Quantifying benefits of smart technology upgrades as part of the SRI

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SRI2MARKET

What is the Smart Readiness Indicator?

Technical Domain

9 Technical Domains

Services

For example, under the **EV technical domain** there is the service of **EV Charging & Grid balancing**

Functionality Levels

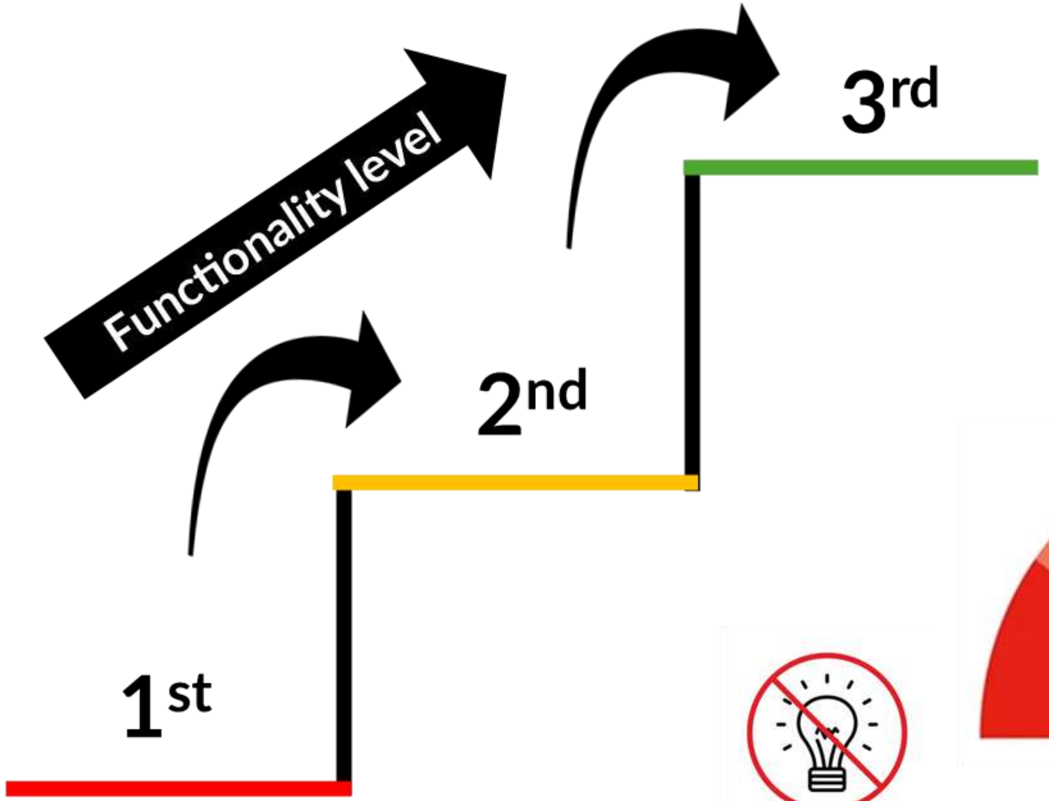
The **EV Charging Grid balancing** has 3 levels

1st : Simple EV charging

2nd : Cost optimized charging based on grid signals regarding prices

3rd : Ability for bi-directional flow of energy (V2G)

Higher service level means a higher SRI rating



With each increase in service level ⬆️

the SRI rating also increases ⬆️

But what does a higher SRI rating mean?

What are the **actual benefits** of a **building with a higher SRI rating?**

How are **tenants**, **landlords** & **investors impacted?**

Are there any **cost savings** associated with **elevated SRI scores?**

Turning smart readiness into measurable performance

To explore this,
a **quantification tool** was developed to estimate **cost & energy savings** for building occupants **as the SRI rating increases**.

Involved parameters:

- Building type / use
- PV & battery characteristics
- Floorspace
- Location specific data (solar irradiance, climate/weather, grid prices)

Why it matters

- Helps consumers understand **how SRI upgrades translate into real energy and cost benefits**, driving wider adoption
- Allows practitioners to **test what-if scenarios** for specific buildings, smart services, and functionality levels

Storage of locally generated electricity

Level 1

> ***When excess electricity is generated**, it charges the […] battery, for **later use**. The stored energy, […] can be used when the system produces **less electricity than the current demand**.*

Level 2

> *The **energy storage system is connected to the network**, having the ability to receive **signals** from it. […] Signals usually relate to **pricing** or periods when load shifting is required. The controller acts based on the signals and its settings.*

Level 3

> *The controller […] leverages **data such as building demand, peak grid hours, consumption, battery capacity, and energy production**. Its primary objective is […] to determine when to use **currently produced energy**, when to **store it in the battery**, or when to **use the stored energy**.*

3 **functionality levels as described in the official SRI catalogue**

Storage of locally generated electricity

Level 1

Uses renewables and the battery **as much as possible**

Level 2

Compares the price of electricity from the grid or renewables / battery (LCOE) & **chooses the cheaper option**

