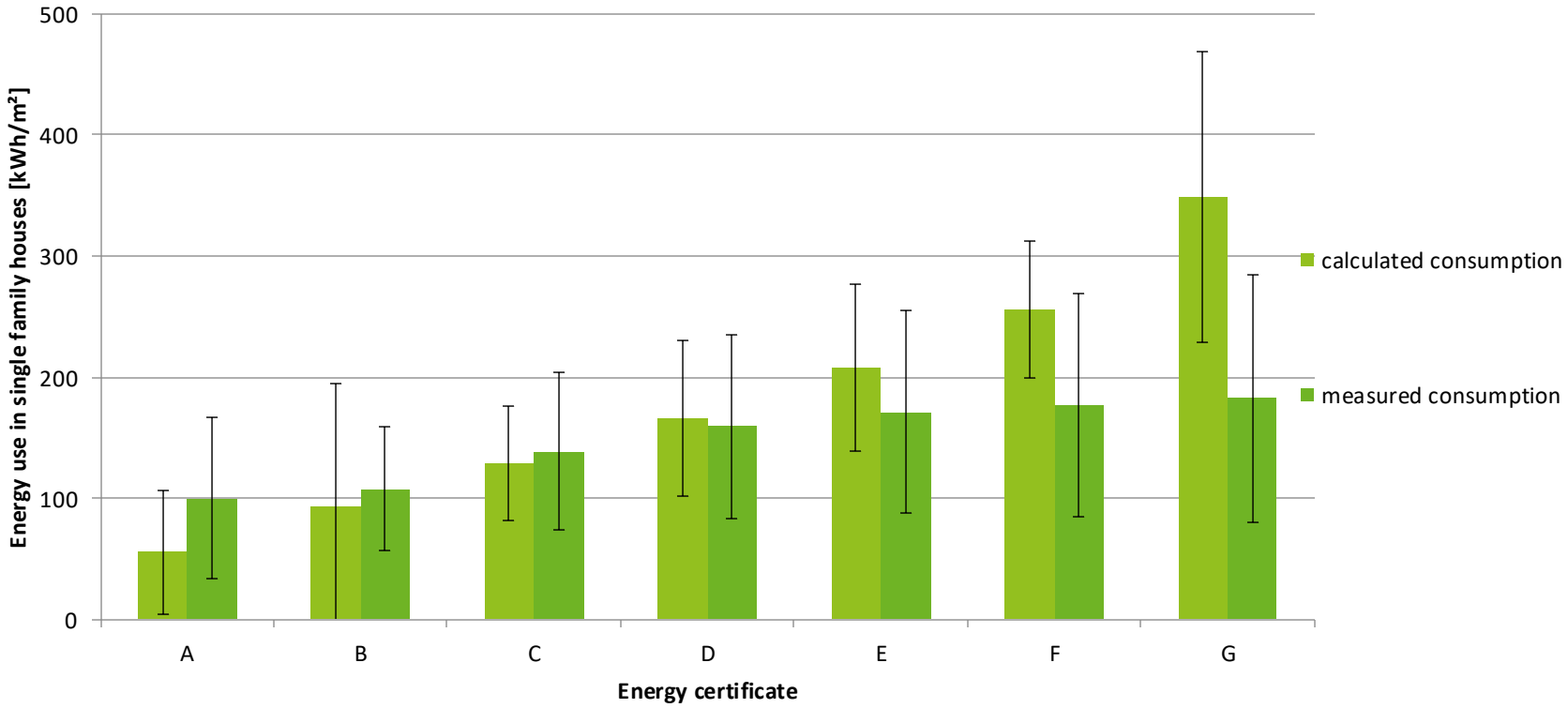
Understanding SRI (2/2)

