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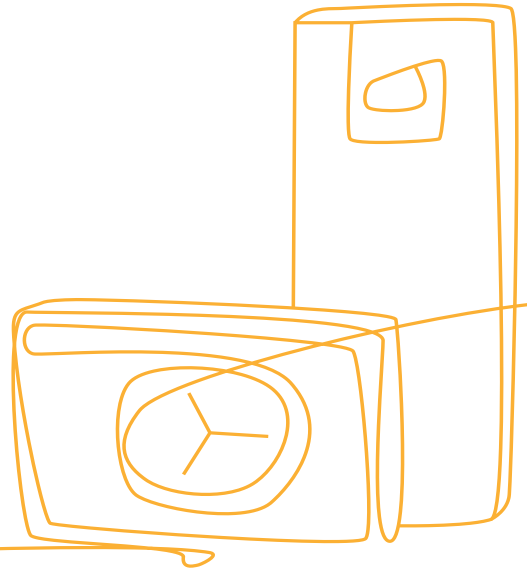

EHPA DIGITALISATION WEBINAR
ELECTRIC HEATING FOR RESIDENTIAL DEMAND SIDE FLEXIBILITY

09 March 2021

Quick intro to Delta-EE

How we work

Research and consulting services helping organisations to develop the best strategies, business models and customer propositions for the energy transition

Our research provides both breadth and depth of expertise, in areas across the new energy space such as:

'New Energy' Business Models

Identify and understand the alternative and new business models for the energy transition

EVs & Electricity	Flexibility & Energy Storage	Heat	Distributed Power	Digital Energy

We help clients navigate the transition from old energy to new energy.

- Centralised → Distributed
- Carbon intensive → Low Carbon
- Commodity sales → Service Orientated
- Meter points → Customer Centric
- Value is upstream → Value is Downstream

We help our clients though:

- Subscription Research Services
- Bespoke Consulting

Our clients include manufacturers, developers, energy suppliers, network companies and policy makers

Flexible electric heating can create value at different levels

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HVAC manufacturers can indirectly benefit through enabling others to capture this value – or they can take a more aggressive approach to capture this value directly.

Most activity with E-HVAC

1 'Home' values

- **Self-consumption optimisation**
- **Time-of-use optimisation**
- Capacity charge management

Main value: End-user running cost savings

Emerging examples with E-HVAC

2 Electricity system values

- **TSO ancillary services**
- DSO services
- Capacity Markets
- **Trading in wholesale markets**
- Imbalance management

Main value: Profit from selling services and trading flexibility

Flexible electric heating: Only a fraction of its potential is currently being realised

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Heating / hot water represent 97% of the potential residential flexible capacity in Europe, but today less than 1% of this is used for flexibility

Comparing potential flexible capacity available from installed residential assets in Europe:

~110 GW Space heating, cooling & ventilation

~110 GW Hot water

5.5 GW Non-heat assets (incl. EV charge points, home batteries…)

1.4 GW HVAC and hot water capacity currently being utilised for flexibility

What type of flexibility?

Optimisation services

Energy services – e.g. trading flexible demand, ancillary services

Source: Delta-EE Flex & Storage Service Residential Demand Response Database; Delta-EE Electrification of Heat Service Flexible Residential Electric Heating Database

Which types of heat assets are providing flexibility?

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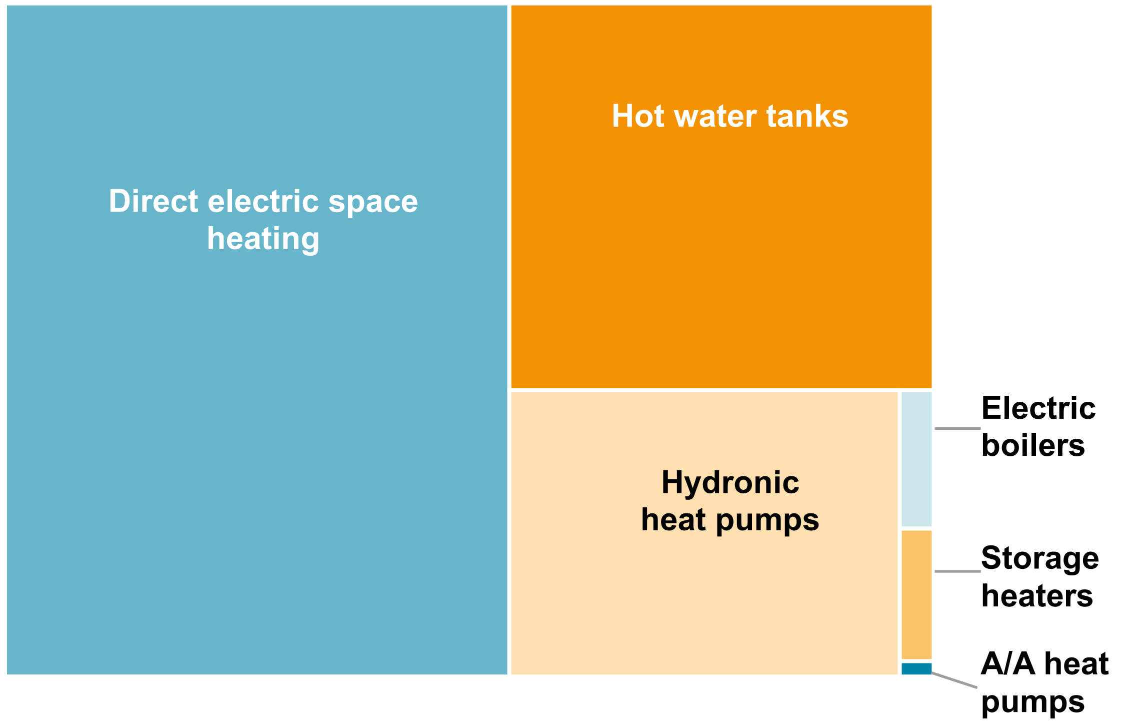
Direct electric solutions, hot water tanks and hydronic heat pumps make up the lion's share of flexible capacity which is actively used in demand response applications.