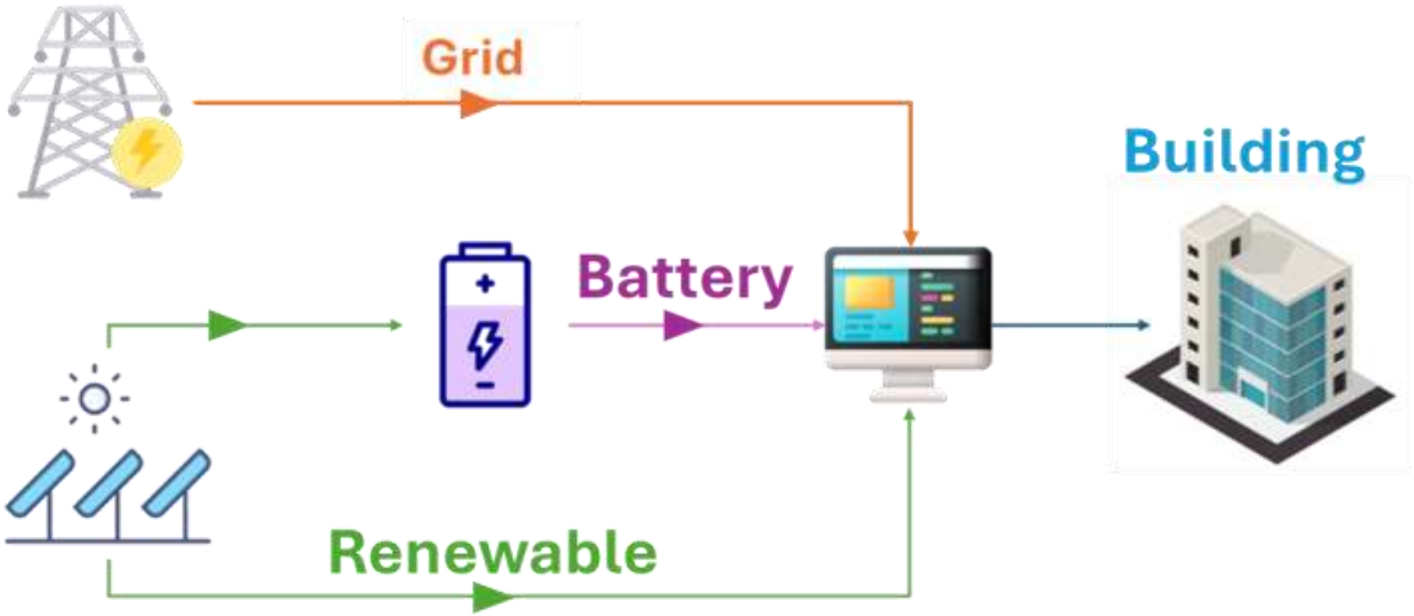
Level 3

Uses day-ahead forecasts on

- grid prices,
- building demand,
- renewable generation,

& **optimizes energy flows** to achieve the **minimum cost possible**

There are three ways to satisfy electricity demand…



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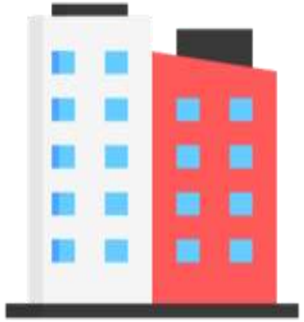
Case studies (1/3)



4 building typologies

All buildings assumed to be in **Marseille, France**

Location is an important aspect of the modelling process as it dictates **several inputs.**

Case studies (2/3)

Residential Buildings

Single-family house

Multi-family apartment building (5+ units)

Commercial Buildings

Office Building

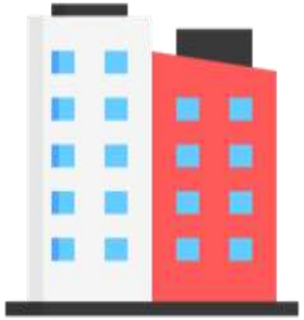
Hotel

Case studies (3/3)

Residential Buildings

100 m²
5 kW
5 kWh

1000 m²
50 kW
50 kWh



Commercial Buildings

300 m²
15 kW
15 kWh

5000 m²
250 kW
250 kWh

Results

We compare the **cost reduction** of electricity supply that is achieved in each of the building typologies…

…as we move up in SRI's service functionality levels

To keep in mind…

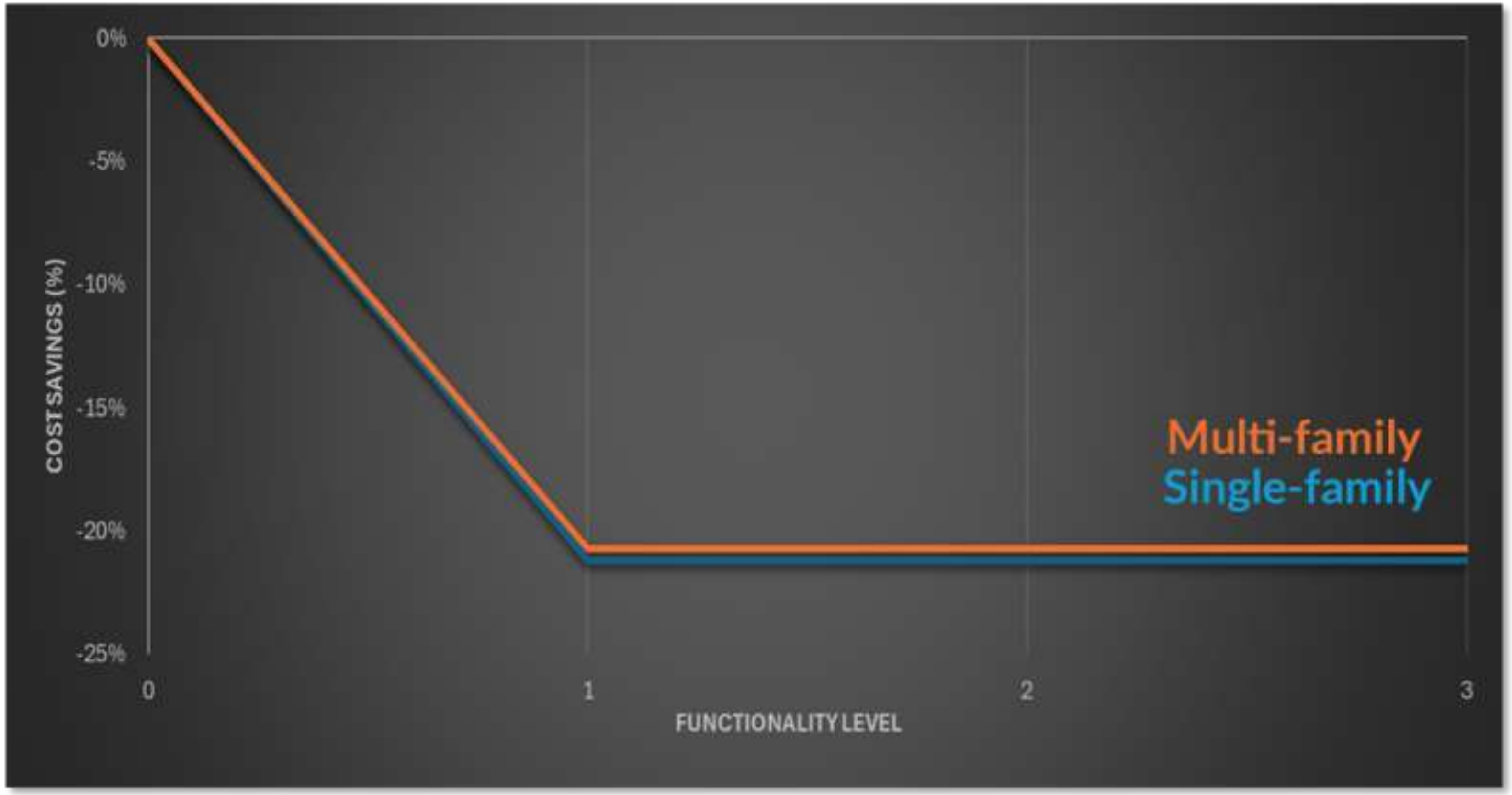
According to the official French government website, **constant rates are prevalent for** **residential consumers** in France.

