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Scaling power market flexibility fast:

How to unlock the potential of demand response in buildings

Enlit Europe 2025

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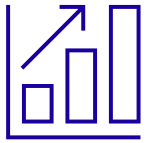
More renewables + less flexibility = power market chaos

Europe is heading toward 50% variable renewables by 2030, but even with just 24% today the **power system is already showing cracks.**

Exploding price volatility

+143%

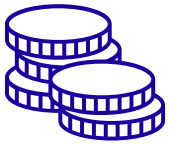
(2018 – 2024)
Average of
UK, DE, FR, IT, ES, BE



Rising average prices

+62%

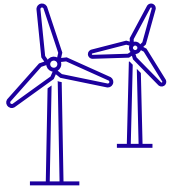
EU (2019 – 2024)



Rising congestion costs

4 Bn EUR

EU (2023)



Growing curtailment of generation & blackouts

+97% (1.4 TWh)
PV curtailment

Germany (2024)

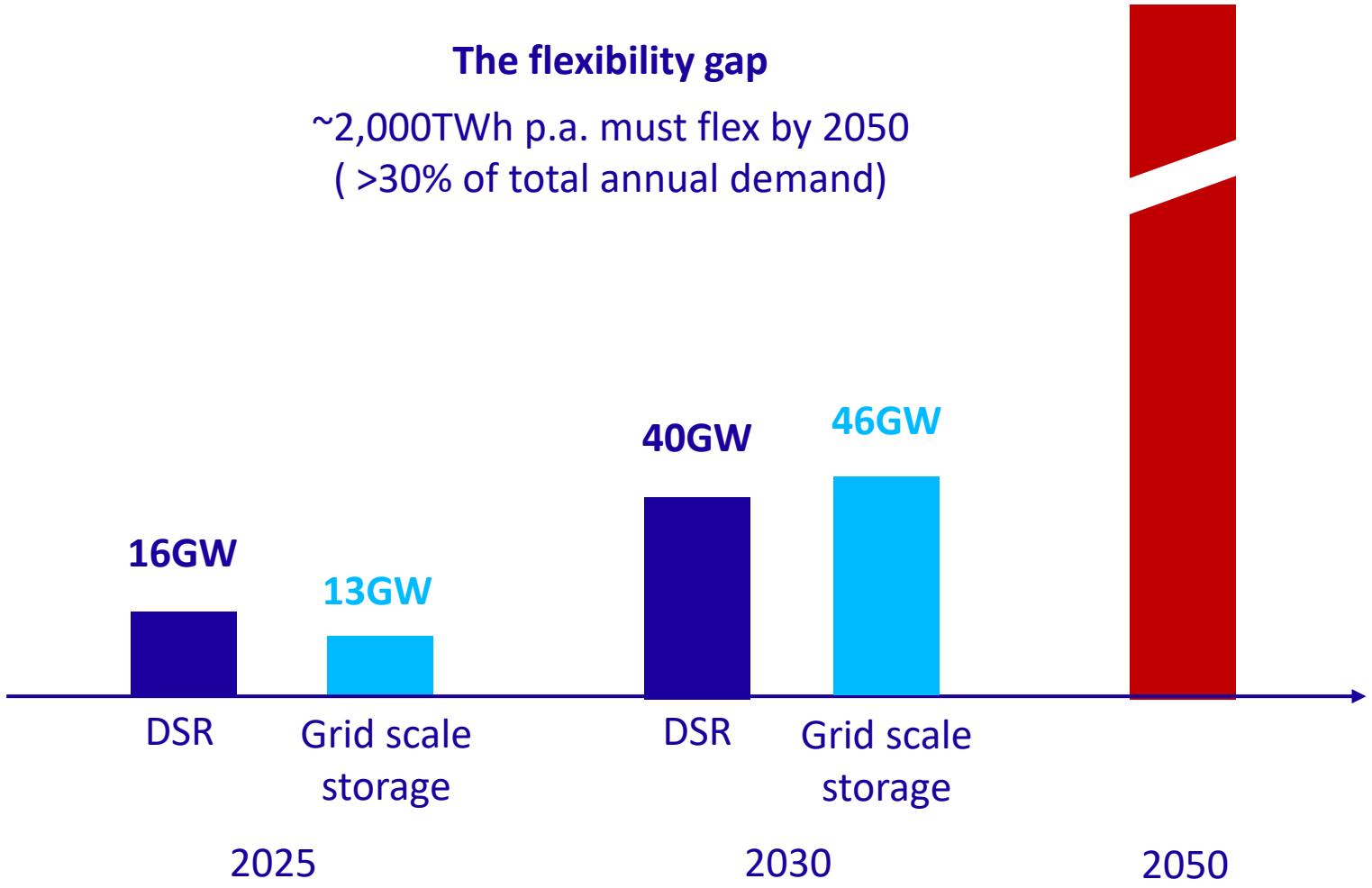
Growing resource adequacy challenges

Peak demand: +24%
Residual Demand: -46%

UK (2026-30)

Flexibility must scale fast

EU doubling wind and solar generation by 2030 requires an equally ambitious growth in flexibility, and we are far behind...



