

# *Unlocking the potential of digital home energy*

MARCH 2024





# Contents

Foreword	3
Business Models	4
Interoperability	7
Customer Engagement	15
Milestones	22
About LCP Delta	24
Contact us	25





# Foreword

**The residential energy markets are evolving.** The integration of digital technology with decarbonising energy systems is unlocking new opportunities for innovation and is set to transform the retail energy sector.

Yet, as we move forward on this journey to a digital energy future, there are two critical challenges that must be addressed: interoperability and customer engagement. Ensuring the seamless integration of various technologies and platforms is essential for unlocking the full potential of digital energy solutions. At the same time, fostering active participation from consumers is a vital part of an efficient and decarbonised energy system.

In this whitepaper, we explore three key areas in residential markets:

- 1 Business models:** the opportunities for generating revenue and creating value through new business models in the digital energy sector,
- 2 Interoperability:** the challenges that need to be overcome, and
- 3 Customer engagement:** the challenge of engaging energy customers at scale.

By addressing these issues, we can unlock the full potential of digital energy, simplifying and personalising the transition for consumers and paving the way for an energy future in which millions of households play a role.

# *Business models*

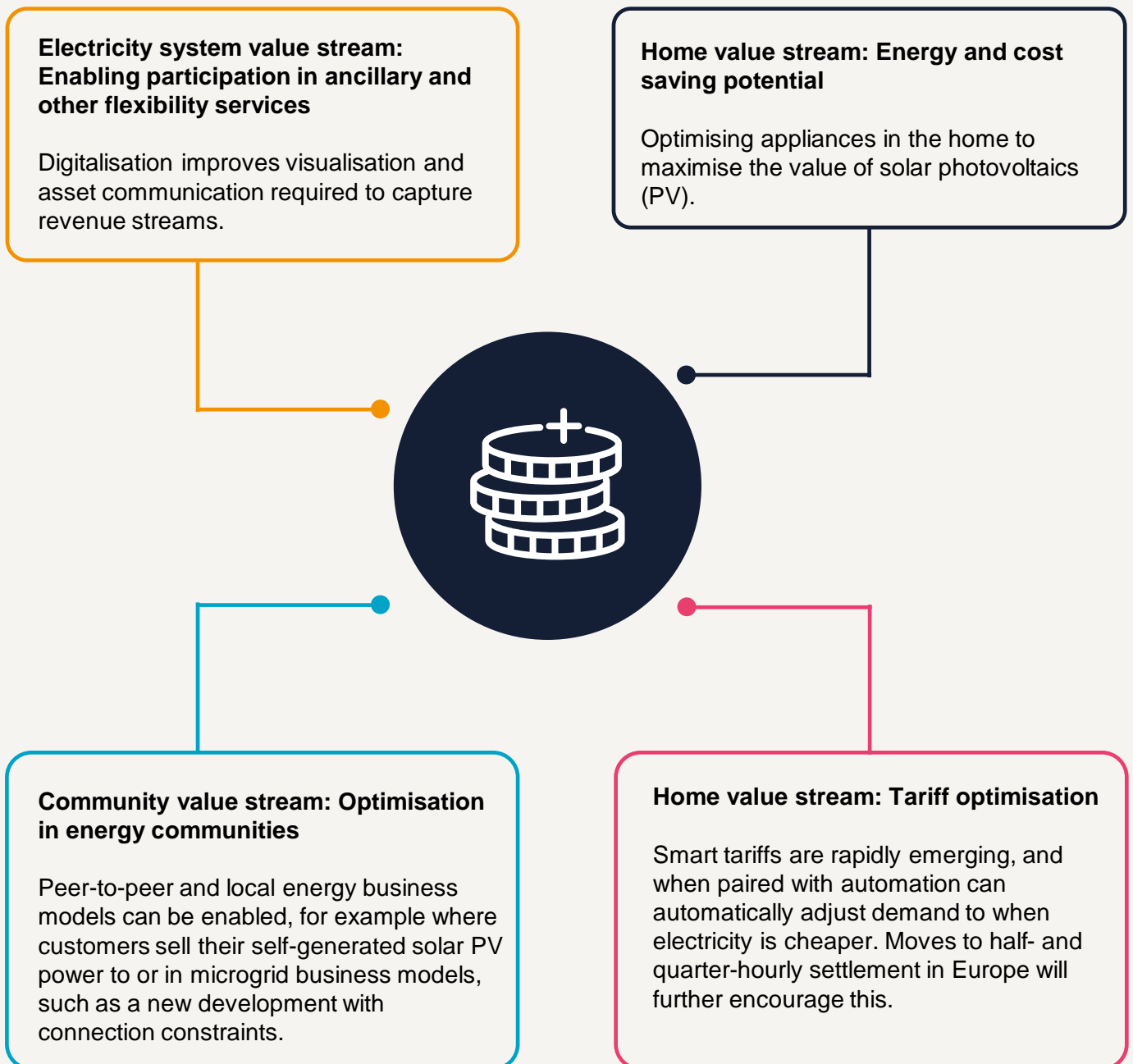
---





## Unlocking the value in the digital energy market

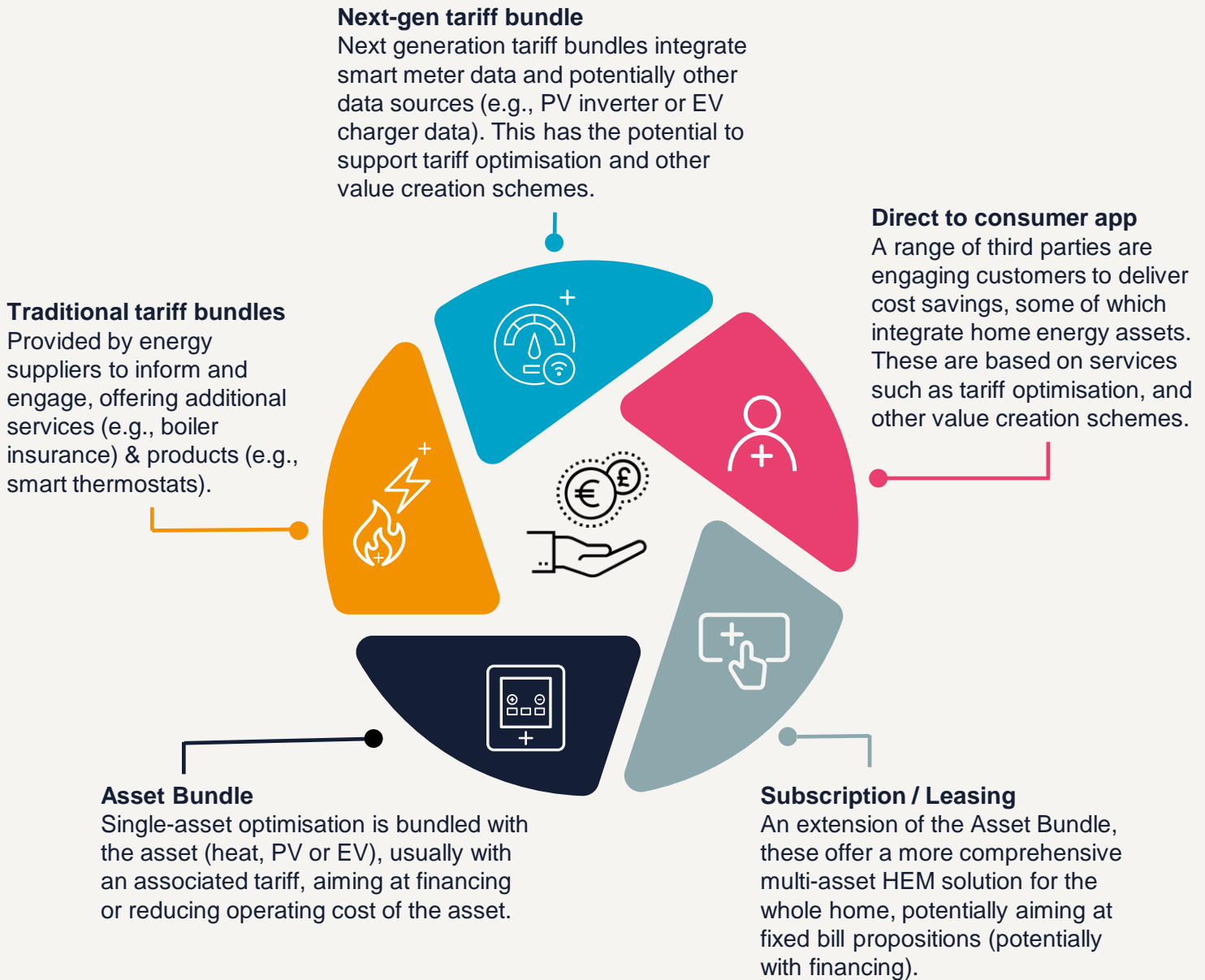
The growth of digital services opens an opportunity for improving customer retention and establishing services that create new value for retailers / service providers and customers. There are a range of revenue and value streams enabled by home energy management that are available to various stakeholders:





## How are solutions being brought to the market?

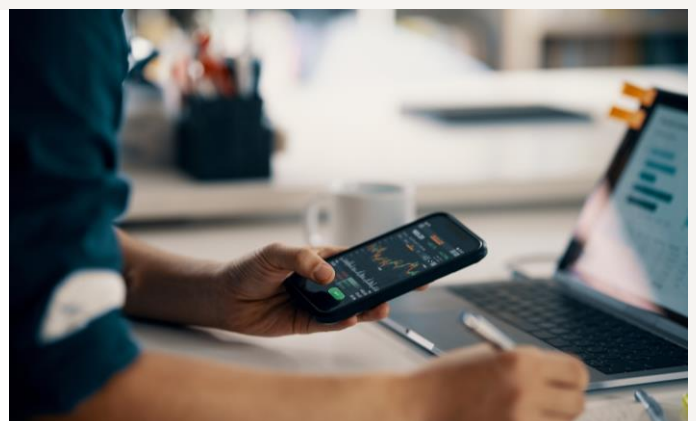
A variety of business models exist and are developing that are unlocking the potential of digital energy.



