



All **Together** Better

Perspective of an independent DR aggregator

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# Power system flexibility: A major and urgent challenge for the energy transition

## NESO: by 2035, UK needs

- 485 TWh of generation to cover demand
- 70% of from renewables
- 97 TWh/year demand modulation

## DR will need to deliver vast volumes daily:

- By 2030, 20% of demand will need to be flexibilised
- By 2030, 10-12 GW of demand response, **4-5x todays levels.**



Delivering a reliable decarbonised  
power system  
March 2023

# Achieving these flexibility goals means give consumers control + automation in buildings

Most of the UK's flexibility potential is held **in residential and commercial buildings.**

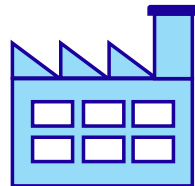
Smart buildings optimise their heating and cooling consumption **without reducing their residents' comfort.**

## C&I flexibility\*:

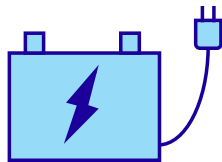
9.8GW



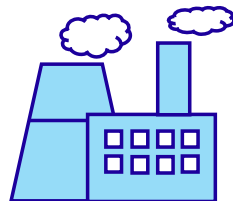
Commercial & Public Sector demand flexibility: 1.7GW



Industrial demand flexibility: 2.8GW



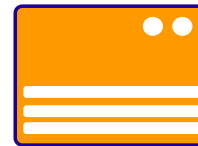
Non-CHP on-site back-up generation capacity: 3GW



CHP: 2.3GW

## Residential flexibility in 2022\*\*:

20-25GW



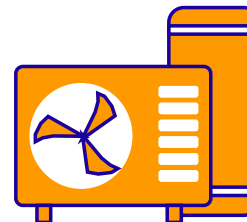
Storage Heaters  
Households: 1.4 million  
Capacity: 8GW



Direct Electric Heaters  
Households: 0.9 million  
Installed capacity: 5.4GW



Electric Hot Water Heaters  
Households: 2.3 million  
Capacity: 5.8GW



Heat Pumps  
Households: 270,000  
Capacity: 670MW



Residential Batteries  
Households: 18,200  
2020 capacity: 110MW



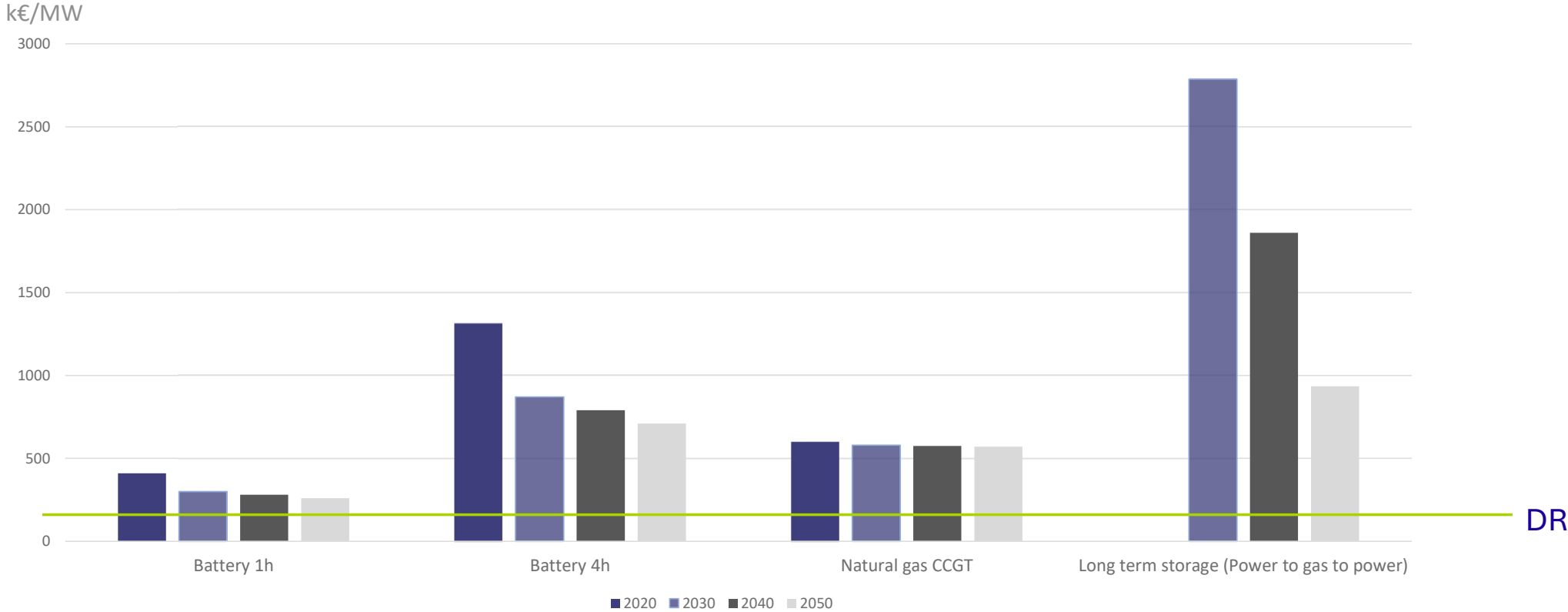
Home Electric Vehicle Chargers  
Charge points: 375,000  
Capacity: 2.6GW