- New indicator *Smart Performance Coefficient* = $SRI_{actual}/SRI_{benchmark}$



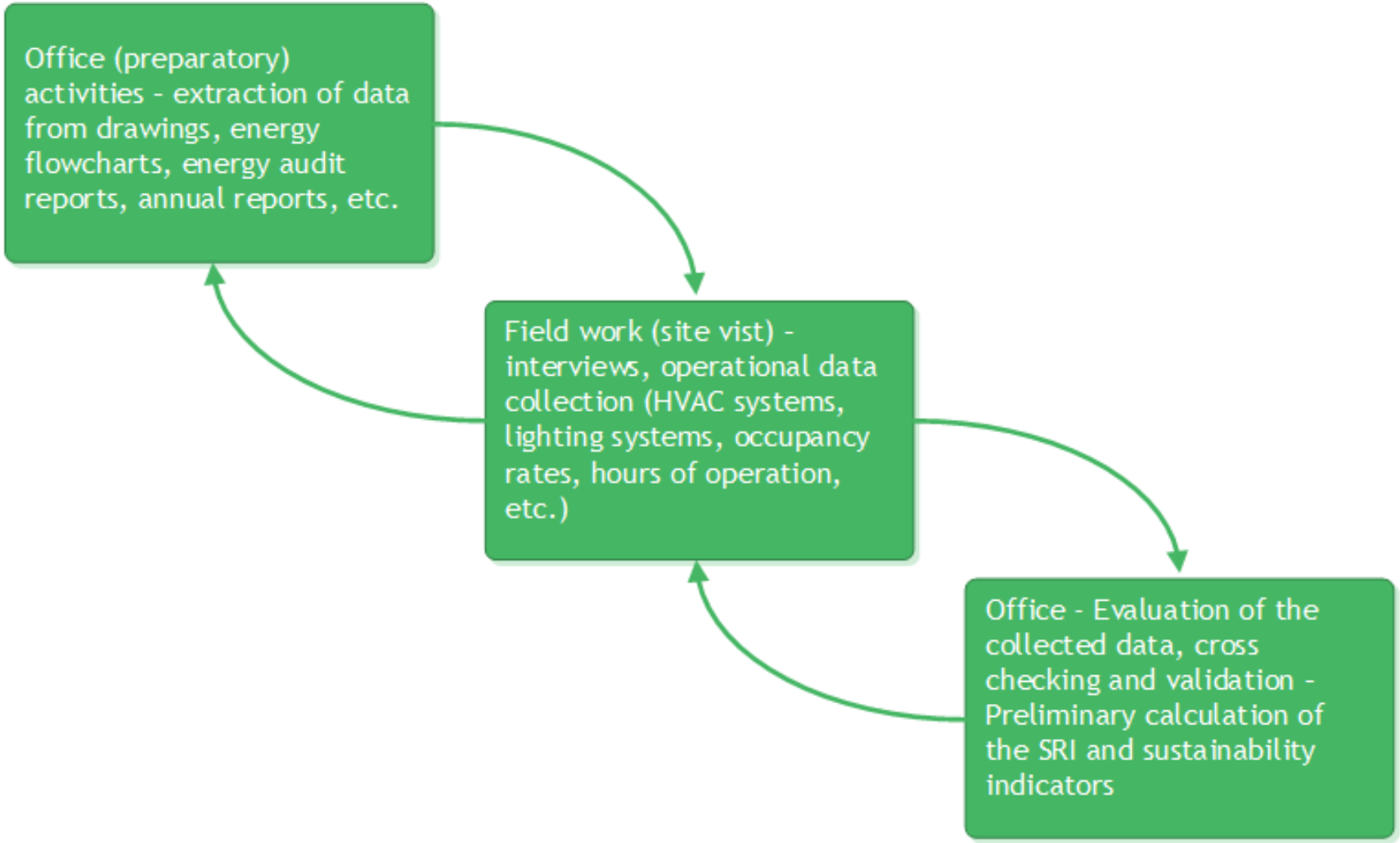
Understanding EPC - problem of performance gap

- Calculated and measured energy use in 135.311 houses in Denmark[1]