Sources: Compass Lexecon (2025), JRC (2023), ENTSO-E (2024)

To scale fast, we must overcome some misconceptions about how flexibility works

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#1. “Batteries can substitute … onse”

« Without DR, the EU would need more than 6000 GWh of batteries in 2050 ! Sounds expensive… »

Strengths of Battery Storage:

- Frequency control, balancing, & ancillary services
- Intra-day abitrage
- Shifting the solar peak
- Supporting renewable project returns (co-location)

Strengths of Demand Response:

- Lower capex/MWp (use existing assets)
- Reduces grid capacity needs (dimensioned for peak)
- Decentralised response (local grids)
- Seasonal peak-loads (heating/cooling)

#2…“Implicit" and "explicit" demand response are competitors, not complements…

Implicit

Implicit (+ explicit?)

Explicit

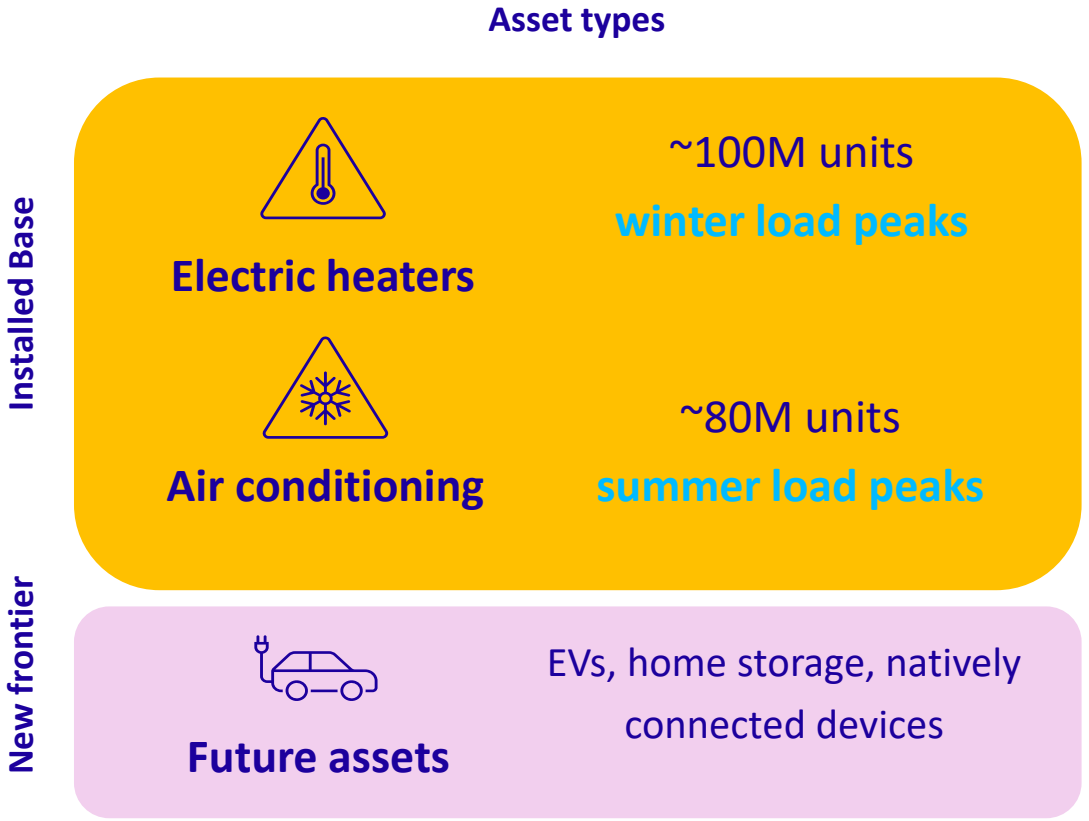
Explicit (+ implicit?)