\*: source: ADE: <https://www.theade.co.uk/resources/what-is-demand-side-response>:

\*\*\*: source: Delta-EE, 2022. Based on cumulative asset capacity.

# Demand response capex is also the most competitive among all flexibility options

Flexible asset CAPEX evolution 2020-2050



Source : Compass Lexecon

# Voltalis has a proven ability to offering DR from buildings at scale and with high reliability

Europe's leading independent aggregator of flexible DER in buildings

With 800MWp today and a further 1.2 GWp under construction by 2026, we have the EU's largest VPP

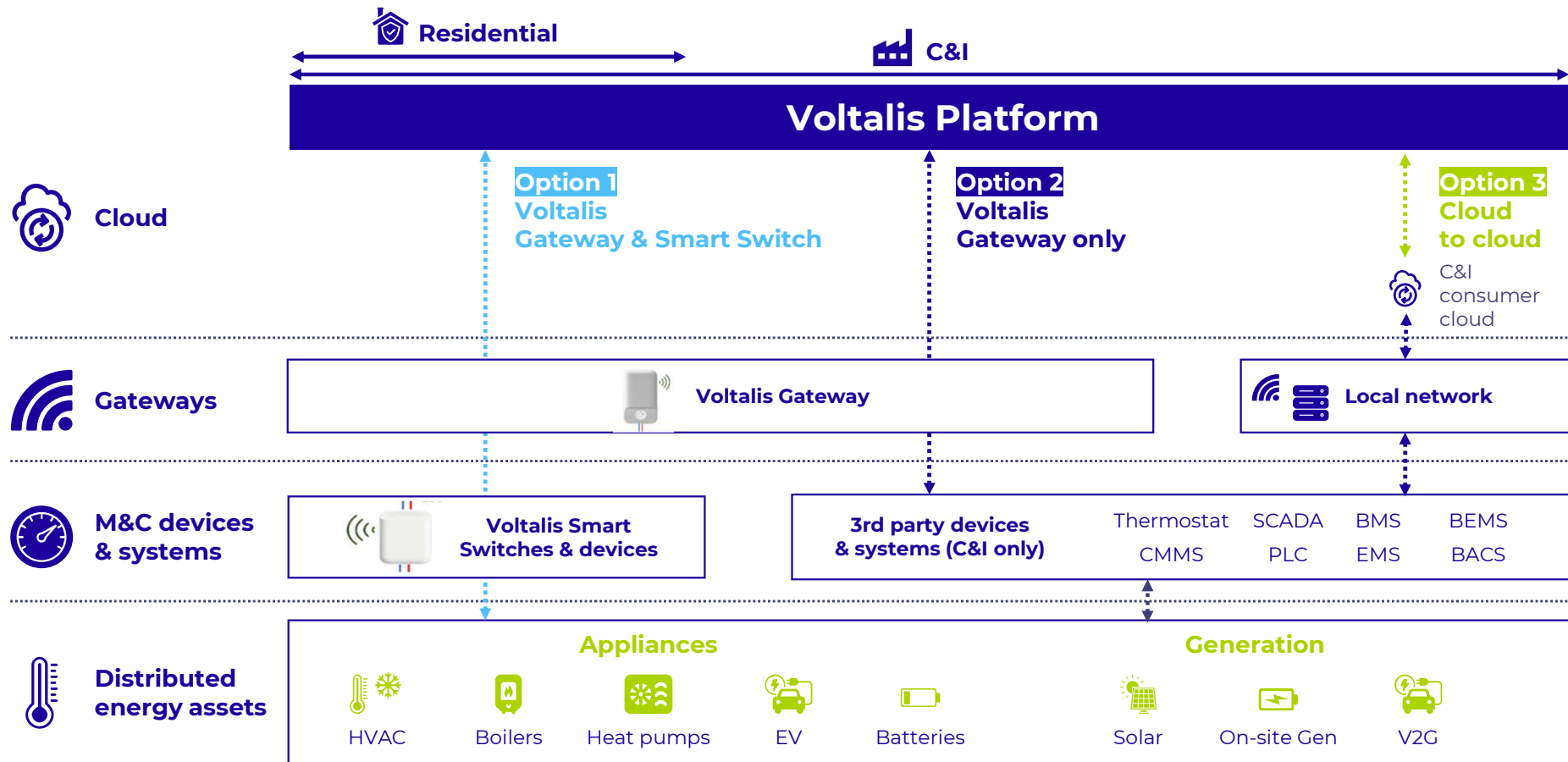
>80% of FR market: first market developed in Europe