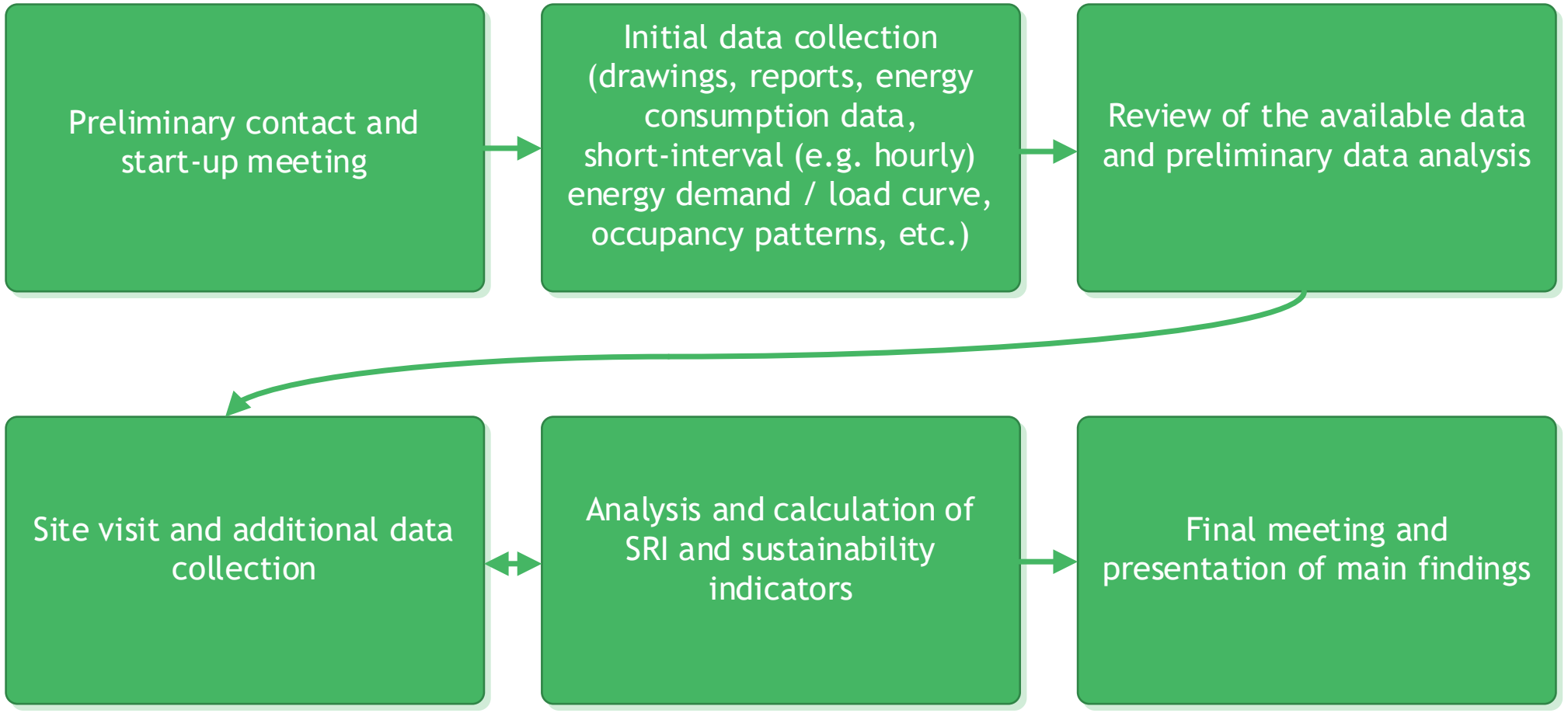


[1]Data from: SBI 2016:09, Forskellen mellem målt og beregnet energiforbrug til opvarmning af parcelhuse

Data collection process and limitations (1/2)