### EXAMPLE



One of the most innovative and engaging energy suppliers, **Octopus Energy** has introduced new tariffs, led the way in GB's Demand Flexibility Service, introduced rewards, consumption and visualisation.



# *Interoperability*

---





## Interoperability in the digital connected home space

Technological fragmentation, where home energy assets are not communicating with each other and / or are difficult to communicate to, poses a major barrier to the future digital energy utopia. The key to overcoming this barrier is improving interoperability. Interoperability allows smooth and harmonious integration of home energy assets.

### Communication standards and protocols used for energy assets

Standards and protocols serve as communication rules, which enable a uniform method for various stakeholders to communicate with various types of home energy assets from different manufacturers. There are currently too many protocols used in this space today hindering seamless cooperation among devices and thereby limiting the functionality of the digital home environment.

### Non-exhaustive list of communication protocols used across the connected home and home energy management space

	Ethernet							
Data transmission	WiFi™	Bluetooth®	Cellular (2G, 3G, 4G)	6LoWPAN	LoRaWAN®	sigfox		
Application	Home automation and heating & cooling control				Energy system services		Cloud APIs	
	Bluetooth®	LoRaWAN®	sigfox	zigbee	openADR ALLIANCE	S2		
	BACnet™	KNX	ZWAVE	6LoWPAN	enocean®	FLEXIBLEPOWER ALLIANCE NETWORK	TNO	
Cross-cutting integration	EEBUS		Modbus		matter		Cloud	
Asset-specific	Heating & cooling		Solar PV & battery		EV & EV charge point		Smart meter	
	Proprietary	SG Ready	SP OpenTherm®	Infrared	SUNSPEC ALLIANCE	Modbus	OCPP	IEC 63110 IEC 61850 CHAdeMO





## The need for standardisation



### Growing number of household energy assets

The uptake of large residential loads / generation assets is increasing at a rapid pace in Europe, with an installed base of ~270m assets in 2023\*. An increasing number of households own more than one large energy asset. Interoperability is crucial especially where multiple devices need to interact.



