

EXECUTIVE SUMMARY

# Delivering Smart Home Energy Management

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# Executive Summary

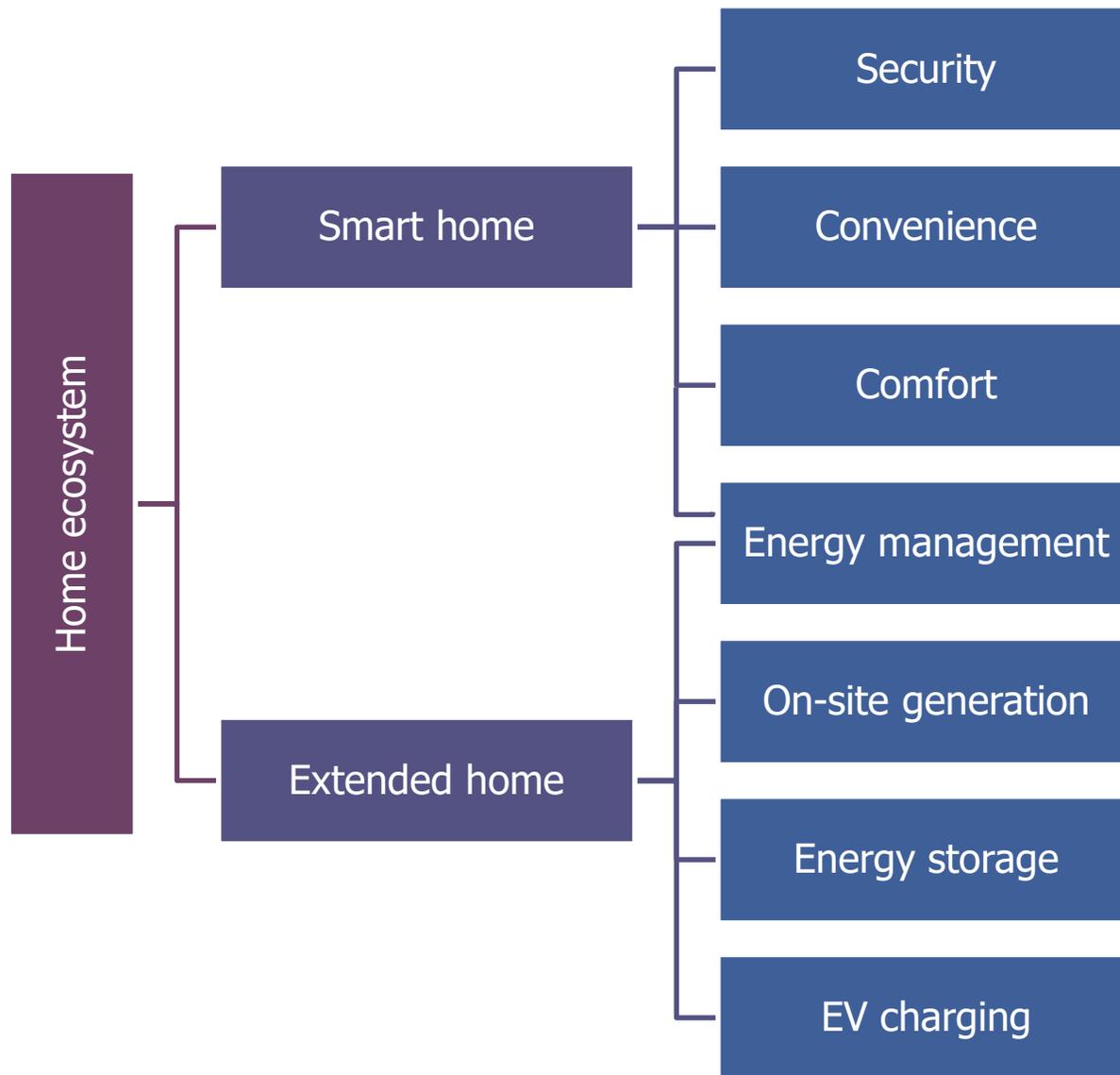
Residential buildings are responsible for the largest portion of all energy consumed in the built environment. In addition, the residential segment is one of the most energy-intensive sectors, second only to industry, which stresses the importance of home energy management for the energy transition.