However, SRI level descriptions often **imply the existence of a** dynamic pricing scheme **for electricity**.

As such, residential buildings **were tested under both dynamic and constant rates.**

Under flat rates, cost savings stagnate

Electricity supply cost savings for
residential buildings under **flat rates**



Residential buildings in Marseille can cut electricity supply costs by over 20% with PV and battery systems under flat-rate tariffs

However, any further increase in smartness level will bring **no added value**.

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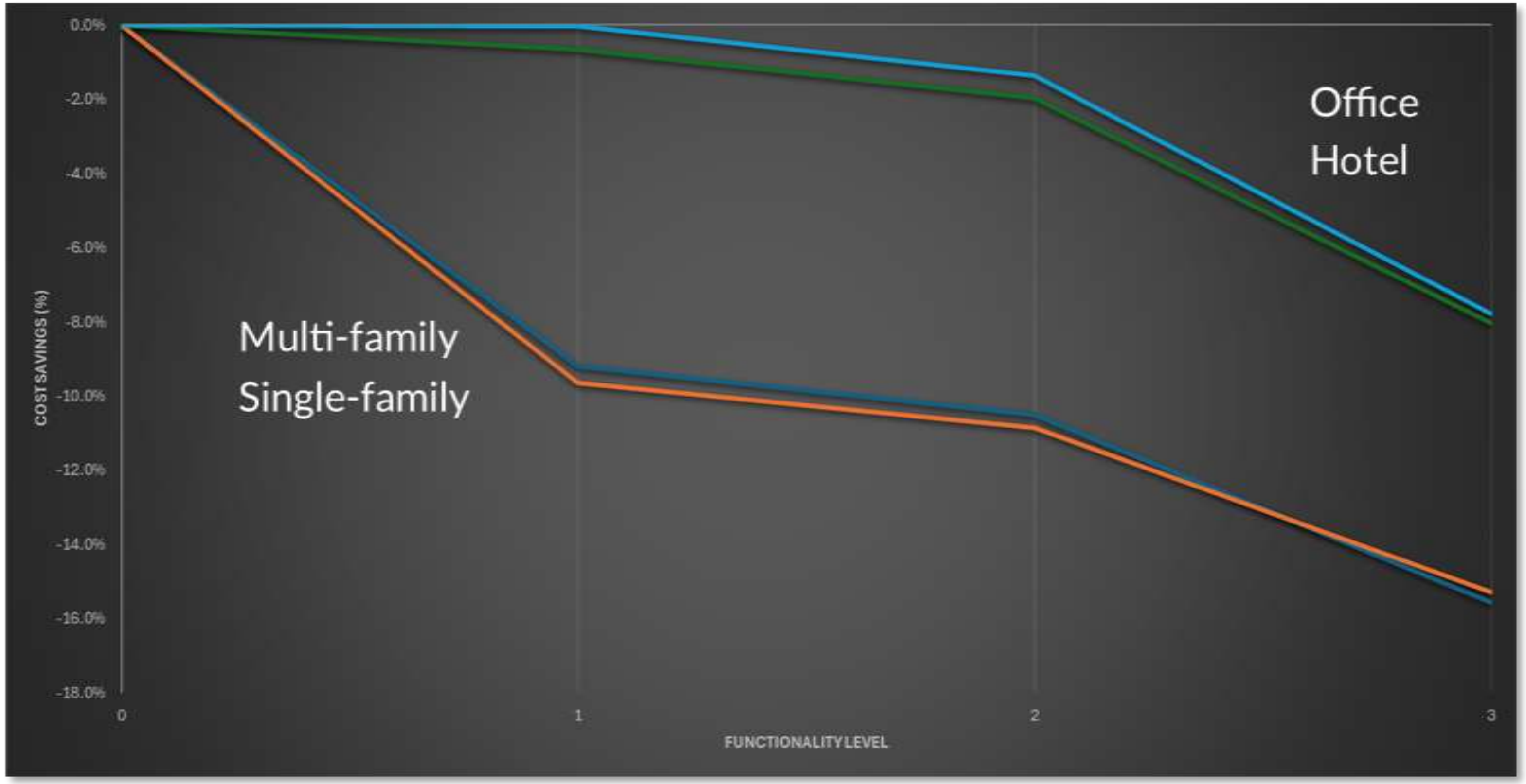
Dynamic rates allow for progressive reduction of costs

Electricity supply cost savings for **residential** & **commercial** buildings under **dynamic rates**