Explicit DR:

- Widens the pool of consumers & assets for DR
- Can layer over the top of implicit flexibility tariffs
- Helps « train the market » to the benefits of DR, without transfering excessive risk

#3…"Ignore the huge potential of the *installed asset base* in Europe's buildings, focus on V2G instead…"

- Residential and commercial buildings in EU are:
  - >60% of final electricity consumption
  - >40% of final energy consumption
- Heating, cooling and hot water > 75% of total final energy consumption.
- Even before mass electrification of heating, EU has
  - >100 million electric heaters
  - >80 million air conditioners



Total DR potential from existing heating and cooling DER >100 GW (SmartEn, 2022)

#4…“We tried Demand Response already. It doesn’t scale.”

“Traditional” DR was limited by the technologies and ideologies of its time: **manual systems, tariffs** and **narrow market roles**.

Lack of automation

Consumers had to act manually

Focus on dynamic tariffs

Incentives misaligned with actual grid needs

Capacity-only mindset

DR treated as a backup tool, not continuous market asset

“But I don’t want to change my tariff.” – Louis XVI

…Actually, there are companies building VPPs like IPPs

Voltalis builds, owns and operates Virtual Power Plants like Independent Power Projects.

We develop GW-scale Demand Response VPPs as an alternative to generation….

2GWp VPP
of which 1GWp in operation

>10GWp
VPP by 2030

10
Operating in ten EU markets

1.5m I 250k
Devices I Sites Connected

What can policy makers do to promote DR?

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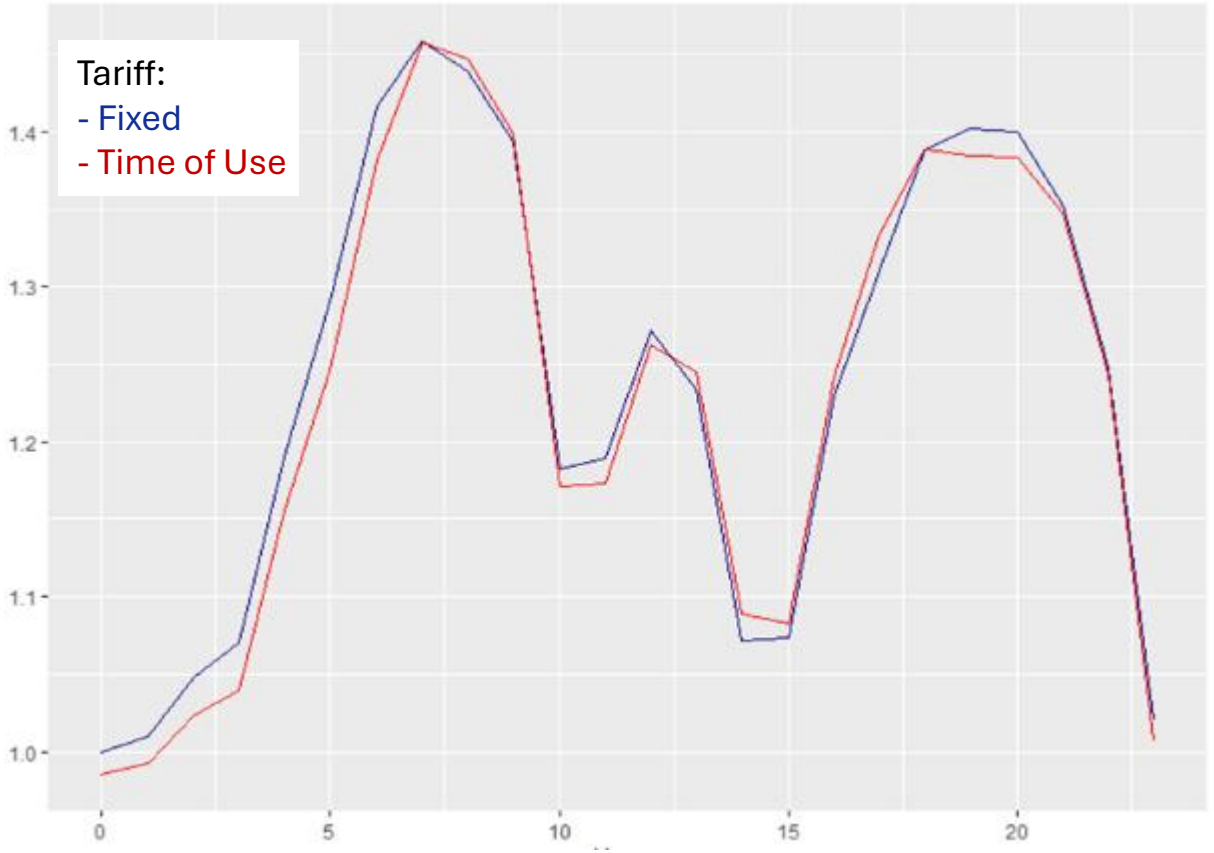
1. Promote independent aggregation of flexibility

Average load curve for electricity heated sites in France in Jan 2024



Source: Voltalis

Supplying energy and providing high quality flexibility are not the same business.