In the meantime, the home ecosystem continues to evolve into the following:

- Smart home – a home with connected devices
- Extended home – a home that offers additional energy services

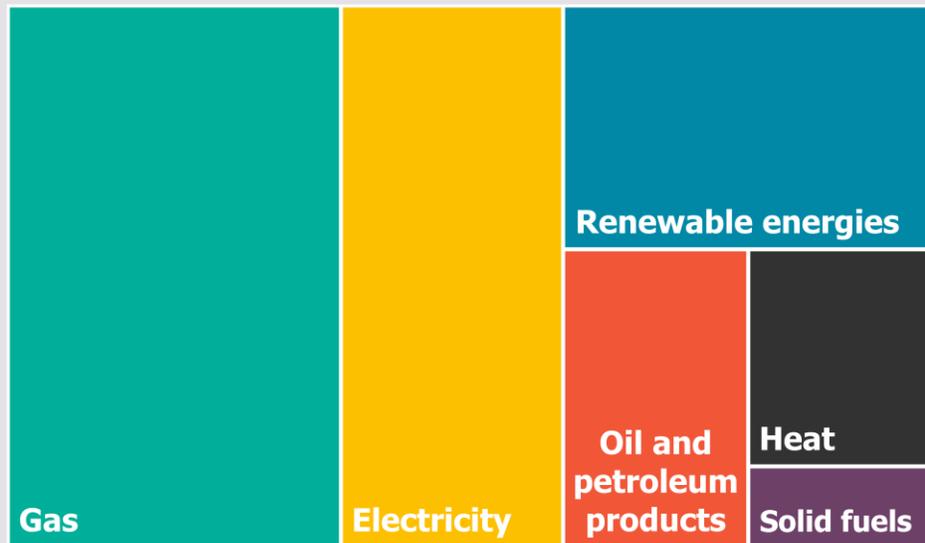
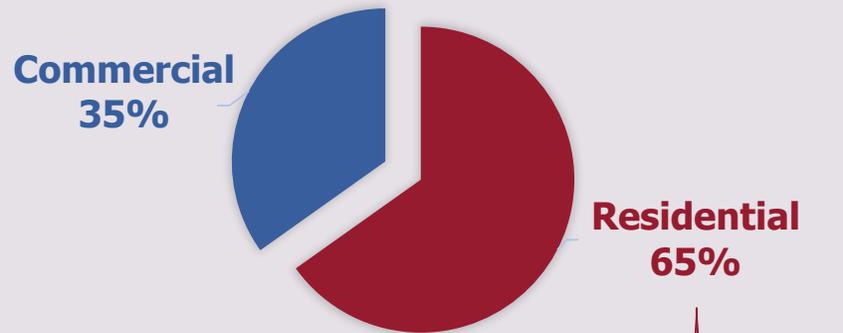
These remain two siloed branches in the home. Today, there is no smart home/energy management offering that delivers on all home ecosystem capabilities.

However, residential service providers can fill in the gaps by establishing the right partnerships in order to succeed in the smart home energy services space.