On the other hand, under **dynamic rates**,

- an increase in the service level
- progressively decreases the cost supply

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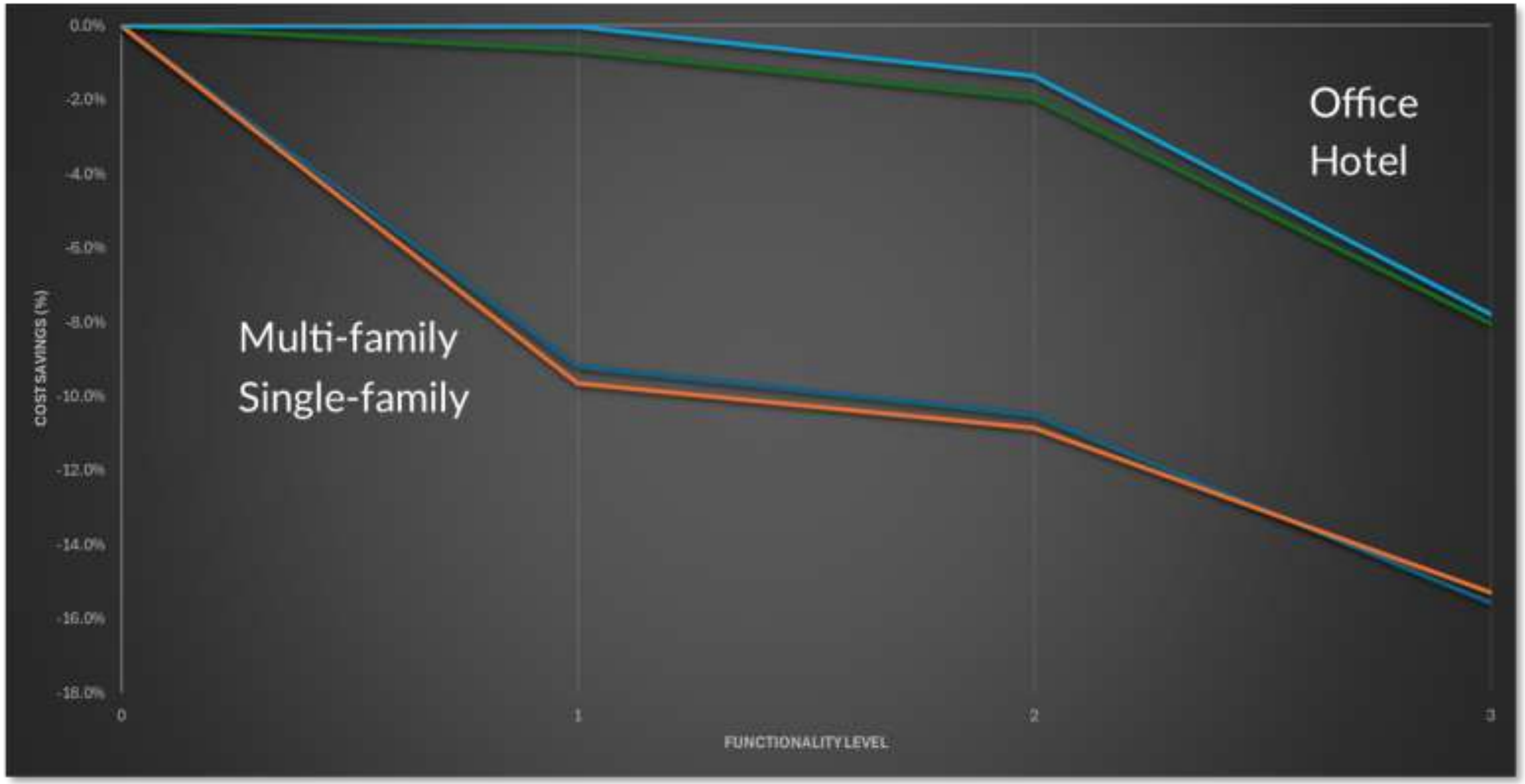
Dynamic rates allow for progressive reduction of costs

Electricity supply cost savings for **residential** & **commercial** buildings under **dynamic rates**



Greater cost reduction is observed in **residential** buildings when compared to **commercial** ones.

This has to do with:

- Demand profiles
- Grid price fluctuations
- Energy generation patterns

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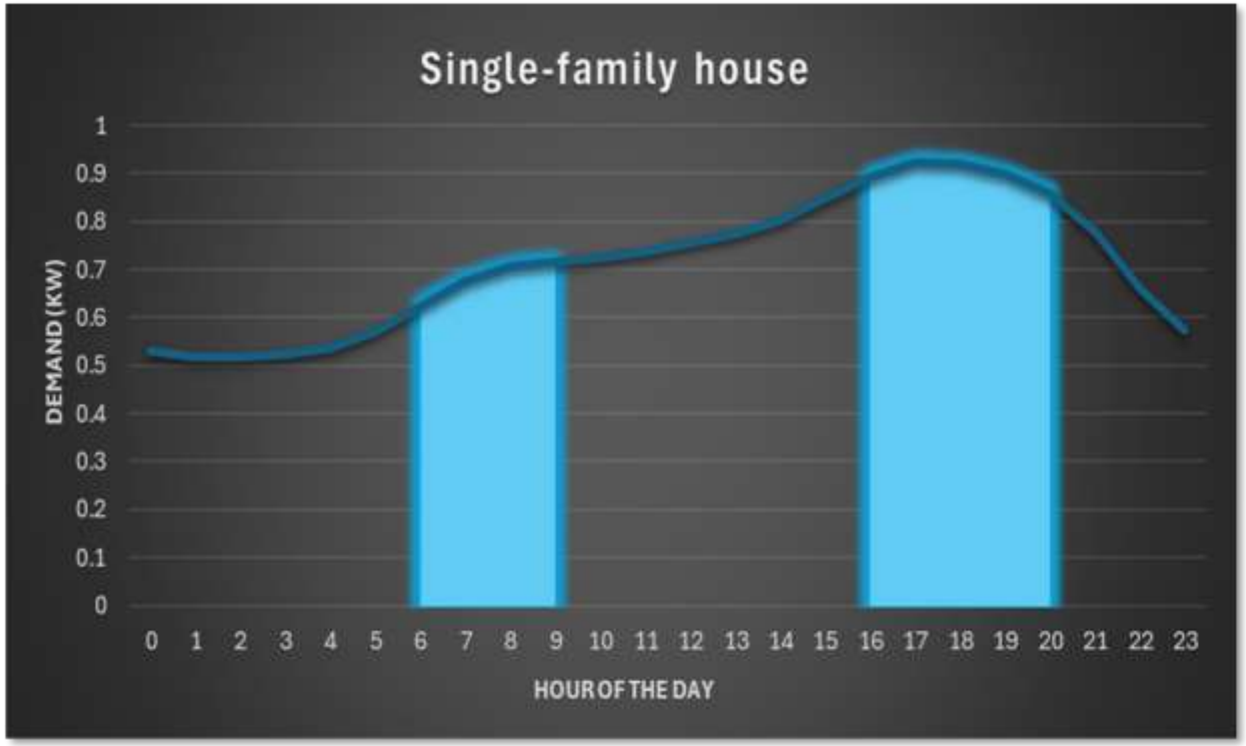
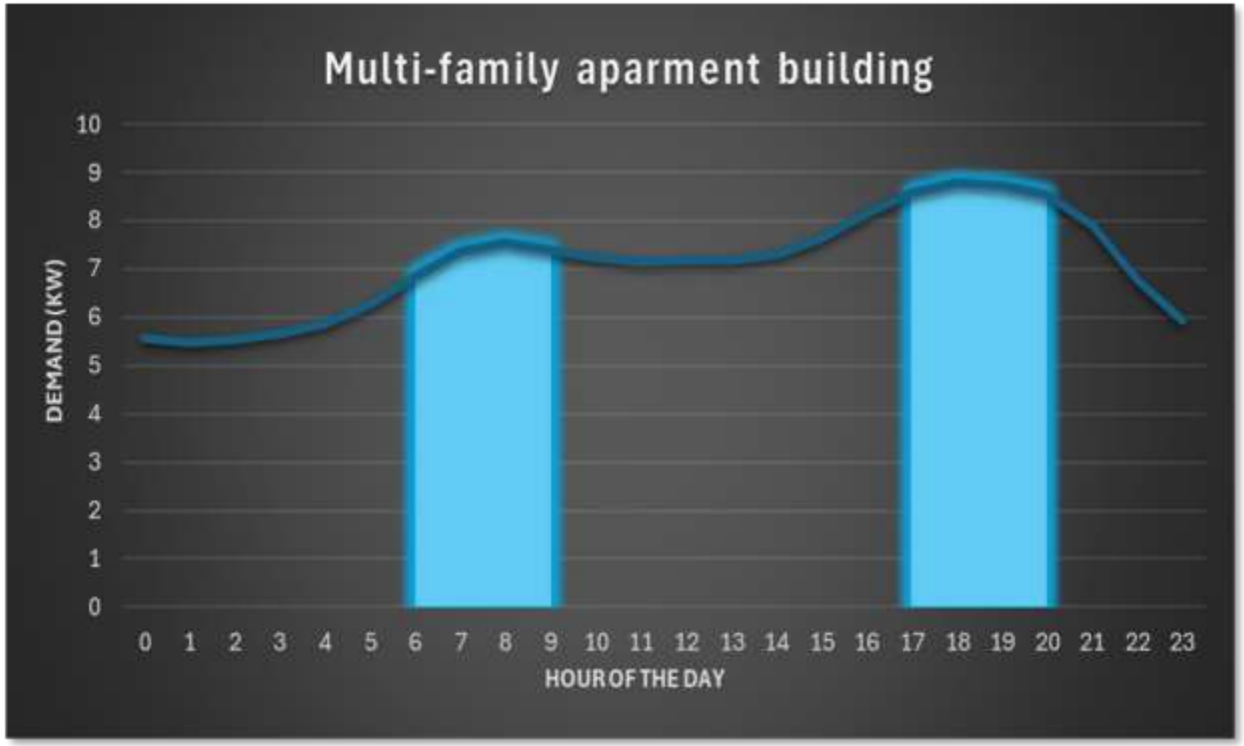
Demand profiles (1/2)

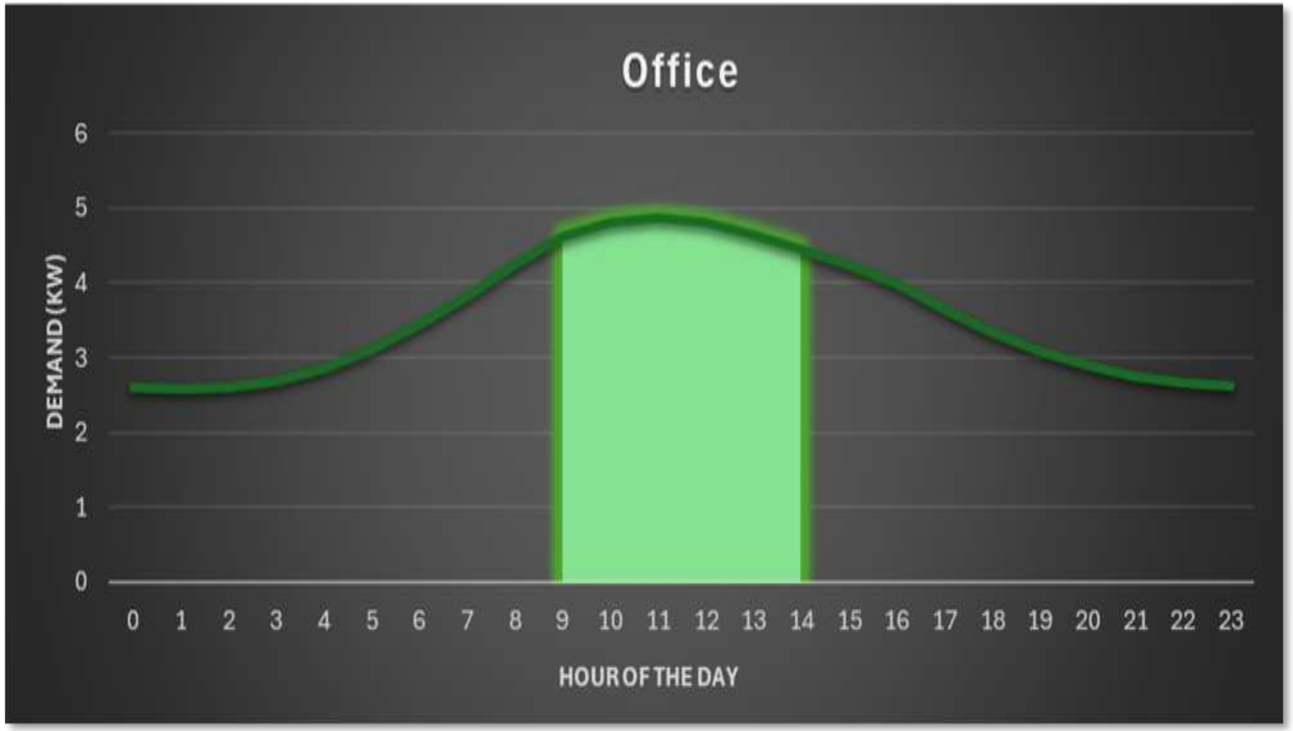
Residential case studies **typically have** demand peaks **early in the morning** (6 am – 9 am) **and in the evening** (4 am – 8 am). These demand peaks **align well with** grid prices spikes (see later).