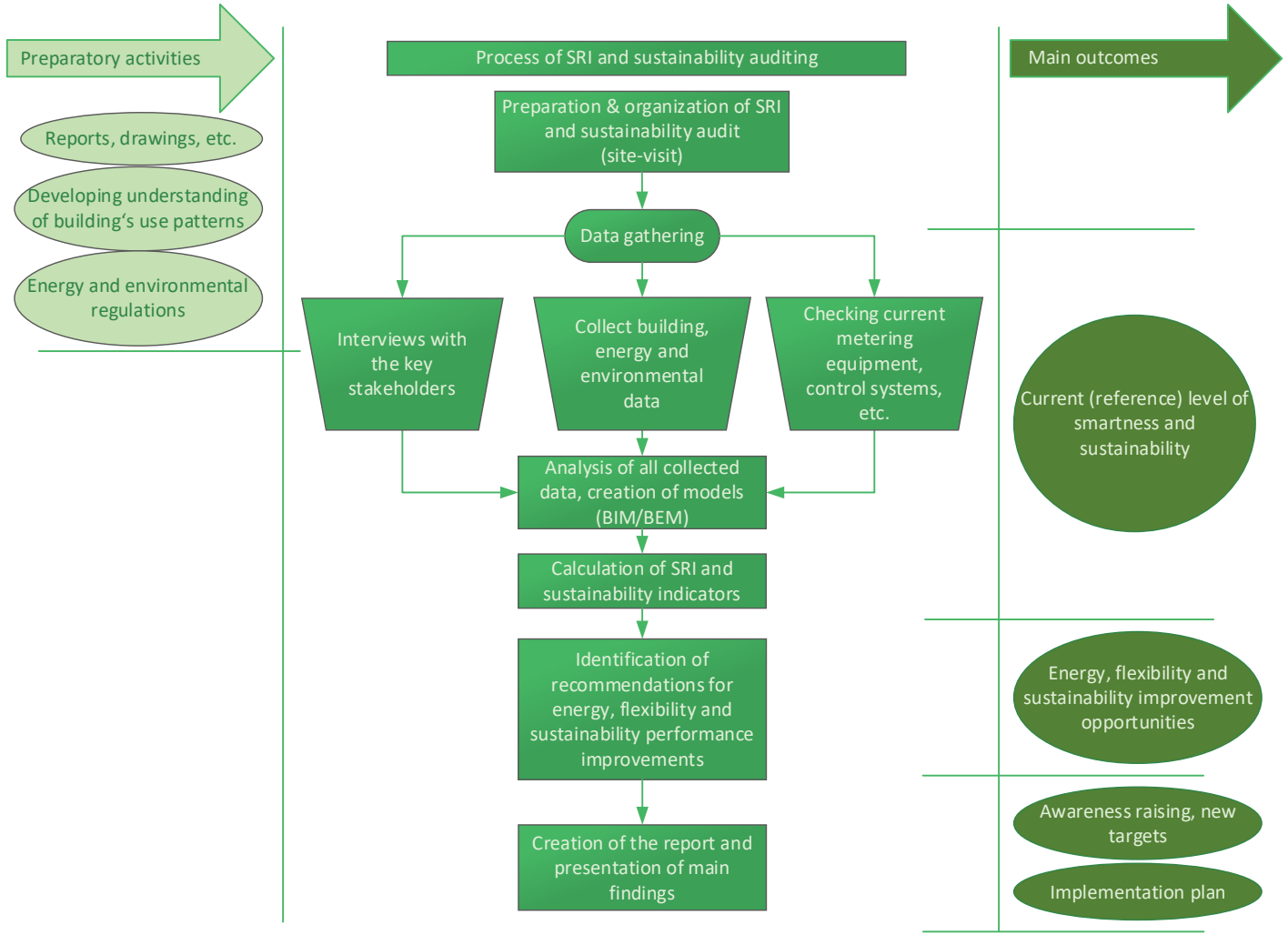
Data collection process and limitations (2/2)



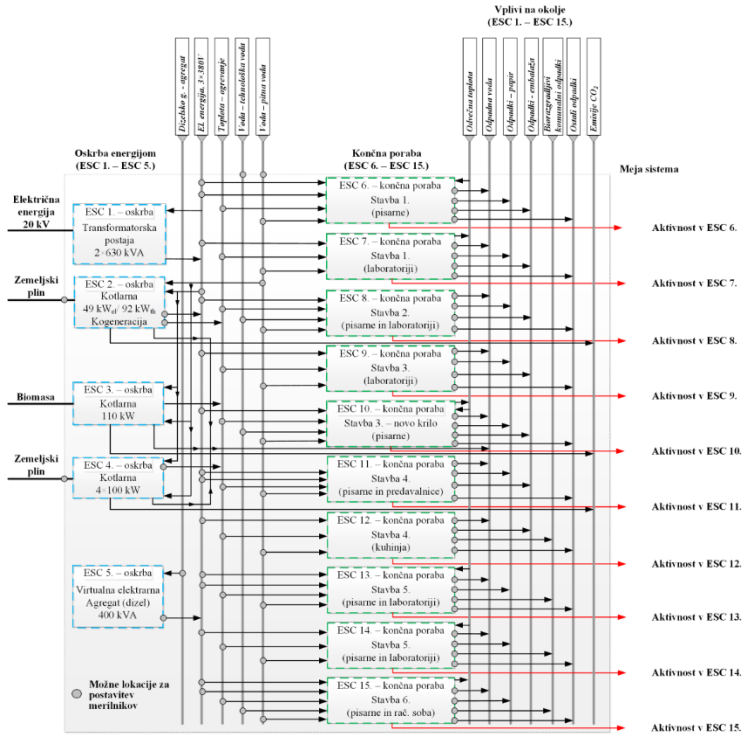
Combining methods and Guidelines for effective SRI auditing (1/2)

- Energy audit is a **dynamic category** (new EED)
- Relevant standards: Auditor must estimate **future energy use and consumption – we need models**
- Identify, prioritize an record **opportunities for improving energy performance**
- **Combining activities** is the key of future success!