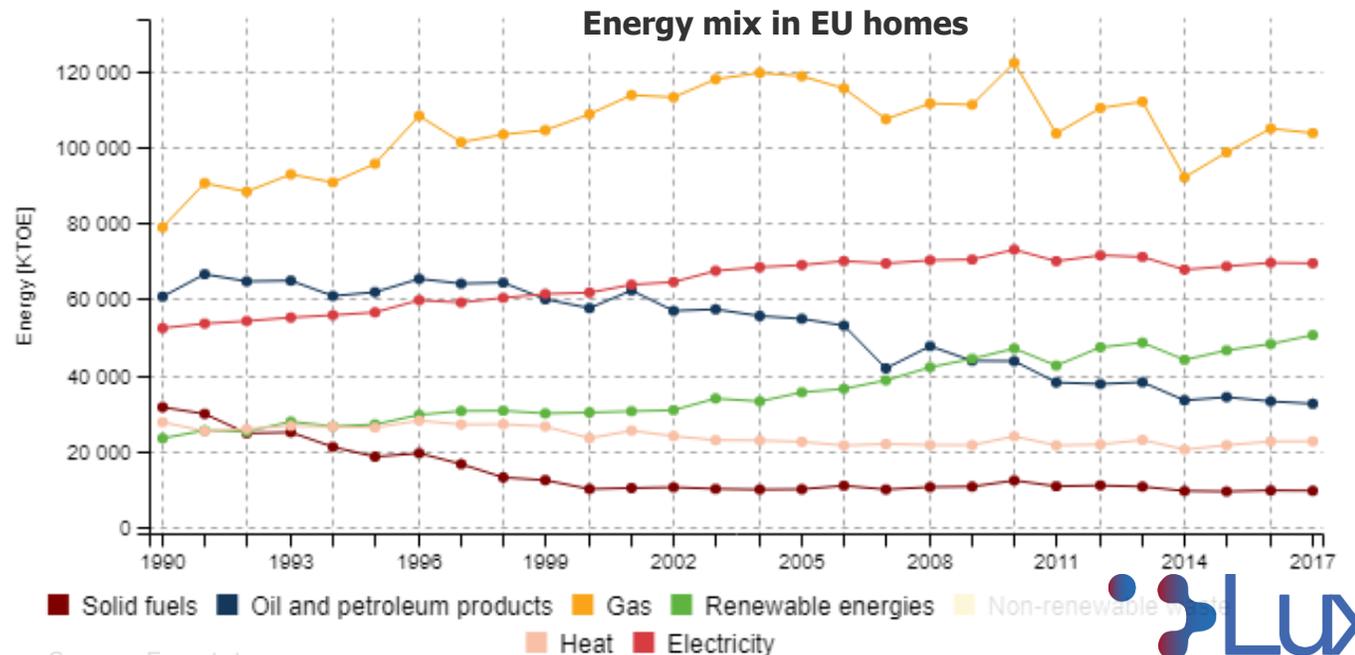
# Homes in Europe are mainly powered by natural gas and electricity generated from fossil fuels

Energy consumption in buildings in the EU during 2017



During 2017, homes in the EU were responsible for 65% of the energy consumed in buildings.

A mix of energy carriers go into the residential segment, the biggest being natural gas, followed by electricity. However, with renewables on the rise as an energy source, there is an opportunity to help homeowners manage their energy profile, in preparation of further electrification and diverse utility pricing schemes.



Source: Eurostat

# A number of players have already been active, and others are entering the HEM space with diverse approaches

## Incumbents

Old-timers in the space include:

- **Electric utilities**, which have been targeting residential energy efficiency through energy-saving programs.
- **Appliance manufacturers**, which first intended to manufacture more energy-efficient equipment (driven also by standards and regulations).

## Challengers

IoT enabled other players to enter:

- **Smart home solution developers**, which can optimize energy-intensive systems (e.g., smart thermostats for heating control).
- **Energy service providers** take advantage of connected solutions to monitor and control home systems.

## (Un)expected new entrants

The rise of distributed energy opens opportunities for new entrants:

- **Energy storage solution developers**, which help reduce utility bill costs and maximize self-consumption of on-site generation.
- **Automotive OEMs** are gaining interest in residential electric vehicle (EV) charging solutions.

The approach of deploying connected sensors and controls for use cases beyond energy management enabled home automation, which then gave birth to the smart home, in which energy-related applications are only one piece of the equation. In the smart home, squarely energy-related applications do not worry homeowners as much in comparison to the other focus areas in the home, which include security and well-being applications.