Demand profiles (2/2)

However, commercial buildings' demand profile **peaks during the day**, typically from **9 am to 2 pm.** Their profile mostly **aligns with the times** when on-site renewable energy generation peaks.



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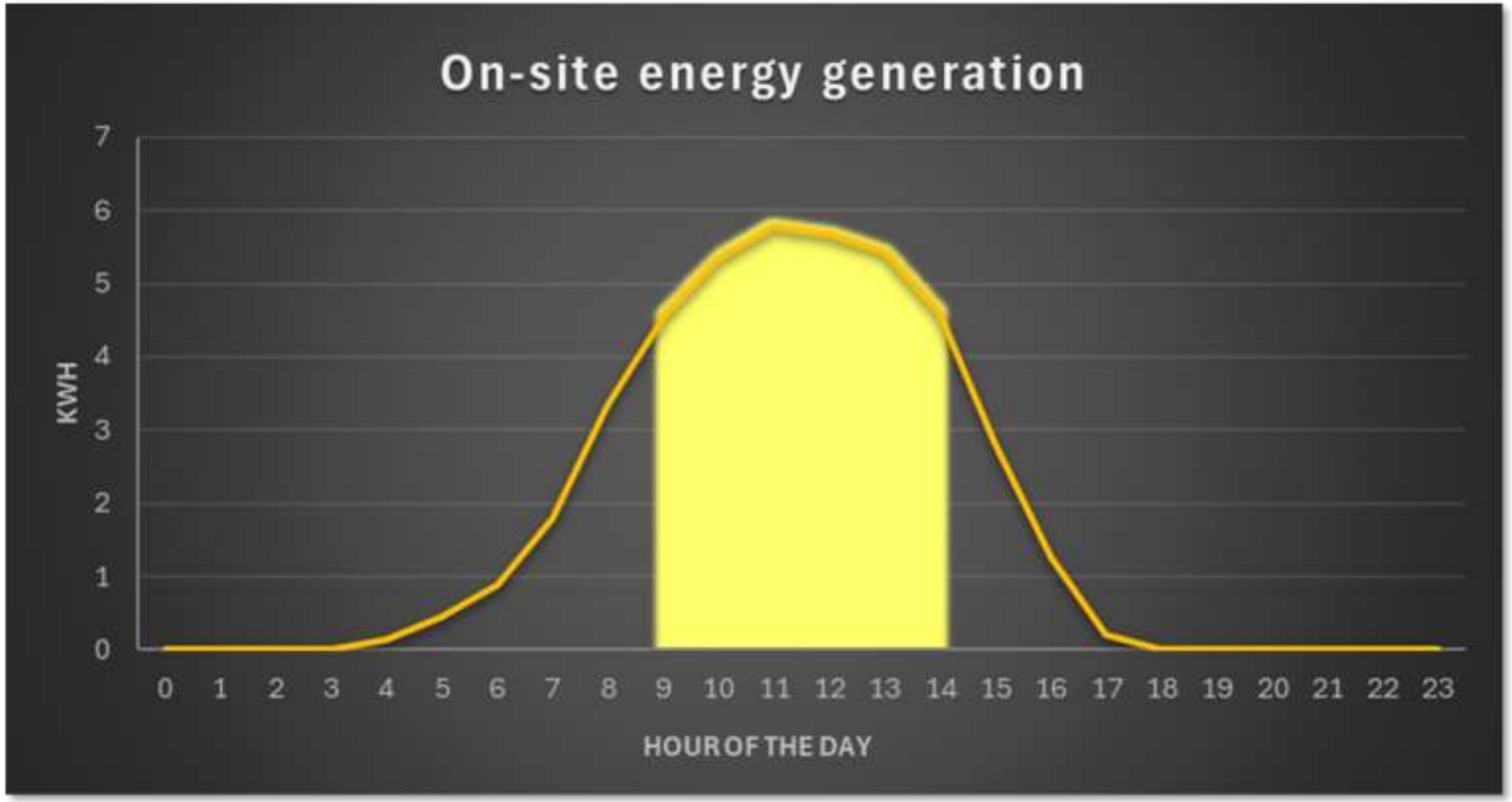
On-site renewable energy generation profile

On-site renewable (solar) energy generation peaks at noon.



As such, it aligns well with demand peaks in commercial buildings.

This means that **there is little need to transfer energy for later use**, as demand decreases later in the day.

In such cases,
renewable energy is mostly consumed at the time it is produced, and only a small percentage is stored.

