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The joy of flex

Five key actions for activating household demand-side flexibility

Electrification Academy Webinar

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1 Context and background

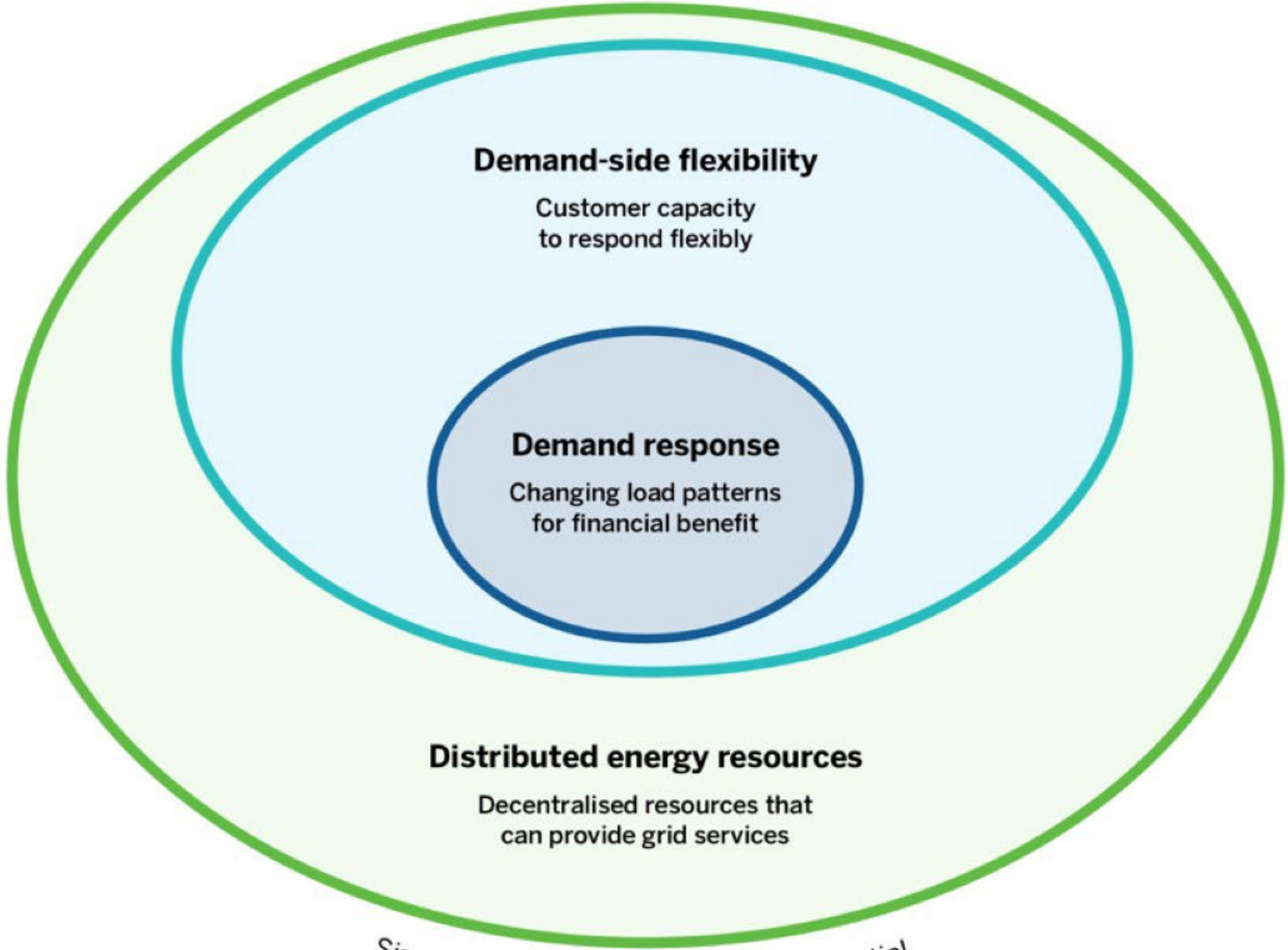
Intro and impetus for the report

- Bring DSF policy strands together
- Start to bridge gap between sectors
- Move conversation from “why” to “how”
- Household DSF focus

The joy of flex: Embracing household demand-side flexibility as a system resource for Europe
full report available at raponline.org

What is demand-side flexibility (DSF)?