<b>100%</b> Availability on critical services	<b>99.99%</b> Availability on non-critical services
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<b>1.5m+</b> DER connected	<b>250k</b> Sites	<b>800 MWp</b> VPP	<b>1.2 GWp</b> Under construction	<b>8</b> European countries
<b>Daily activation</b>	<b>&gt;200b</b> Data entries collected since inception	<b>10b</b> Individual shedding orders since 2010	<b>13</b> Patents	<b>€200m</b> Project finance in the last 12 months

**2 GW**

# We connect any type of distributed energy resource



# Voltalis welcomes the opening of the UK flexibility market and key market design choices taken so far

## P415 is a leading approach to design of flexibility markets:

- Allowing VLPs access to wholesale energy markets, goes further than many EU member states
- Builds on insights from successful models in US
- Recognises the value of independent aggregators of DER in providing flexibility
- Treats DR MWh as equivalent to those of generation assets and remunerates the same way: critical to achieving TWh scale for DR

## Real world consequence for us:

- A strong investment case to move into the UK market: next biggest market after France
- Goal: 3-5 GW of DR capacity from buildings before 2030
- Raised 200 million EUR in project finance to do so
- Work has begun constructing our VPP in the UK



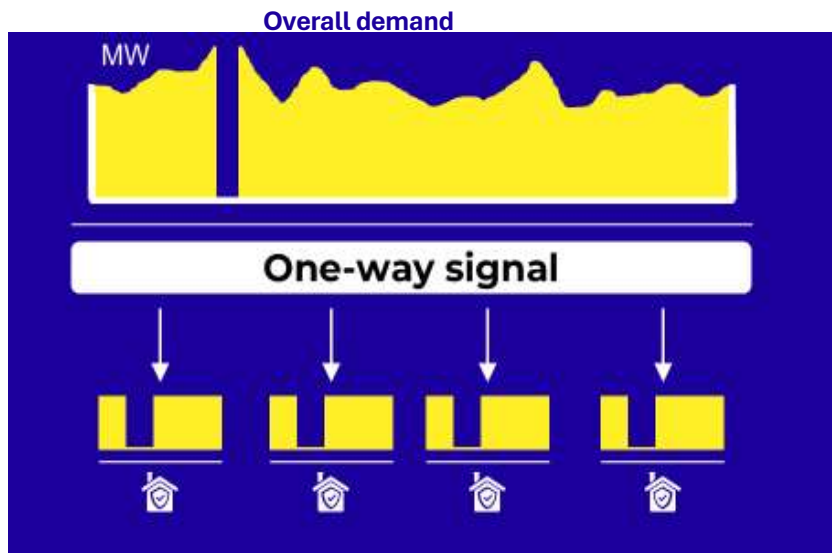
# Interoperability for residential and commercial DR aggregation

- In principle, greater standardisation of interoperability would make our life much easier :
  - HEMS to ESA, DSRSP to SO
- Participation in IDSR - Our experience with OpenADR2.0 and PAS1878 is more mixed...
  - Noble ambition. Valuable learning experience.
  - But Voltalis would not be able to operate in the UK with these standards
  - OpenADR2.0 and PAS1718 raise a number of practical issues for the way we operate,
- Need to be careful about overly-restrictive standardisation : « give us the language but let us make our own sentences ».
  - Wide range of different assets with varying smartness/perf. requirements
  - Need to ensure consumer satisfaction/value in a wide variety of contexts
  - Need to ensure high reliability interfacing with electricity markets
- However, a core concern is risk of delay: 2030 is just around the corner & 10-12 GW is a LOT of DR
  - Need to be able to install assets and work *today* to contribute to UK goals
  - In short run, most helpful would be open source APIs from OEMs