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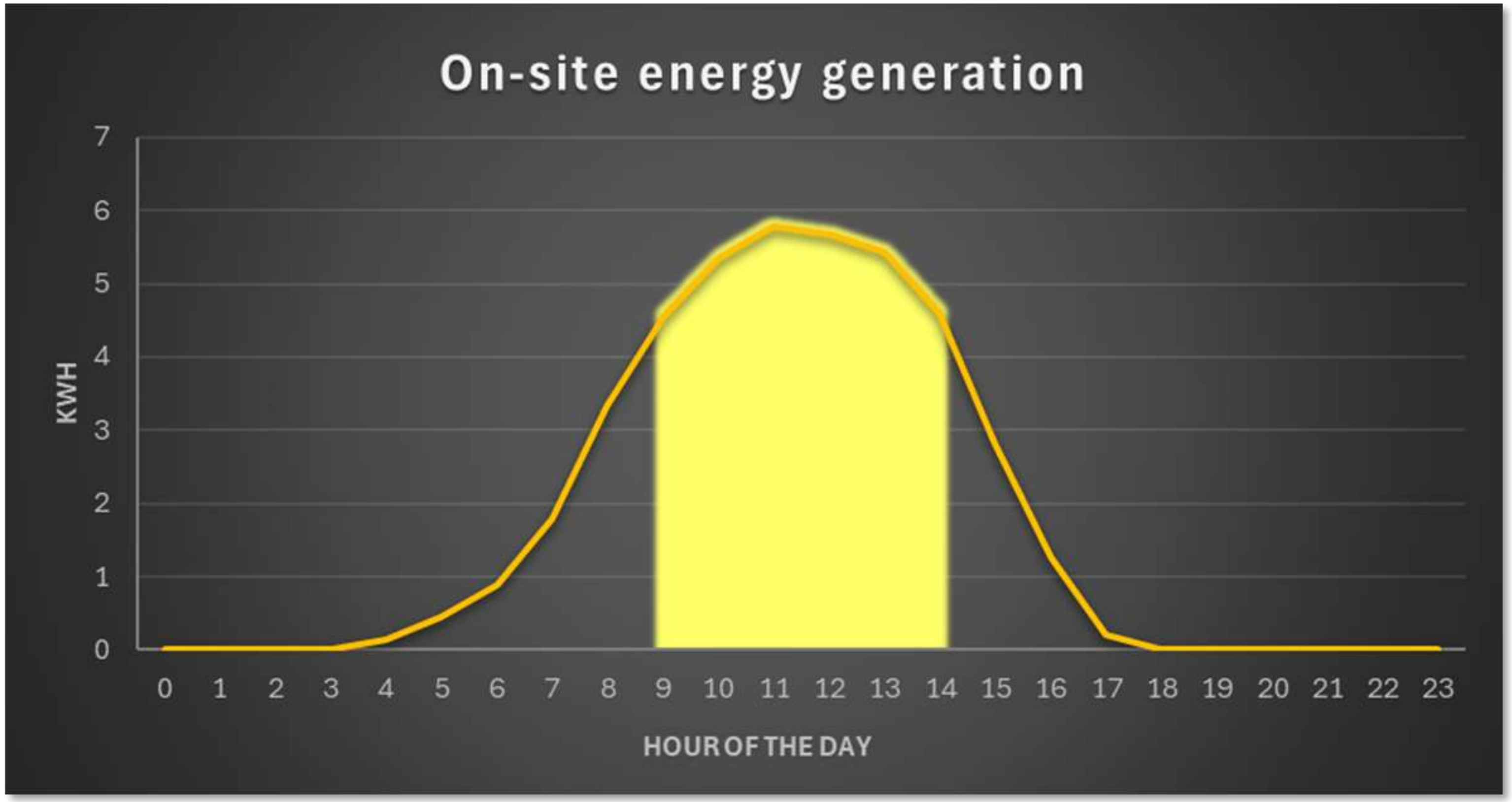
On-site renewable energy generation profile

On-site renewable (solar) energy generation peaks at noon.



On the other hand, in residential buildings, demand and availability of renewable energy **are not in sync**.

This creates the need for transferring energy to the evening, when demand for energy rises.

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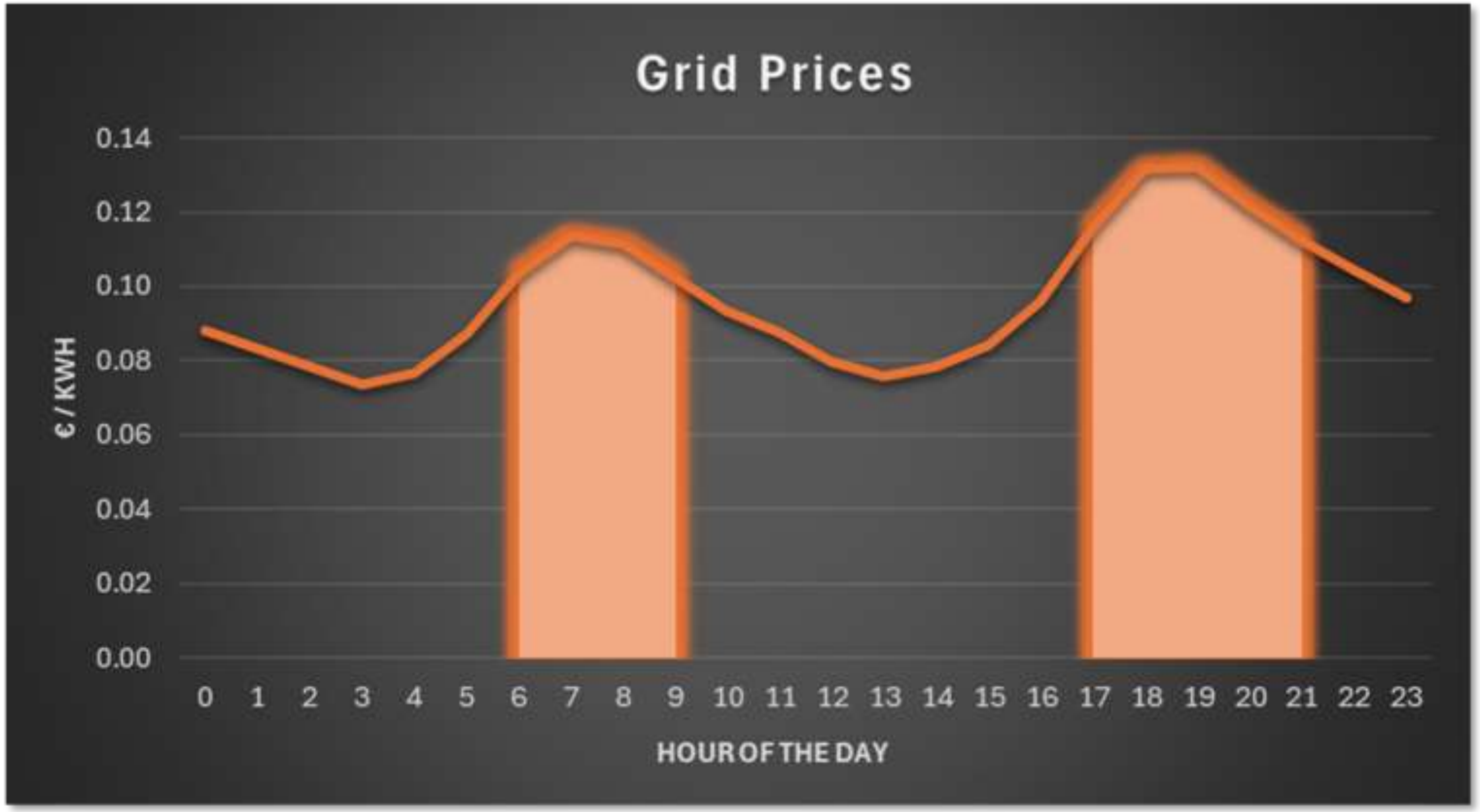
Dynamic grid prices impact effectiveness