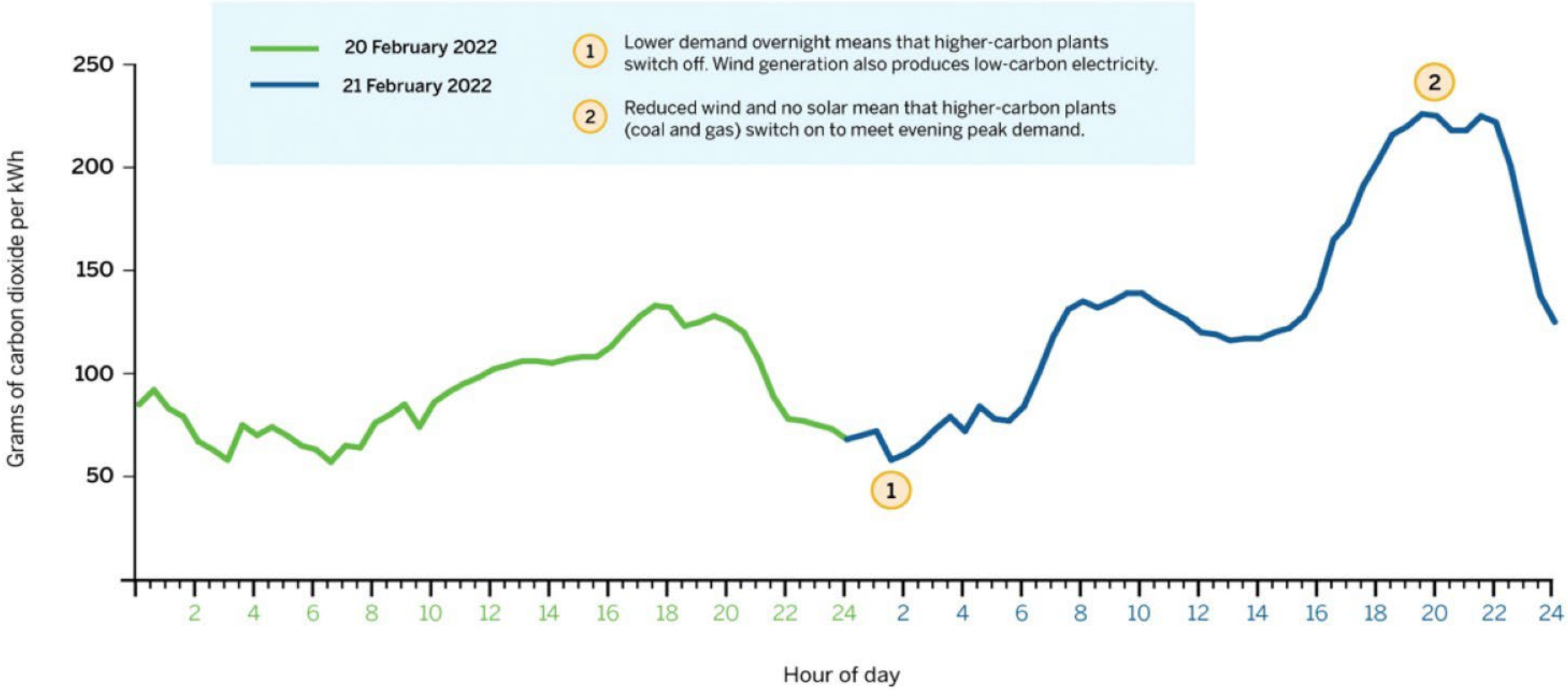
- Energy customers changing use patterns for financial reward. Includes export of onsite resources.
- Tech allows us to use energy and draw it from the grid at different times
- Explicit DSF - defined service. Implicit DSF - price based.


Demand-side flexibility
Customer capacity
to respond flexibly
Demand response
Changing load patterns
for financial benefit
Distributed energy resources
Decentralised resources that
can provide grid services
Size of ovals not representative of potential.

Why is DSF important?