### Asset specific protocols

Protocols tailored to specific assets / use cases may cause wider compatibility issues; e.g. the OCPP protocol was designed to manage EV charging infrastructure.



### Proprietary protocols

Many manufacturers offer devices that operate using proprietary protocols. This often hinders interoperability between different devices / assets from different manufacturers.



### Region dependent success

Some protocols have been recognised for their benefits in terms of interoperability. However, success can be region dependent. For example, the EEBUS initiative has mostly been adopted in Germany, with limited but slowly growing interest in wider Europe.

\*Taken from our [Home Energy Management](#) and [Connected Home](#) research services









## How is the residential digital energy market addressing interoperability today?

The digital energy industry is adopting three main approaches to achieve interoperability:

**Local Integration:** This method involves direct communication between connected home devices using either open protocols (Zigbee, Z-wave and Thread) or proprietary protocols within a home's network without relying on the internet. Open protocols aim for wide compatibility across brands, while proprietary protocols functions within specific ecosystems.

**Cloud Integration:** Devices connect and communicate through internet-based cloud services, facilitating remote control and monitoring. This approach leverages centralised cloud platforms to enable interoperability and integration with broader devices and services, dependent on internet connectivity and standardised cloud APIs for cross-brand compatibility.

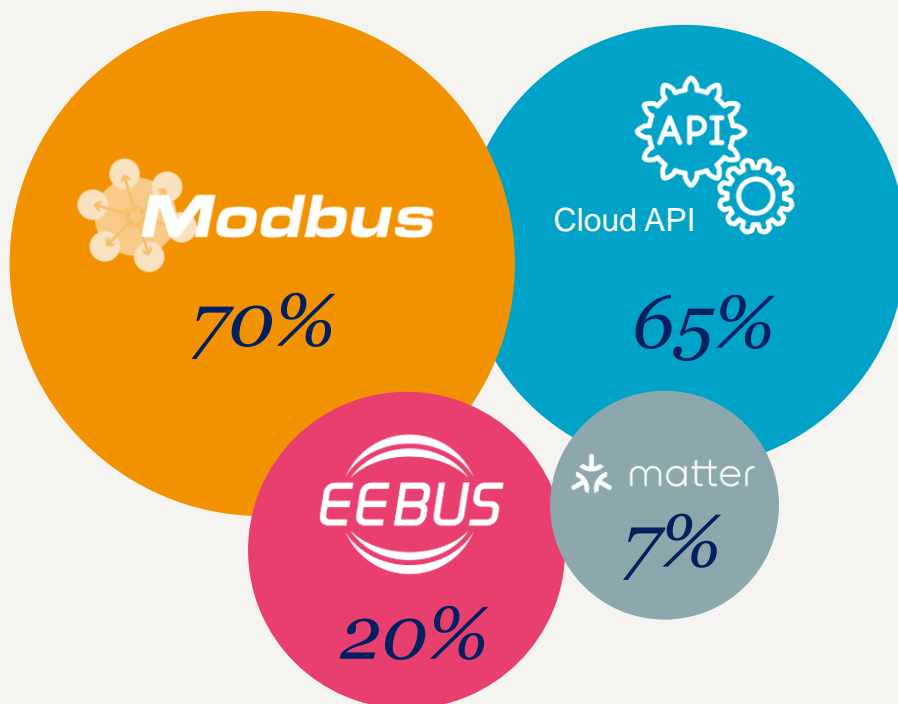
**Hybrid Integration:** This approach combines both local and cloud integration, aiming to create a more flexible and robust ecosystem by leveraging the advantages of both local and cloud-based approaches.

	Local Integration	Cloud Integration	Hybrid Integration
<b>Data Transmission</b>	<ul style="list-style-type: none"> <li>Using communication protocols</li> </ul>	<ul style="list-style-type: none"> <li>Using APIs</li> </ul>	<ul style="list-style-type: none"> <li>Using communication protocols &amp; Using APIs</li> </ul>
<b>Pros</b>	<ul style="list-style-type: none"> <li>Direct connectivity with a wide range of devices and appliances</li> <li>Fast and reliable transmission of data</li> <li>Enhanced privacy</li> </ul>	<ul style="list-style-type: none"> <li>Remote Accessibility</li> <li>Modularity of API</li> <li>Ease to update, scale up and monetise</li> </ul>	<ul style="list-style-type: none"> <li>Connectivity with a wide range of devices and appliances with different use cases possible.</li> <li>Fast and reliable transmission of data</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>Cost and complexity induced by hardware</li> <li>Limitations for scaling up</li> </ul>	<ul style="list-style-type: none"> <li>Reliance on the cloud connection</li> <li>Cannot connect to all appliances</li> <li>Resource intensive</li> </ul>	<ul style="list-style-type: none"> <li>Cost and complexity induced by hardware</li> <li>Heavily resource intensive</li> </ul>
<b>Adoption rate*</b>			



In recent years, despite advancements, the connected home sector is still evolving to fully satisfy the growing need for **interoperability**. No single protocol has significantly outpaced others, nor is it anticipated that one will dominate in the near future. **However**, there are some approaches that are getting more traction than others, including **Modbus**, **EEBUS**, and **Cloud APIs**. The introduction of **Matter** as a new standard, aiming to tackle the challenge of interoperability, could be a major part of the interoperability solution in the longer term if interest remains.

### Adoption rates of key communication protocols and standards by major energy asset manufacturers in Europe



\*Adoption rate among home energy management and appliance optimisation companies.