Combining methods and Guidelines for effective SRI auditing (2/2)



Exercise 1 – Calculation of SRI for a building from Slovenia



https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/smart-readiness-indicator/implementation-tools_en

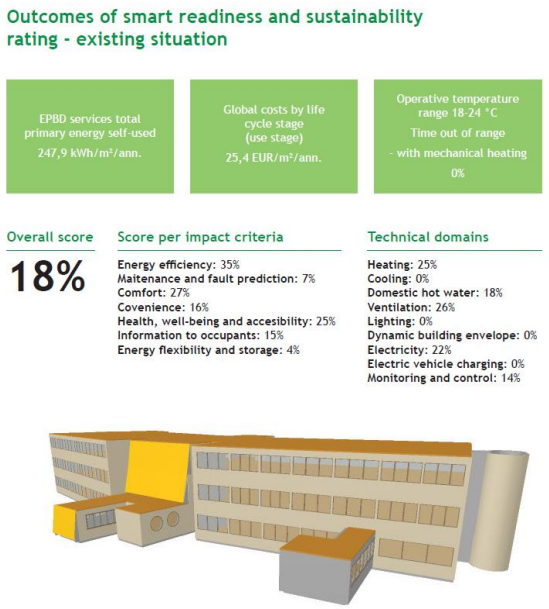
https://epc.bt.siemens.com/EPC/

https://www.smart-ready-go.com/Dashboard?type=General

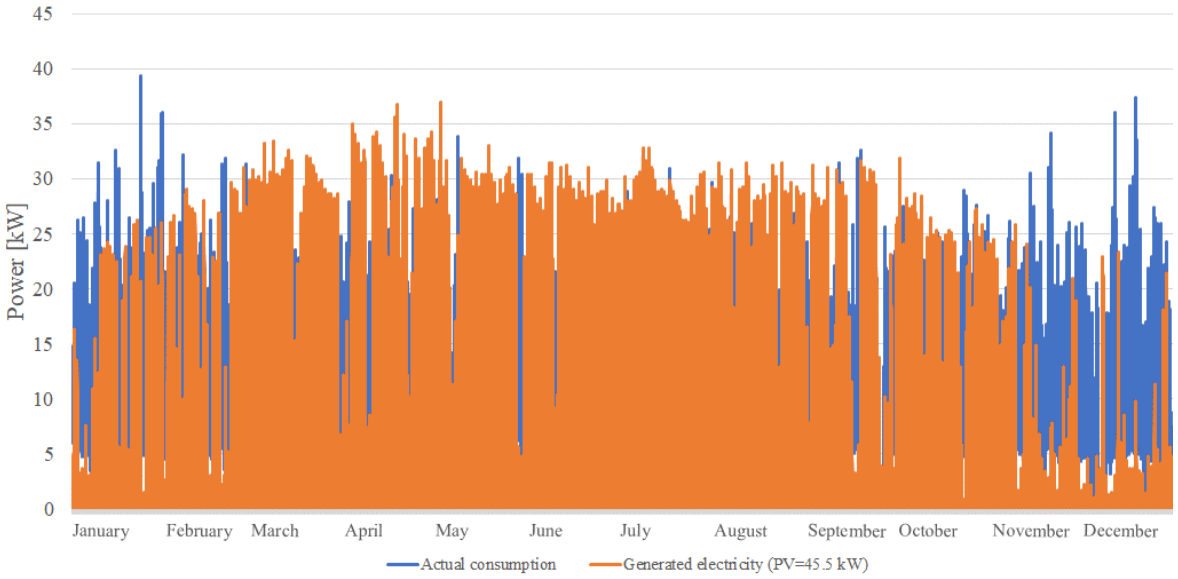
Exercise 2 – Calculation of SRI for a building from Cyprus – tertiary sector