Aggregators bring:

- Innovative business models
- Billions in investment in automation & operation
- Incentives to save the consumer energy/money

2. Forget balancing, open *wholesale* and *capacity* markets to explicit DR aggregation

Wholesale power markets open/closed to explicit DR in 2024

ID, DA Market access

Only UK fully open;
France partially

Implementation delay

2019 EU legislation,
MS still slow to
implement in 2025

Source: SmartEN

3. Ensure that supplier compensation models are not a barrier to explicit DR

Don’t make the same mistake as France…

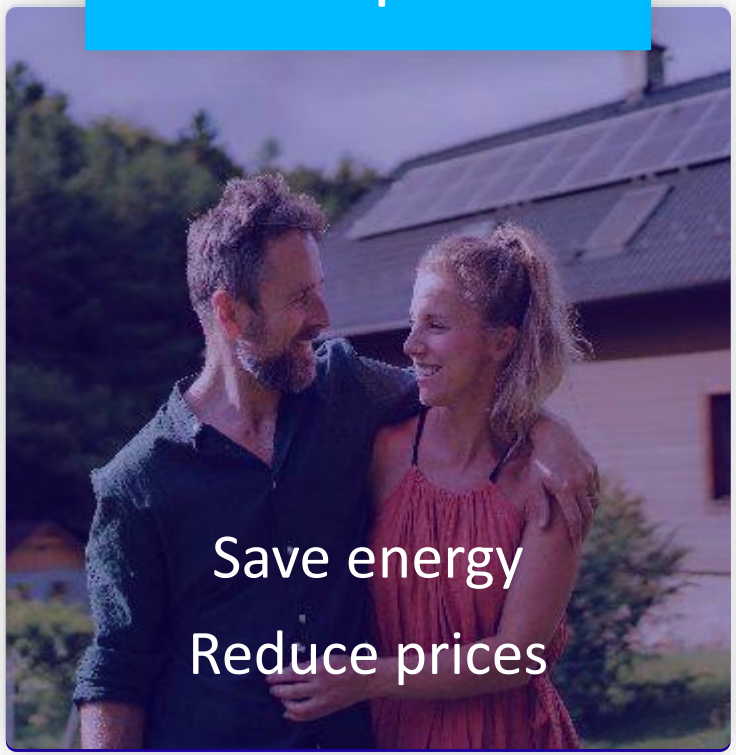
4. Think beyond existing Smart Meters (think DMD…)

Smart Meters

Direct Measurement Devices

Demand Response from buildings is a "Win-Win-Win"

People



Energy system

Planet

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Thank you.

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Where can we scale flexibility most quickly and cost-effectively?

Traditional solutions alone are slow, expensive or environmentally unsustainable.

We need smarter, faster, cheaper alternatives.

Necessary, but slow & capex-intensive

Thermal capacity, but costly, high CO_2, energy security

Useful, but slow, limited capacities

Consumers are ready

Citizens want reliable, affordable power

Spanish Blackout 2025

Consumers are happy to provide flexibility if it is made easy

Trap #4…
Oppose "implicit" and "explicit" demand response as substitutes rather than complements

We use AI, IoT, and cloud computing to create **Virtual Power Plants** from millions of connected devices.