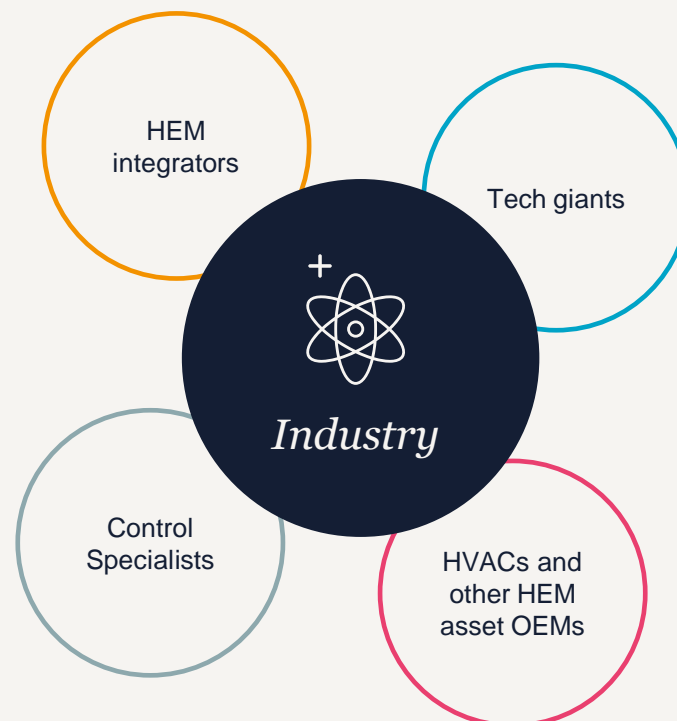


## *Who should be leading the charge for a solution to the interoperability challenge?*

Despite industry and government efforts, interoperability is still one of the main barriers that hinders the adoption of Home Energy Management systems to optimise multiple different energy assets at home. This raises the question of who should take the lead to solve the issue, should it be industry-led or regulation-led?

### **Industry-led**

On one side, market players are at the forefront of innovation and could drive interoperability if they develop or adopt standardised protocols. However, this cannot be achieved without a large coordinated effort; otherwise, it could lead to an even more fragmented market. While there are some alliances comprising key industry members, we haven't reached the ideal spot yet. Based on the current market conditions, our view is that we are still a few years away from achieving industry-led standardisation as there is no clear indication of a 'winning' standard.





## Regulation-led

On the other hand, governments could mandate industry standards that guide the path towards interoperability. This could ensure consistent interoperability across technologies, use cases, and regions, with a long-term vision. However, the process to implement new regulations can be slow, potentially hindering innovation. It also requires international cooperation (e.g., at the EU-level) to avoid local implementations leading to internationally fragmented regulations. While there are some initiatives trying to push for standardisation, apart from the EV charging OCPP protocol, the efforts haven't had a significant impact in the market, and it is very unlikely they will lead to a quick solution.



### Achieving the interoperability challenge

An ideal approach would involve market players collaborating actively in standardisation efforts. At the same time, governments should create an enabling environment to build a cohesive strategy and ensure regulatory compliance toward HEM interoperability. However, it looks like we are many years away from reaching this ideal approach. In the meantime, current offerings are taking different approaches, including partnerships, cloud integration, and developing small ecosystems. In the future, interoperability will be a customer expectation.



*“The ambition must be to standardise protocols and personalise customer experiences.”*