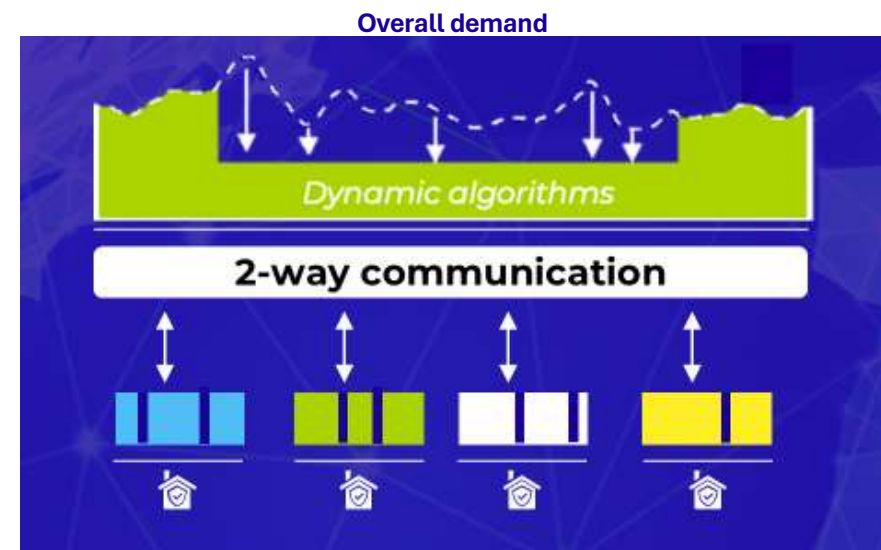


# Voltalis needs to be able to interact with its assets flexibly in real time as it offers its services

## Conventional Demand Response



## Voltalis' Demand Control



Demand Control is based on real-time aggregation and smart devices supporting a much wider range of services to both the grid and end-users

- **Accurate and dynamic control** of the aggregated demand of a very large number of appliances,
- **Short and frequent actions on each site**, without any impact on customers' comfort
- Enables active **renewable intermittency management**
- **Advanced consumer services provided**

# A need to understand how independent DR aggregators in buildings work in practice to design appropriate API standards

- To roll out DR at scale, a balance must be struck between 3 priorities
  1. **Consumer experience and value proposition:** confort, control and cost
  2. **Reliability of commitments** made to the electricity market
  3. **Business model to finance GW scale** investments in DR assets and related technologies
- Important to reflect the value that DSRSPs provide in ticking these 3 boxes when designing interoperability standards.
  - A vision of highly sophisticated in-home devices that speak directly to SOs without intermediaries may not yet be able to square with these realities.
- Happy to engage with other stakeholds and standardisers here to bring our insights to this process

**THANK YOU**

# Our approach is field proven at large-scale

We guarantee consumer comfort & control, while ensuring high reliability of resources for the system, while operating at scale

**100%** Availability on critical services  
**99.99%** Availability on non-critical services




**Connected Devices**



**Aggregation Platform**



**Cybersecure**



**AI Algorithms**

**REAL TIME**

- Time response ~ 1sec
- Parallel computing
- Edge computing
- Realtime processing

**FIELD PROVEN AT VERY LARGE SCALE**

- 1.5+ million appliances connected in 250 000+ sites
- Up to 200 billion data entry collected since inception
- 10 billions of individual shedding orders sent since 2010
- Scalable and scaling

**SECURED & PRIVATE**

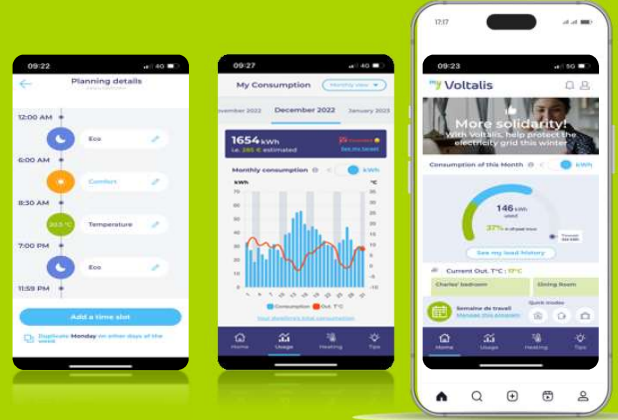
- Private cloud, local hosting
- Encrypted anonymized data
- Private key in vault chip
- M2M tunnel through dedicated VPN

**PROPRIETARY & REFERENCED**

- User & asset behavior
- Site selection & orchestration
- DR volumes prediction
- Cloud and Edge

# A best-in-class, easy-to-use HEMS for the end users

## Control and optimize all appliances to reduce energy bills



-  Alerts
-  Cool / Heat only if home
-  Virtual Smart Thermostat
-  Budget management
-  Price Plans TOU

**15% energy savings**  
**Real-time consumption**  
**Budget management**  
**Recommendations, alerts, benchmarks**



# Domestic Solution