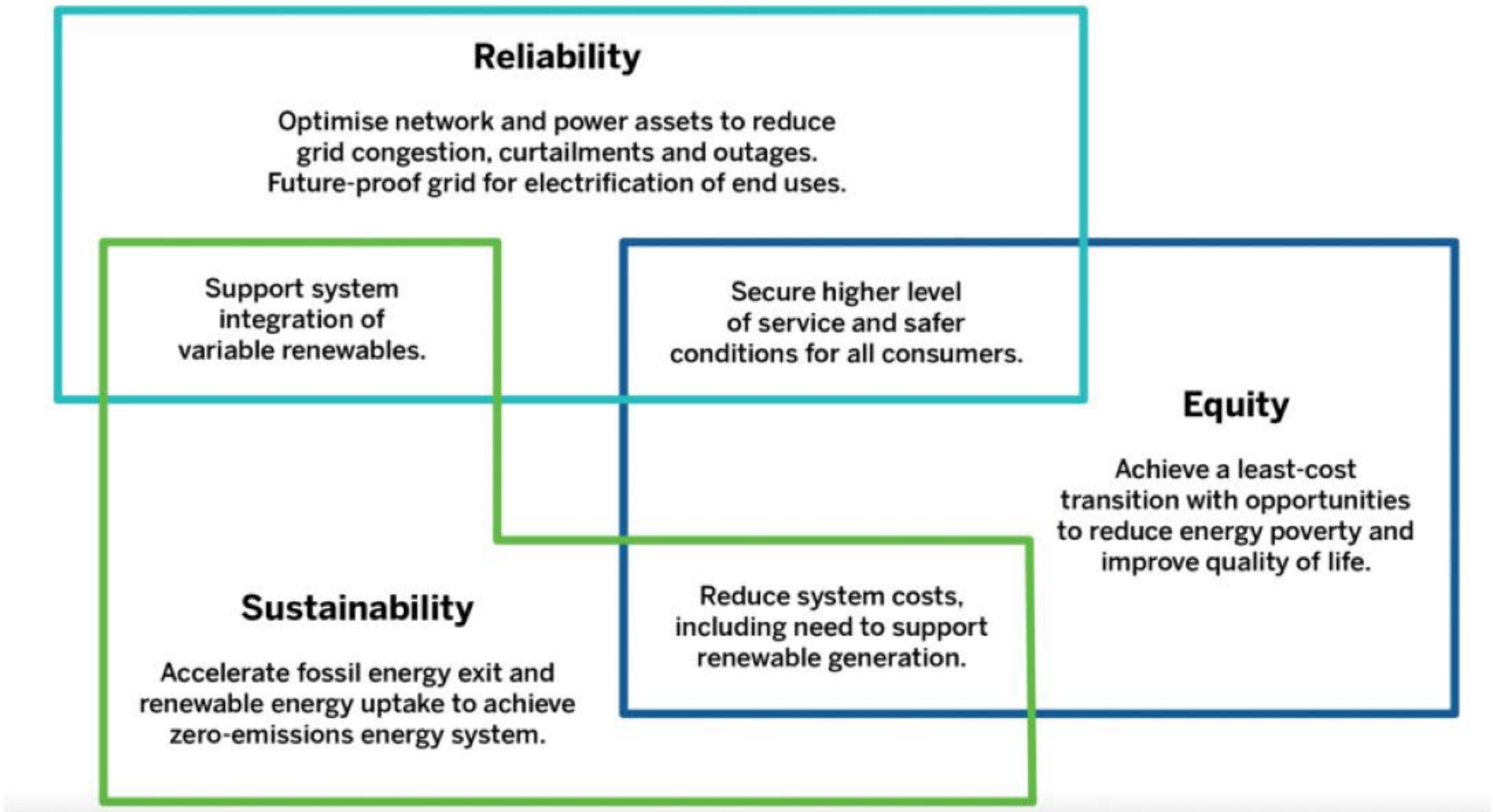
- Net-zero emissions by 2050 requires tenfold DSF increase worldwide by 2030 - IEA (2021).
- Integrate variable renewable generation and newly electrified loads at least cost.
- Old: schedule supply to meet load.
  New: schedule load to meet supply.