**David Trevithick,**  
Head of Digital, LCP Delta



# *Customer Engagement*

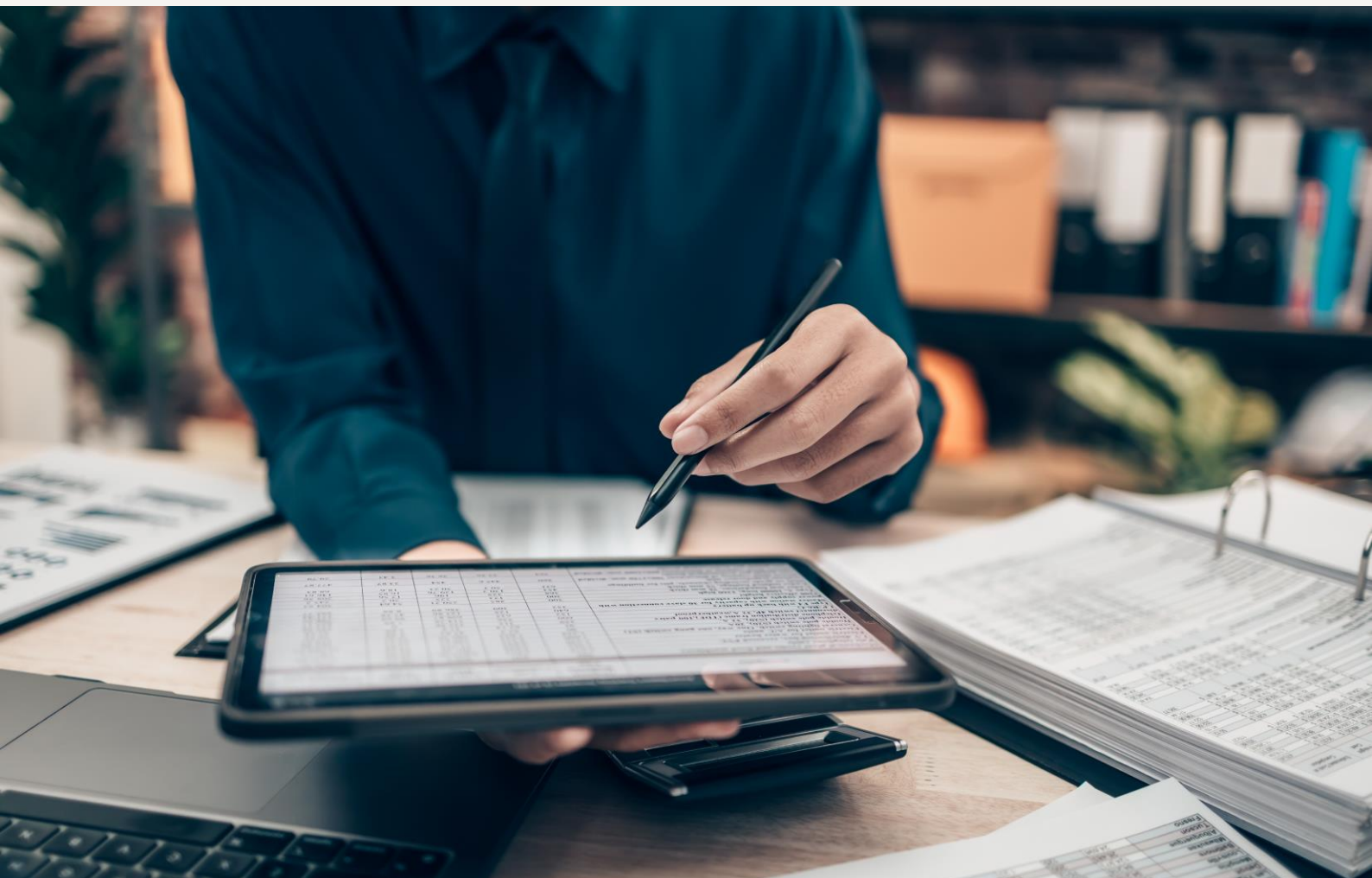
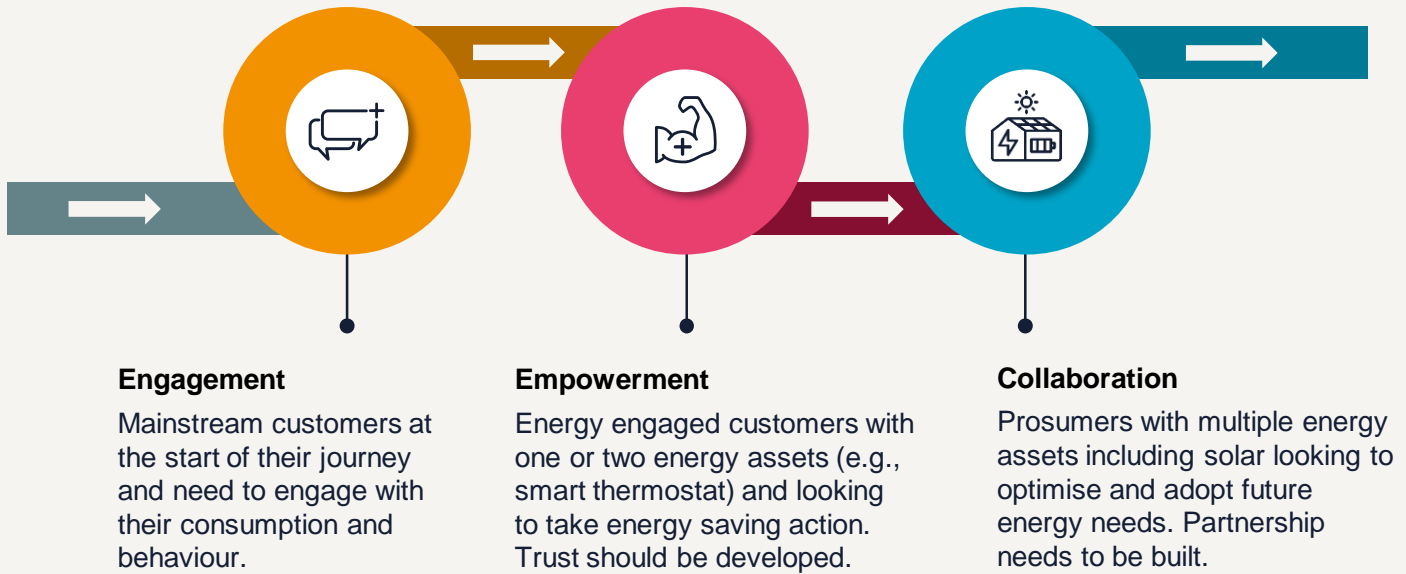
---





## What is customer engagement?

Customer engagement uses digital tools, like mobile apps and web portals, to progress residential customers' energy transition journey. There are three key stages that customers move through on this journey: engagement, empowerment and collaboration.







## Why is customer engagement important?

A lot of focus has rightly been on the technology side of the energy transition such as solar PV, heat pumps, and EVs, which provides the means to be more energy sustainable. These are huge enablers but are not enough to develop scaled adoption quickly, unless forced through regulation.

Customers must have the desire or need to embrace this technology and to develop sustainable energy behaviour. There must be a 'pull' from customers, and customer engagement and trust has not been a strong sector skillset historically. This needs to change.

As customers own their energy data and typically their energy assets, they must be willing participants in the energy transition to unlock the opportunities offered. The cost-of-living crisis has reduced peoples' financial elasticity to respond, but it has elevated the importance of energy saving and sustainability. So, the motivation is there, it's an open door for the companies that are best positioned to support their customers.



Customer Pull



Ownership of data



Ownership of energy assets

*The good news is that people generally want to do the right thing. Consumers are concerned about climate change – for example helping to protect the environment is a motivation for over 70% of consumers in making energy-sustainable decisions, actions or investments related to the home\*. But they often don't know what they should do and seek direction.*

\* LCP Delta customer research 2023 across 6 European countries (n=2,592)



## Key requirements for customer engagement

Many energy companies claim to be customer-centric but very few truly put the customer at the centre of the organisation and problem solve from there. Addressing two challenges will help customers on their net zero journeys, and bring value to market players who deliver this.