Automation

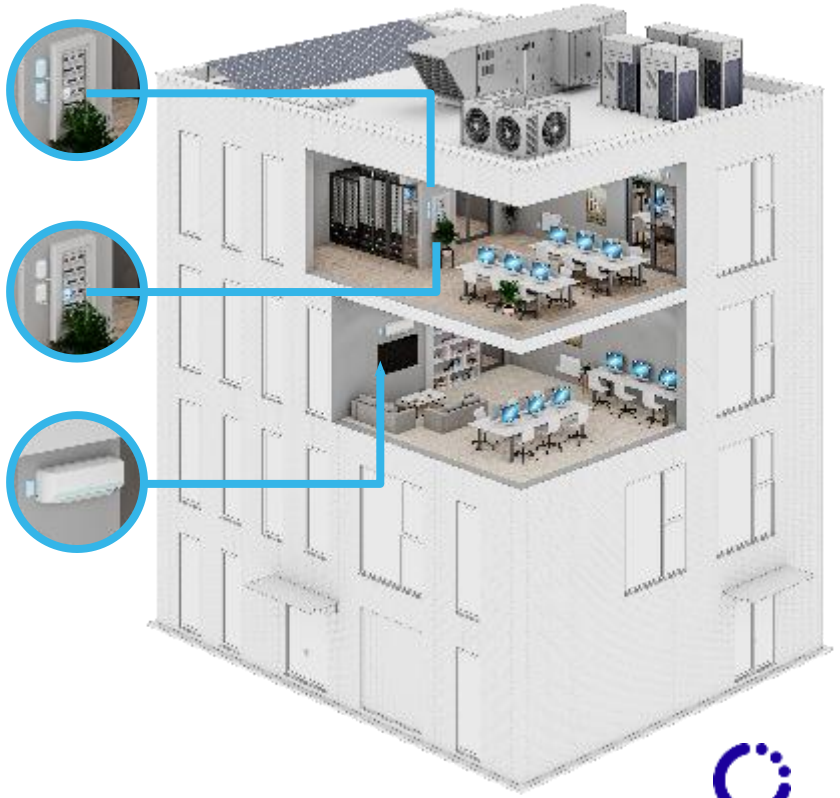
Daily trading in market

Retrofit installed asset base

Two-way communication

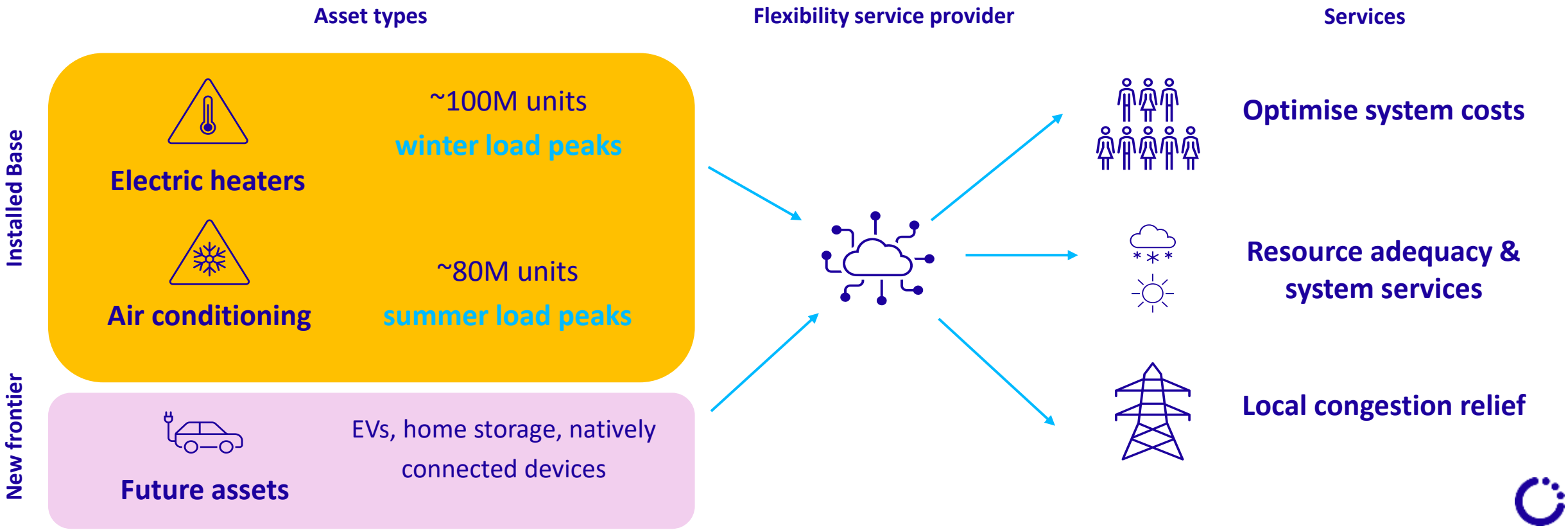
Tariff agnostic

Cloud-to-cloud



Buildings hold Europe's largest untapped flexible demand reservoir

Residential and commercial buildings account for >**50% of EU electricity** demand and are **ripe for flexibility solutions.**



More renewables + less flexibility = rising prices and price volatility