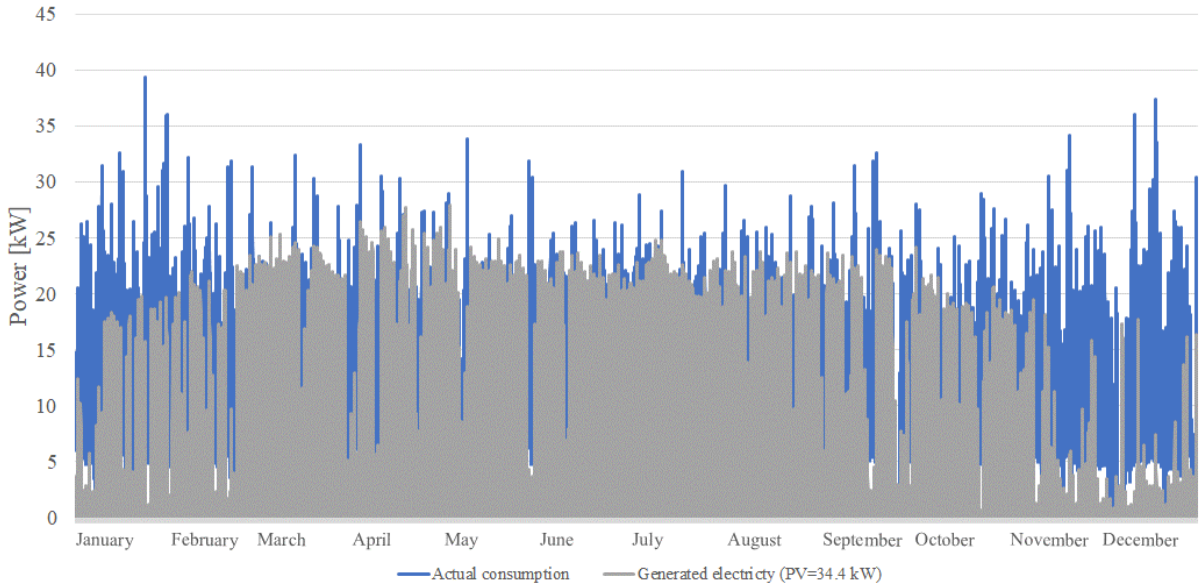
Exercise 3 – Calculation of SRI for a single family house

Exercise 4 – Feasibility analysis for the investment in PV plant



Case study – Rooftop PV plant





SSR = 45% and SCR = 72%

SSR = 34% and SCR = 84%

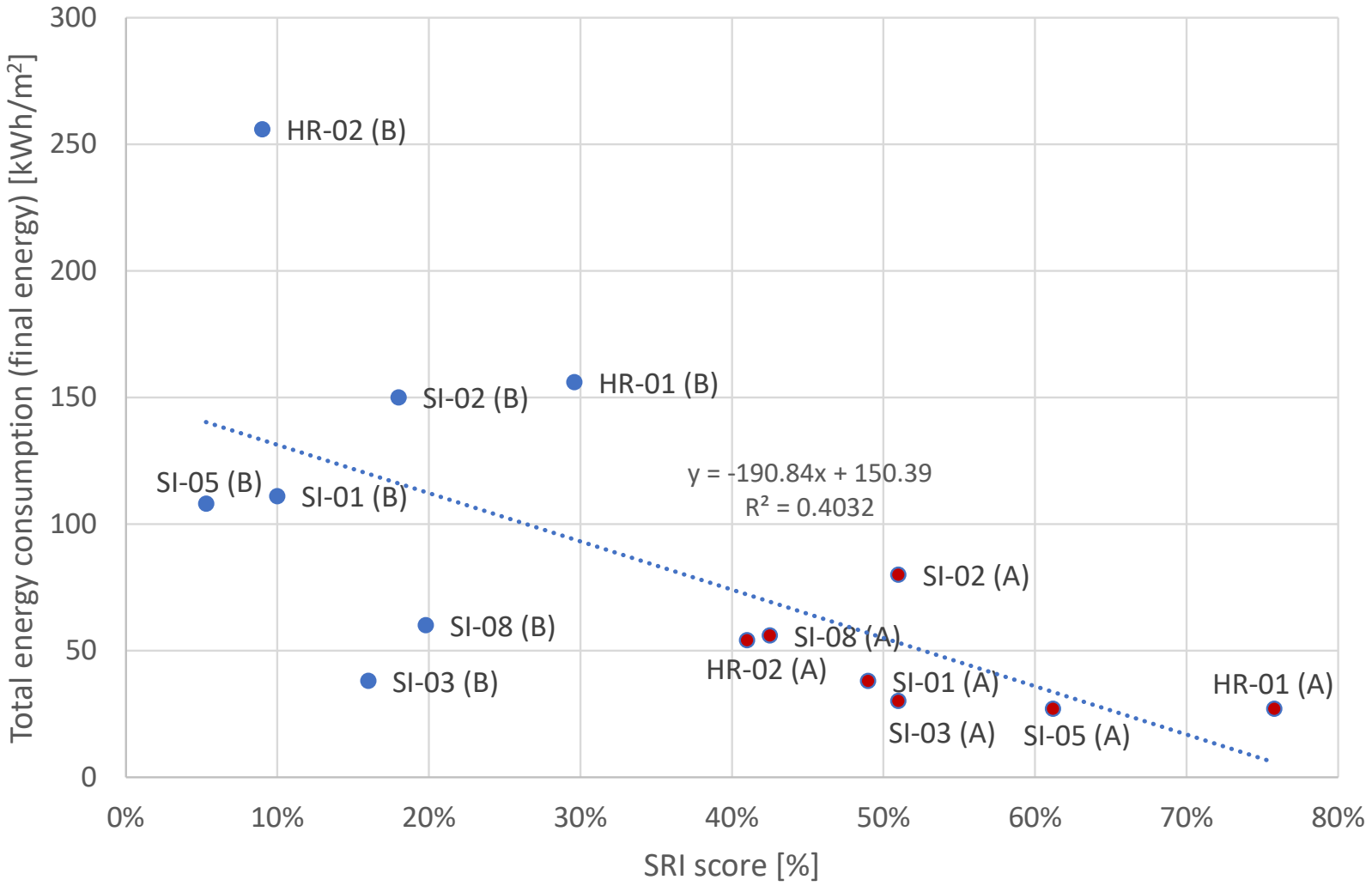
Extraction of energy and flexibility measures (1/3)