# HEM AND THE SMART HOME

## Lux Tech Signal

The Lux Tech Signal is based on our analysis of innovation data including:

- Patents
- Academic papers
- VC funding
- Government funding
- Lux proprietary data

The **Innovation Interest** score is calculated by analyzing multiple, diverse datasets weighted based on our evaluation of the role innovation sources play in each stage of commercial technology development, empirically tested and validated against real-world historical data.

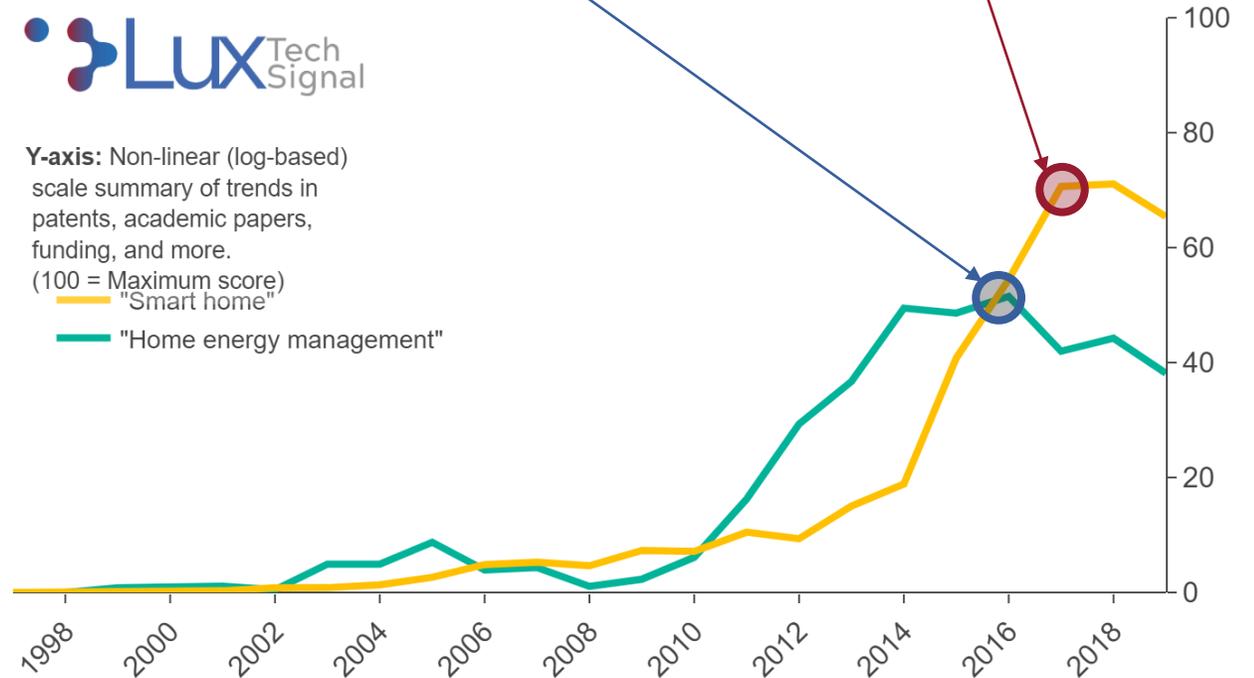
The maximum possible score is 100, indicating the highest observed rate of research, patenting, funding, etc.

Home energy management innovation interest peaked right after the smart home surpassed it, and interest only seemed to decline afterward