Under a dynamic pricing scheme, electricity prices will vary throughout the day…



Prices peak at

- Early Morning (6 am – 9 am)
- Evening (5 pm – 9 pm)

Price peaks align with increases in the energy demand of residential buildings. This creates further need for offsetting grid energy usage, as it becomes a costly period for households and apartments.

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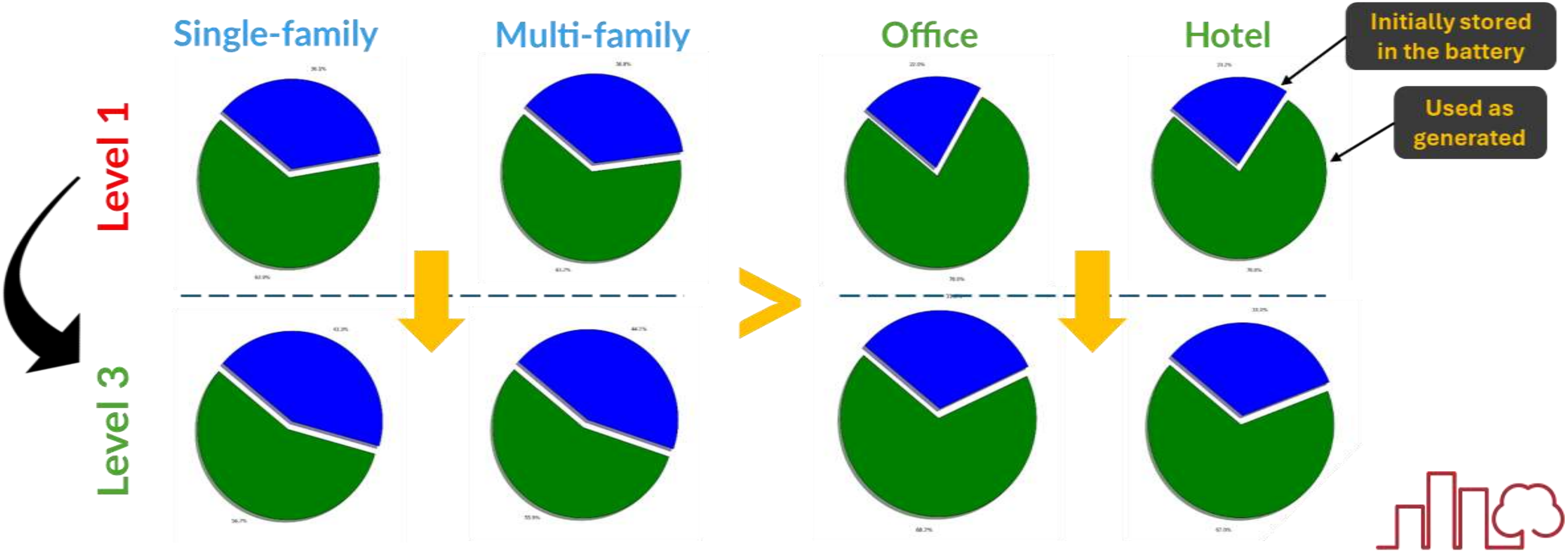
Better utilization of the Energy Storage System

A building's battery is **better utilized** as the **functionality level increases**.

In **residential buildings** even more so than **commercial buildings**, as it **better suits their demand needs…**



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Conclusions & Recommendations

Building typology matters

Residential buildings benefit more from storage because their demand profile is poorly aligned with PV generation and well aligned with grid price peaks.

Commercial buildings, whose load profiles already match PV generation, gain less from storage but they their performance benefits from predictive and price-responsive control (Levels 2–3).

Conclusions & Recommendations

Role of pricing schemes

Under flat pricing, smart functionality beyond simple storage management (Level 1) has no additional financial impact.

Under variable pricing, advanced functionality (Levels 2–3) allows grid price-based signal response which unlocks system-level flexibility and further cost efficiency.

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Conclusions & Recommendations

Support open access to grid and market data

For Level 3 functionalities to be unlocked, access to reliable day-ahead forecasts (demand, RES generation, and prices) is essential.

Next steps and further research

Model new SRI services and technical domains
e.g., **microgrids** & **EV charging**

Explore cross-domain synergies
e.g., **heating** ↔ **electricity** ↔ **EV**

Further develop the tool to be used by SRI examiners in the upcoming EU rollout phase.

Extend the SRI beyond residential and commercial buildings and into the **industry**.

Thank you!

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