- SRI auditors will need to provide **comments** that are **necessary for the extraction** of energy efficiency and flexibility improvement measures
- **Comments and notes** from assessors are crucial for **properly understanding the SRI rating**
- SRI can facilitate the **alignment of common interests between ESCOs and building owners** in exploiting urban areas for energy production from RES and supporting e-mobility

Extraction of energy and flexibility measures (2/3)

- Installation of the **modern energy-management system** with **demand/response functionalities and feedback to the occupants**
- Renovation of **lighting system and advanced control systems**
- Installation of **PV system**
- Reconstruction of the HVAC system – **implementation of new heat pump for heating and cooling**, new VSD pumps and advanced control of heating and cooling systems
- Installation of **new EV-charging station** with advanced control systems and all system reports
- Installation of the **battery system for the peak-load management**, emergency power supply and optimizing of the PV production

Extraction of energy and flexibility measures (3/3)



Code of Conduct (1/2)

- **Site visit is essential** for the effective and transparent SRI rating
- Avoid conflicts of interest and **never try to sell products or services**
- Respect the **privacy and confidentiality** of the client's information
- The SRI auditor **supports the application of innovative tools** such as Building Energy Models (**BEMs**) and Building Information Modelling (**BIM**)
- The SRI auditor **supports long-term use of energy-management systems**
- A key element of efficient demand-side management (DSM) is the proper **identification of controllable and uncontrollable loads**

Code of Conduct (2/2)

- Recommendations should be **tailored to the specific** building and its unique characteristics and needs
- Always be **transparent about the methods and assumptions** used during the SRI and sustainability rating
- The SRI rating should be unbiased and objective, **focused on providing accurate and reliable information**
- Always try to **understand operational practices** about how the building is used and operated, including occupancy, operating hours, and behavior of occupants
- The SRI and sustainability auditor must ensure that **all collected data are accurate, reliable and relevant**
- Before submitting an official report **always discuss your findings with the client**

Conclusion

- The calculation of the SRI can be the **basis for the identification of performance-improvement opportunities**
- Our experiences clearly confirmed that in order to make SRI rating useful, **specific and tailored recommendations for performance improvements** must be provided to the final user
- Special attention must be given to the proper **explanation of the SRI score**
- Implementation approach – **team work, honest communication with the key stakeholders** (owner, energy manager, facility manager, maintenance personnel, etc.) and **a focus on effective measures and follow-up indicators**

TIMEPAC The new EPC for Europe

If you would like more information, please visit www.timepac.eu or contact us at

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