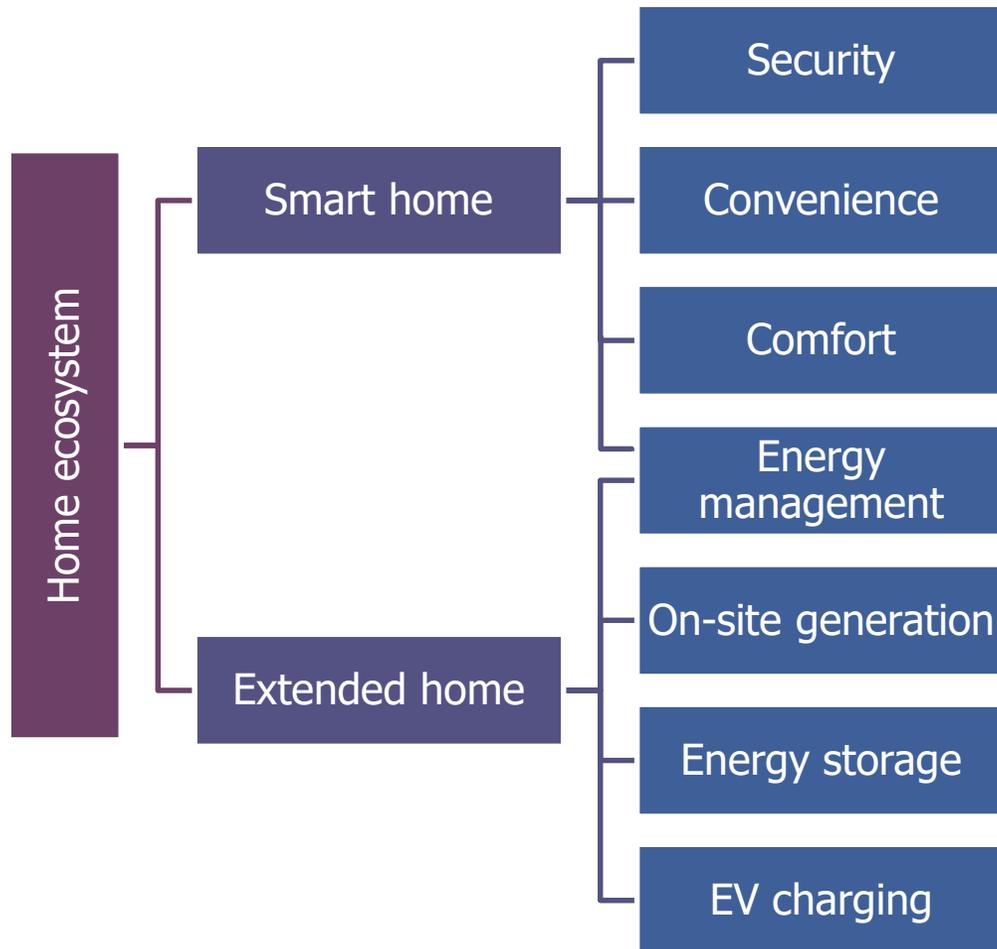
After 2016 failed to be the "year of the smart home," innovation interest in the area remained high; however, skepticism around the opportunities it unlocks grew



Y-axis: Non-linear (log-based) scale summary of trends in patents, academic papers, funding, and more.  
(100 = Maximum score)  
— "Smart home"  
— "Home energy management"



# Availability of distributed energy assets for the residential segment gave birth to the “extended home”



The home ecosystem continued to evolve thanks to the growing number of commercially available residential energy assets like on-site rooftop photovoltaic systems, stationary energy storage, and electric vehicle (EV) chargers, giving birth to what we define as the extended home.

While the smart home branch focuses on security, convenience, and comfort, it still includes a number of energy management capabilities. At the same time, the extended home includes the ability to manage the small energy resources installed behind the meter. **Energy management is the only area that the smart home and the extended home have in common, and so far, this connection has remained relatively ignored by companies focusing on either branch of the home ecosystem.**

Smart home energy management is not an offering that exists today; however, there are [indications](#) that players involved in both smart home and energy management are aiming to cover as much ground as possible in the home ecosystem.

# Players in the residential space can be compared based on their flexibility and service delivery approach

In order to identify how players are positioned in comparison to others targeting the home ecosystem, we look at how flexible their offering and service delivery approach are.

Flexibility refers to the number of capabilities or types of residential systems supported that enable one or multiple functionalities, which add value for the consumer.

- Players with limited flexibility include those that only offer a small number of residential systems enabling a limited number of applications in the home.
- Players with full flexibility are those that can enable multiple functionalities within the home thanks to added support for a wider variety of devices and appliances.