- **Direct electric space heating:** Dominated by 1 player's success.
- **Hot water tanks:** Increasingly recognised as potentially the most flexible heating solution
- **Hydronic heat pumps:** The fastest growing flexible electric heating solution - built-in connectivity is becoming a must-have.
- Emerging technologies to watch include **heat batteries**, **electric dry core storage boilers**, and **new generation storage heaters**

Share of flexible electric heating capacity currently used in demand response, by asset type (total capacity ~1.4 GW)



Source: Delta-EE Electrification of Heat Service Flexible Residential Electric Heating Database (includes FR, NL, DE, AT, CH, SE, UK, FI, NO). Includes only commercial projects – excludes pilots and trials.

Which markets are leading in the application of residential electric heating for demand side flexibility?

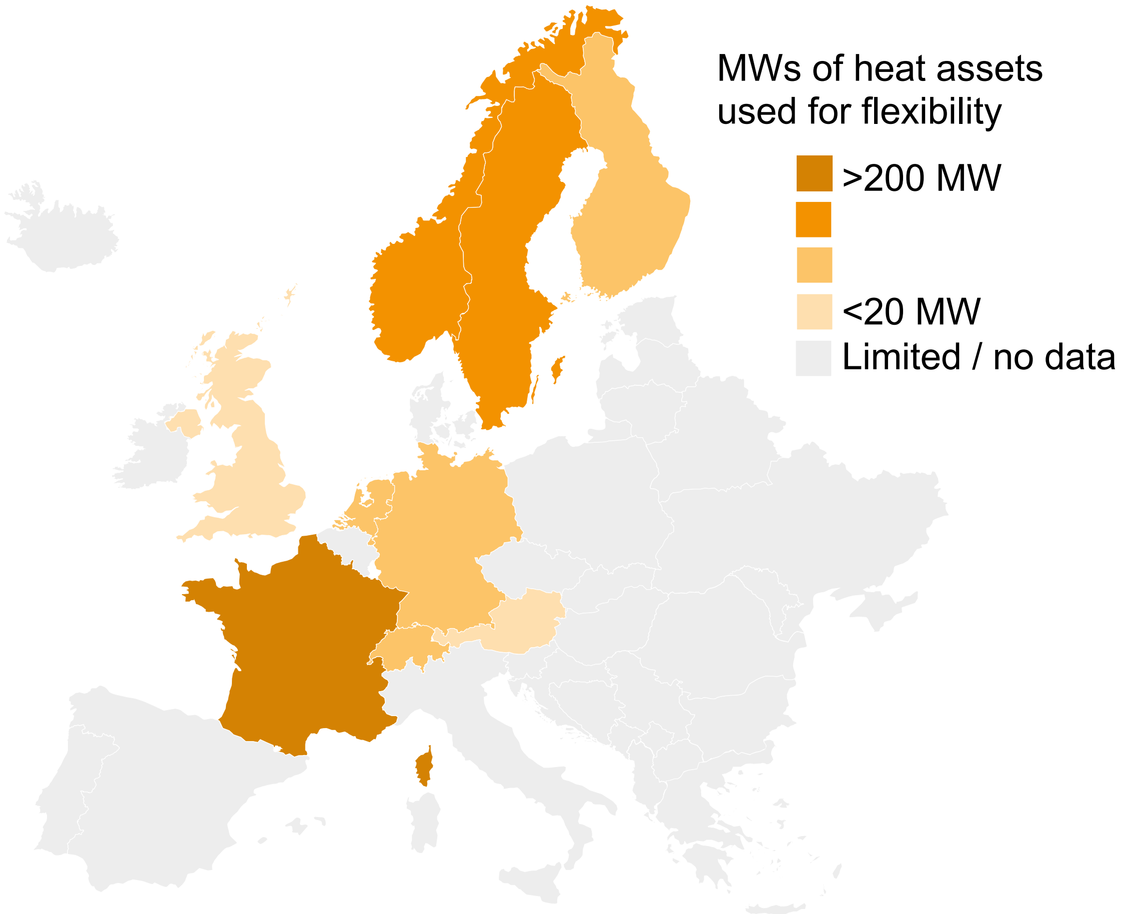
France has by far the largest residential demand response market, followed by the Nordics, Germany, Netherlands, Austria, Switzerland and the UK.

A few energy suppliers to watch

aWATTar
Eneco
tibber
fortum
ovo energy
EVN
centrica
st1

What is driving success in each market?

- **Availability of multiple demand response value streams** to market players e.g. as in France, UK and Finland.
- **Obligation on energy suppliers to offer variable electricity tariffs** (hourly or half-hourly pricing) e.g. as in the Nordics.
- **Large installed base of electric heating** e.g. as in France and the Nordics.
- **Innovation in products and services** from new entrants and increasingly incumbents - energy companies, product developers and manufacturers, IT and controls companies and aggregators – seen across all markets.



Source: Delta-EE Electrification of Heat Service Flexible Residential Electric Heating Database

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