**Establishing customer trust through digital solutions**



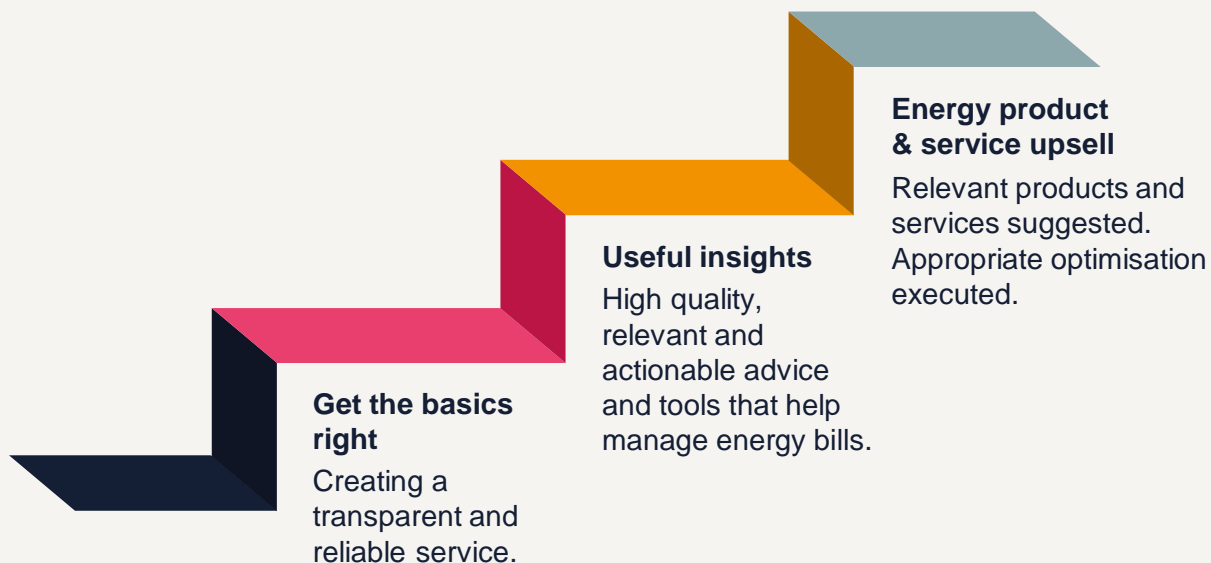
**Providing whole home energy management services**

### How can companies establish customer trust through digital customer engagement?

Trust is hard to build and easily broken. Wide reaching customer trust is essential to enable many of the revenue and value streams for digital energy, particularly when they require customer consent for managed control. To gain trust, companies must provide great customer service over time as an individual customer's needs, motivations, concerns and expectations evolve. And every customer is different, so effective engagement will also differ customer to customer. Home energy data, and the analytics and customer interface to effectively manage it, provides the means to develop strong personalised experiences at scale.

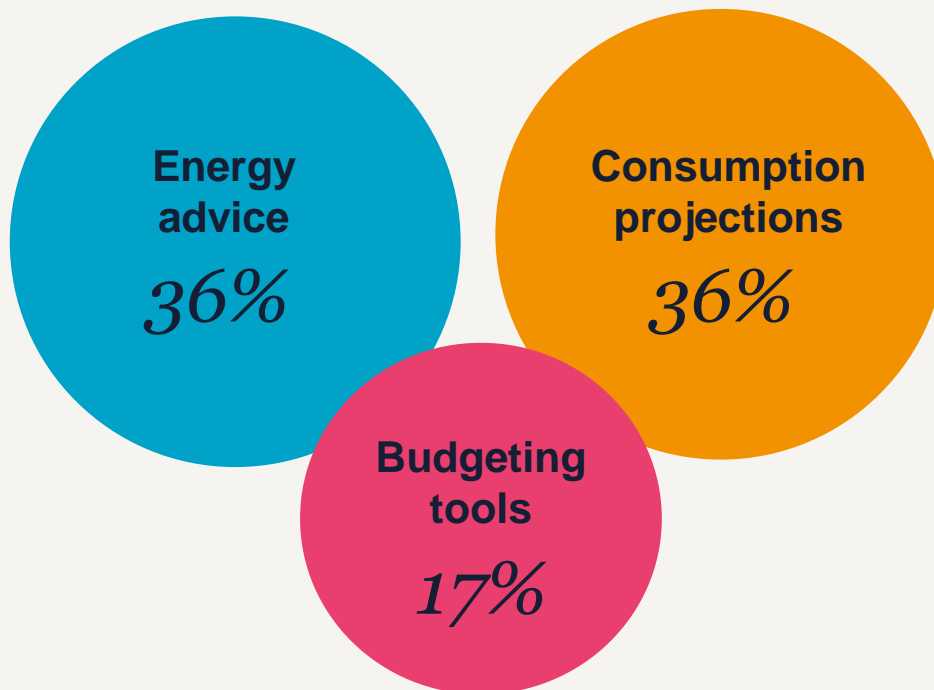
### Trust staircase to managed control

Companies need to foster trust with their customers using digital tools to secure future opportunities.





Availability of selected functionality in energy insights apps offered to residential customers by energy retailers in Europe\*



EXAMPLE



*Hello Watt provides energy insights to users with access to smart meter data, bringing them along the customer journey while building engagement and trust*

Hello Watt is a B2C app that supports customers in France through their energy transition.

They offer a breadth of product features and fulfilment journey, and communication is personalised using consumption and home profile data.

- For example, a high consumption alert might be linked to an eligibility check for solar or heat pump subsidies to start the cross-sell journey.