**Services can be delivered remotely or locally, which affects scalability, customization, and the ability to tap into additional revenue streams.**

## Local presence

Local service delivery enables players to offer more personalized solutions tailored to regional needs and to tap into additional value-added service opportunities.

*Limited*

**Flexibility**

*Full*

## Remote presence

Remote service delivery can enable scalability at a faster rate, but affects the level of customization of a residential offering as well as customer support and engagement.

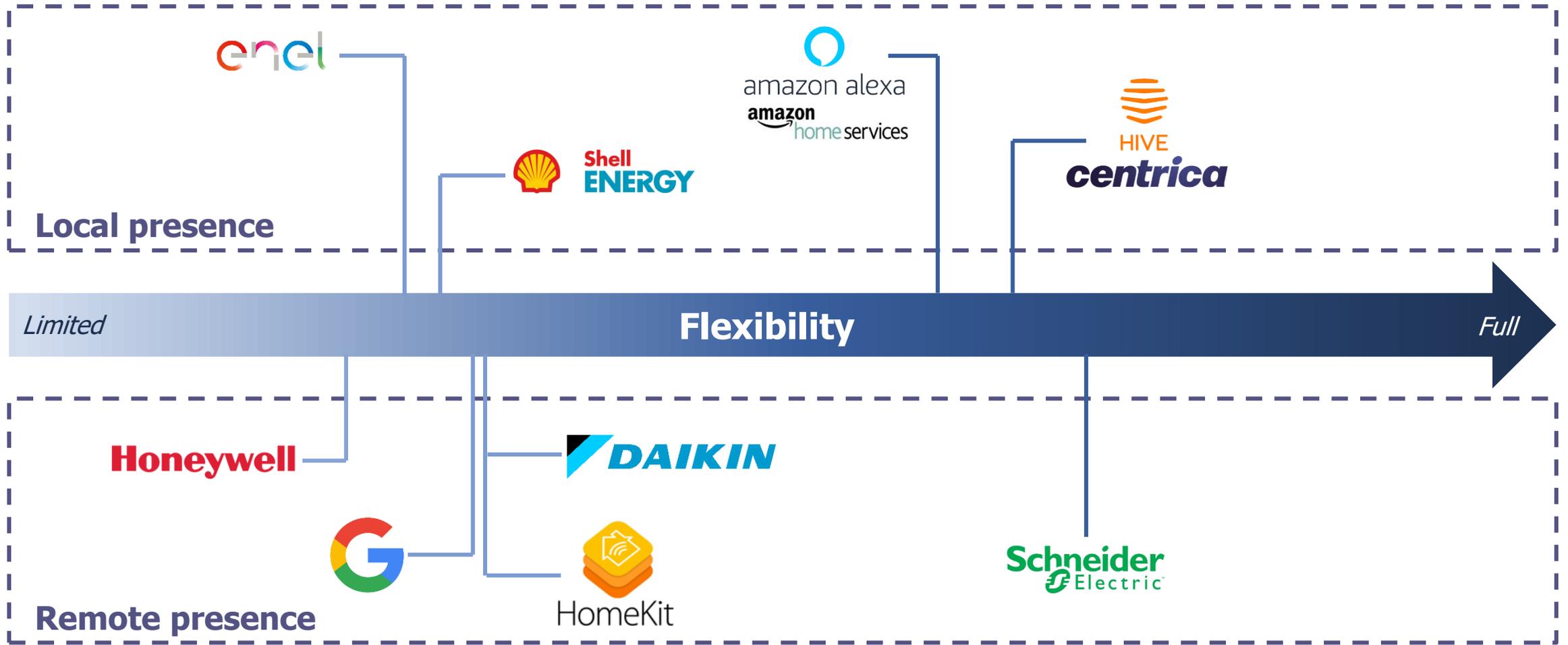
# We scored electric utilities that are paving their way to becoming energy service companies of the future

We applied the scoring system to three forward-thinking electric utilities that have been aiming to become energy service companies. The results show:

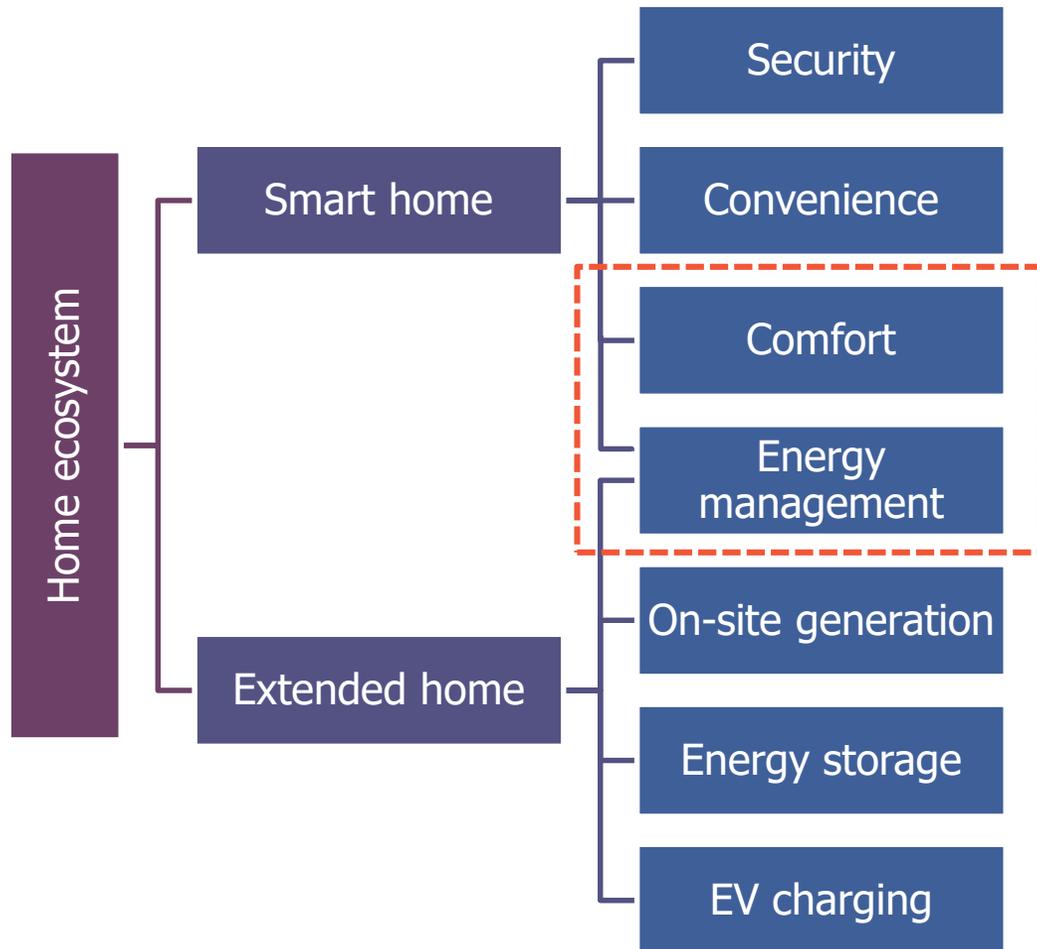
- From the pool of utilities we handpicked, only Centrica shows a relatively strong presence in the smart home branch; the British energy company is checking all the boxes, although it's less concerned about enabling security capabilities.
- To cover energy storage capabilities in the extended home, Shell took the [acquisition path](#), which will enable the company to integrate Sonnen's residential batteries into its offering. As for Centrica, the company gained [virtual power plant](#) aggregation capabilities after its [acquisition of REstore](#) and it now offers value-stacking services including behind-the-meter asset optimization and access to new revenue streams.
- Enel is particularly strong in residential EV charging solutions thanks to the technology it [acquired](#) and [integrated](#) into its Enel X business recently, while [Centrica](#) and [Shell Energy](#) in the U.K. are focusing more on expanding the residential charging infrastructure.

	Smart home			Extended home			
	Security	Convenience	Comfort	Energy management	On-site generation	Energy storage	EV charging
Shell Energy				High		High	High
Enel				Medium	High		High
Centrica	High	High	High	High		High	High

# Players can be compared based on their flexibility and service delivery approach



# Smart indoor environment control enables a passage from the extended home into the smart home

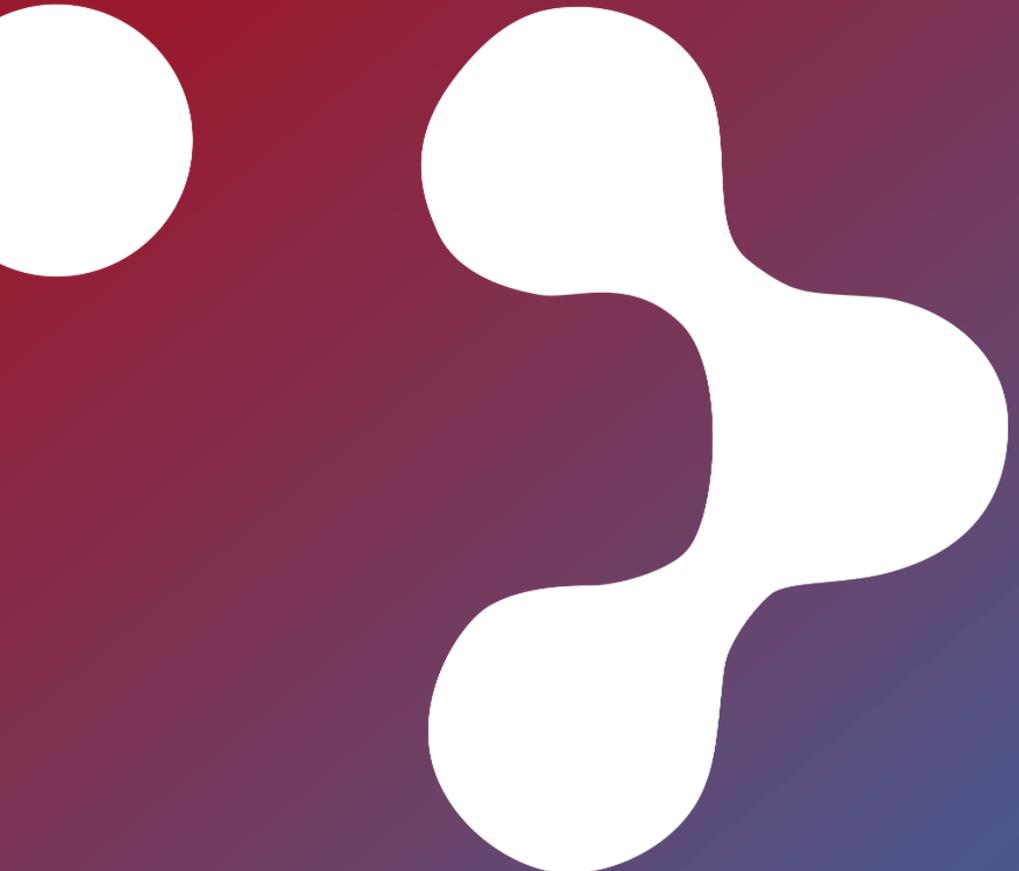


**The entryway for players active in the extended home to get into the smart home is through a combination of energy management and comfort delivery**, both of which are included in smart indoor environment management.

Smart thermostats are a clear example of how energy service companies and electric utilities can deliver smart home features like comfort and convenience while tackling energy efficiency as well.

The last but not least important piece of the puzzle for players moving from the extended home space toward the smart home is delivering smart home security capabilities, which are a key concern for residential customers.

Service providers in the extended home should take advantage of their local presence and partner with players in the space that offer higher flexibility in terms of their enabled capabilities to deliver smart home energy management services.



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