\*Taken from our [Energy Insights+](#) research services

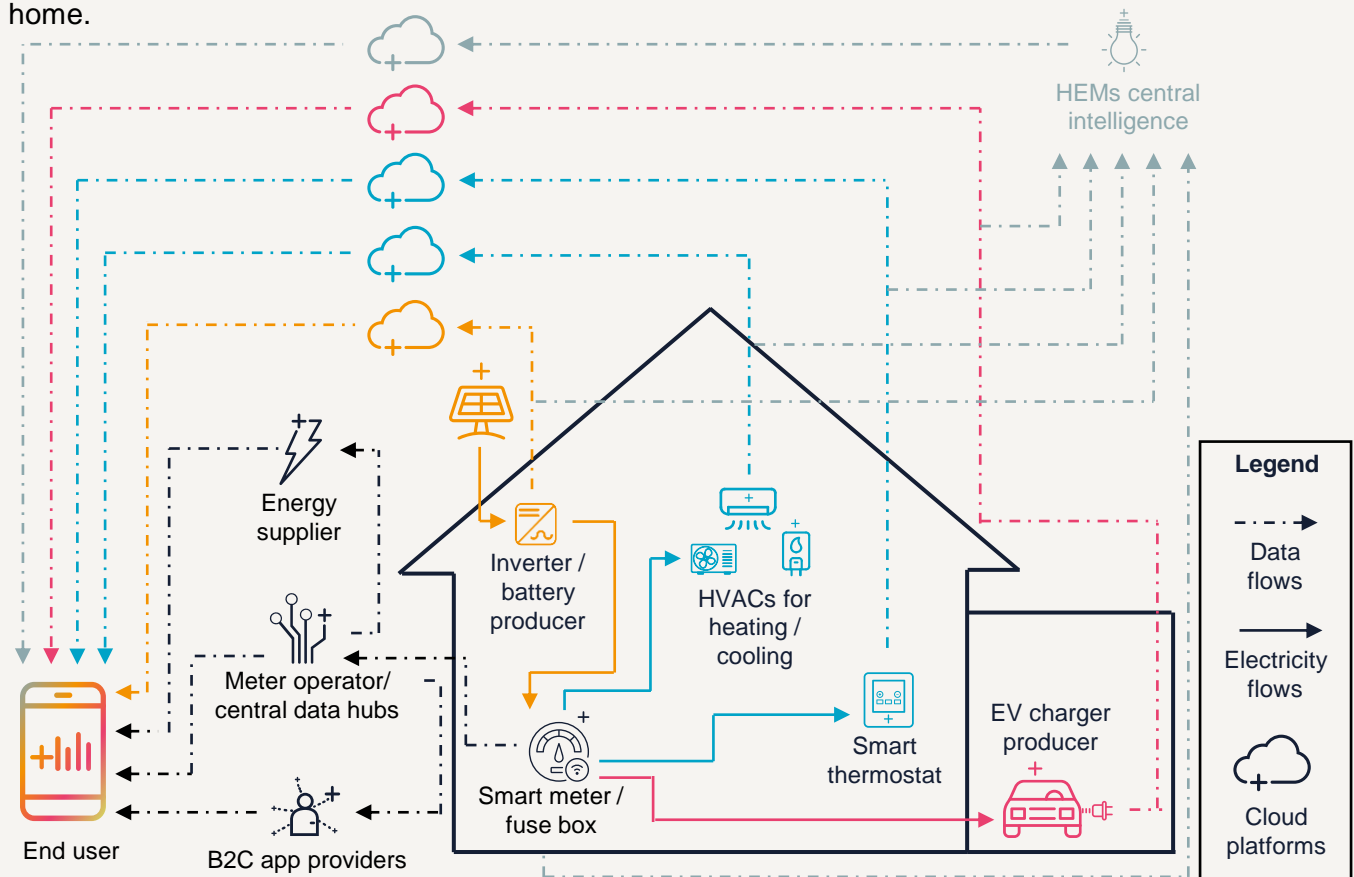


## Customer engagement through whole home energy visibility

Whole home energy visibility is essential to meet customer's needs in their energy transition journey with the right products and services (such as bespoke tariffs, suggested upsell for green energy tech, appropriate optimisation of multiple assets, etc). As discussed earlier, interoperability is a key part of this.

Only 26%\* of European energy suppliers' energy insights apps integrate heating controls, and only 25%\* monitor solar PV production, so many are unaware a customer even has solar PV. This means self-consumption is not considered in their service and the prosumer disengages. OEM companies like PV inverter manufacturers and EV smart charging specialists have domain specialism in their home energy product but often have blind spots into the other areas of the home. For example, only 33%\* of solar insights apps connect with EV smart charging.

Collaboration is key between the different energy market players to establish effective customer engagement. This will avoid multiple brand relationships and customer interfaces that result in higher time and mental capacity to oversee and manually balance the energy management for the whole home.



\*Taken from our [Energy Insights+](#) research services



## EXAMPLE



*Providing a foundation for self-consumption optimisation*

SolarEdge's app displays both generation inverter data and consumption and grid export data from an additional meter bought from SolarEdge.

This combination adds value

- Monitors system performance and provides behavioural insights
- Improves customer energy awareness and decision making



## EXAMPLE



*Optional behavioural or managed control to save money in combination with electricity spot price visibility*

Fjordkraft uses Enode's API to connect to EVs and other assets for smart charging and to optimise electricity tariffs.

In a single app customers can:

- Have real-time data visibility of different energy devices



# *Milestones*

---

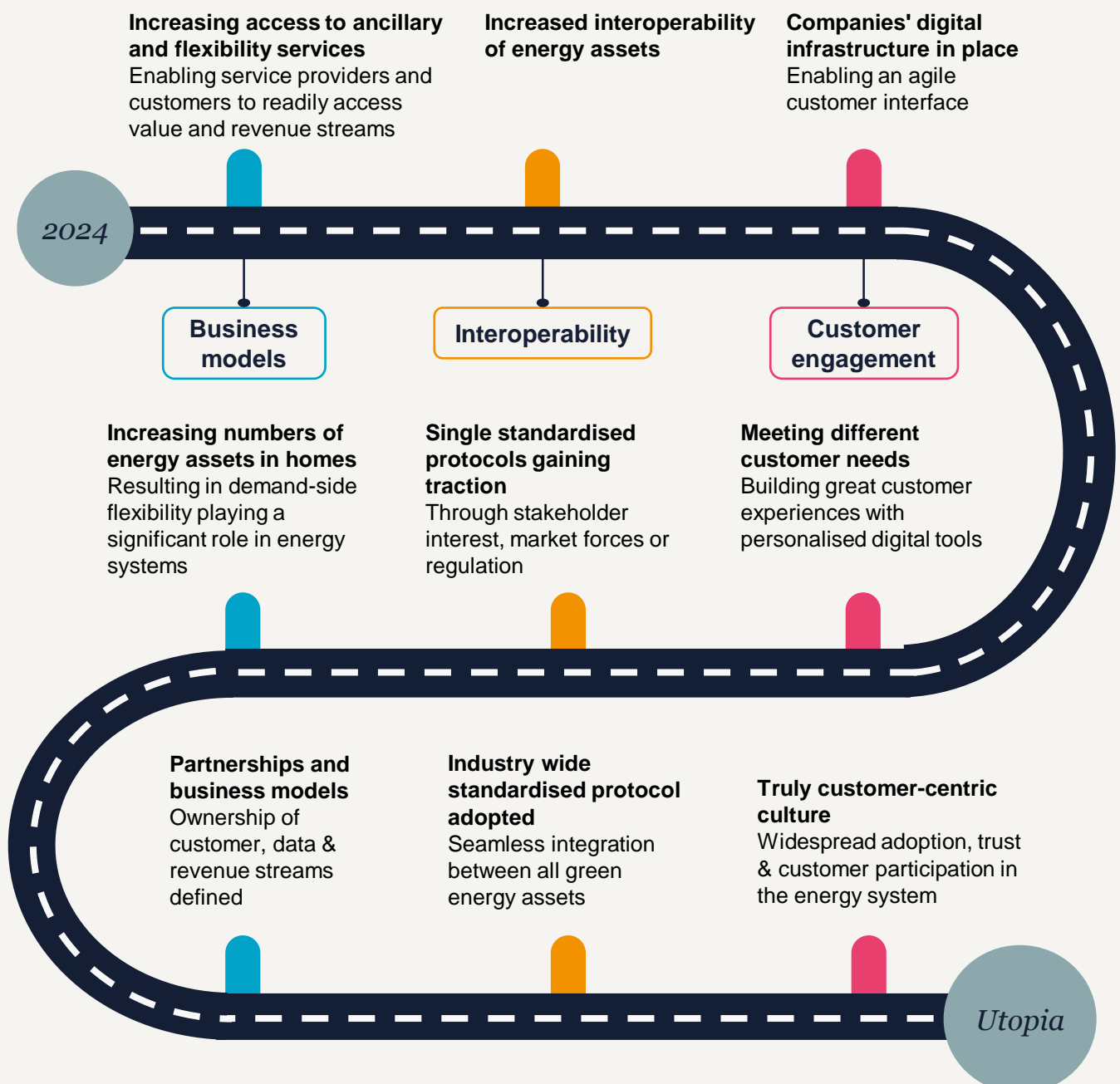




## What milestones need to be achieved to realise a digital energy utopia?

There is value to be unlocked within digital home energy. To achieve this, we have identified two central themes. Firstly, the need for a much higher degree of standardisation of protocols. This won't happen overnight so, until standardisation has developed, companies are having to work through the challenge by building eco-systems with APIs and cloud to cloud integration. Secondly, the need for greater personalised customer experiences. Here, a young working couple in one home for example may receive a very different experience to a retired couple in an identical home next door, even with the same energy technology. And their digital home energy service will adapt according to their daily routines and circumstances, as well as external events like weather and price signals. This deeper level of intelligence, customer trust and participation will also take time to develop.

### Roadmap to a digital home energy utopia





# More from LCP Delta

Take a moment to explore some of our top recommendations:



## Home Energy Management

Our HEM service provides research on how companies are positioning themselves in the market, who is succeeding, and how, as well as investigating what the most promising business models and propositions are.



## Energy Insights+

Explore the Energy Insights+ Service, streamlining the customer interaction with their energy data. We support our subscribers with their customer engagement, energy efficiency and value creation initiatives.



## Connected Home

Find out more about the Connected Home Service. We offer data, analysis, and insights to understand the rapidly changing home connectivity market.



## Flexibility

Discover our Flexibility Service where we provide data, analysis and insights to enable participation and partnerships across the flexibility value chain from all asset and customer types.

Follow us on:







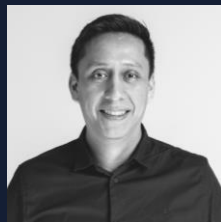
## Contact us



*David Trevithick*  
*Head of Digital Energy*  
david.trevithick@lcp.com



*Tim Zhou*  
*Energy Insights+ Analyst*  
timothy.zhou@lcp.com



*Ricardo Lopez*  
*Home Energy Management  
Research Manager*  
ricardo.lopez@lcp.com



*Eibhilín Cadogan*  
*Connected Home Research Manager*  
eibhilin.cadogan@lcp.com



*Phillip Twiddy*  
*Senior Consultant*  
phillip.twiddy@lcp.com



*Alice Cheetham*  
*Consultant*  
alice.cheetham@lcp.com

### About LCP Delta

LCP Delta is a trading name of Delta Energy & Environment Limited and Lane Clark & Peacock LLP. References in this document to LCP Delta may mean Delta Energy & Environment Limited, or Lane Clark & Peacock LLP, or both, as the context shall require.

Delta Energy & Environment Limited is a company registered in Scotland with registered number SC259964 and with its registered office at Argyll House, Lady Lawson Street, Edinburgh, EH3 9DR, UK.

Lane Clark & Peacock LLP is a limited liability partnership registered in England and Wales with registered number OC301436. All partners are members of Lane Clark & Peacock LLP. A list of members' names is available for inspection at 95 Wigmore Street, London, W1U 1DQ, the firm's principal place of business and registered office. Lane Clark & Peacock LLP is authorised and regulated by the Financial Conduct Authority and is licensed by the Institute and Faculty of Actuaries for a range of investment business activities.

LCP and LCP Delta are registered trademarks in the UK and in the EU. Locations in Cambridge, Edinburgh, London, Paris, Winchester and Ireland.

Copyright © 2024 LCP Delta.

<https://www.lcp.uk.com/emails-important-information> contains important information about this communication from LCP Delta, including limitations as to its use.

### Disclaimer and use of our work

Where this report contains projections, these are based on assumptions that are subject to uncertainties and contingencies. Because of the subjective judgements and inherent uncertainties of projections, and because events frequently do not occur as expected, there can be no assurance that the projections contained in this report will be realised and actual events may be difference from projected results. The projections supplied are not to be regarded as firm predictions of the future, but rather as illustrations of what might happen. Parties are advised to base their actions on an awareness of the range of such projections, and to note that the range necessarily broadens in the latter years of the projections.