Carbon intensity of system is highly variable

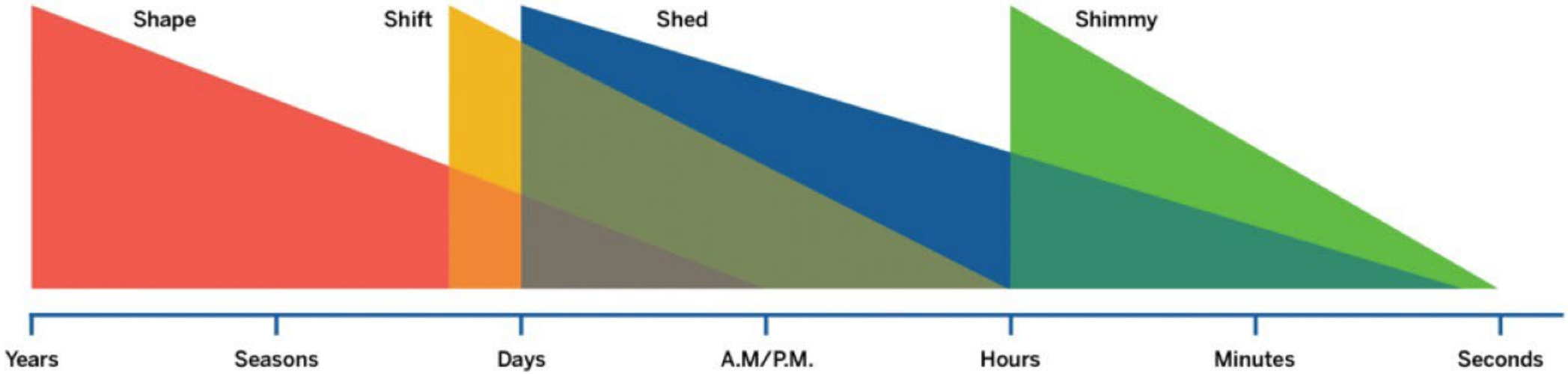


Source: Based on National Grid ESO. (2018). *Future energy scenarios*. Updated by RAP with data from National Grid ESO. (n.d.). *Carbon intensity API*

Enormous upside if we do this well



DSF value across timeframes



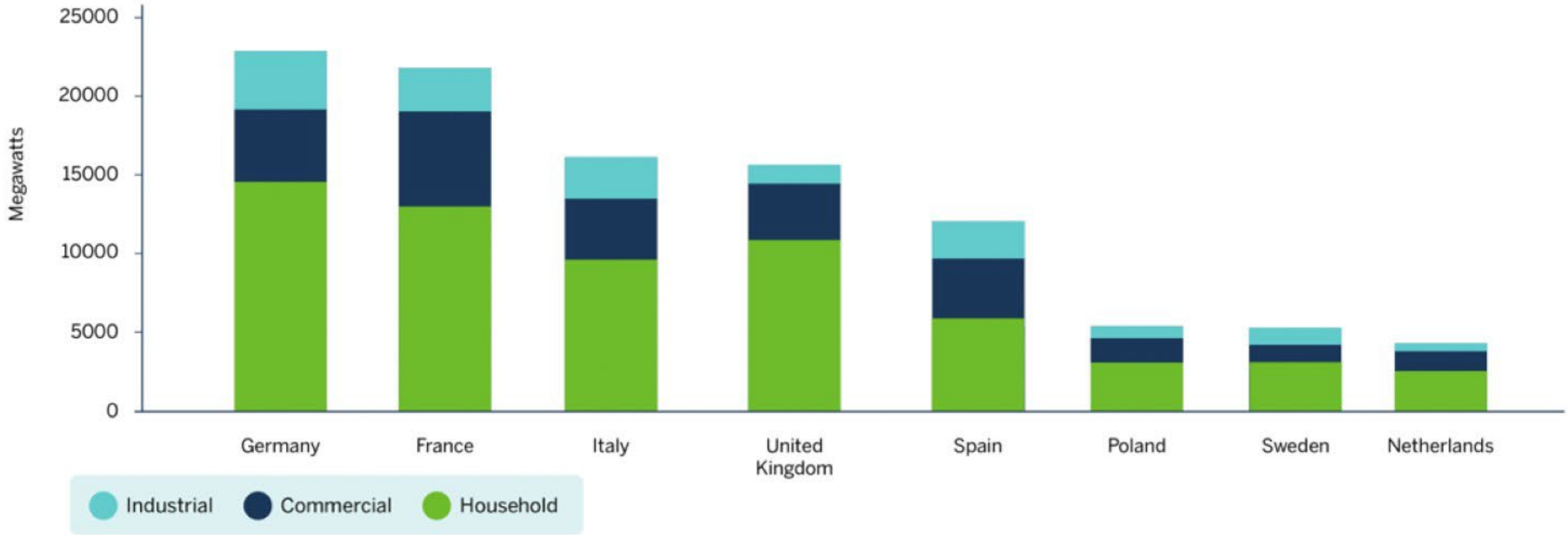
Source: Alstone, P., et al. (2017). *2025 California demand response potential study — Charting California's demand response future: Final report on Phase 2 results*

2 Household flexibility

Why household focus?

- By 2030 over 160GW DSF potential in EU, mostly residential - European Commission (2016).
- Electrification and digitalisation of home energy use.
- New tools and thinking required to unlock full potential and enable access to direct DSF benefits.

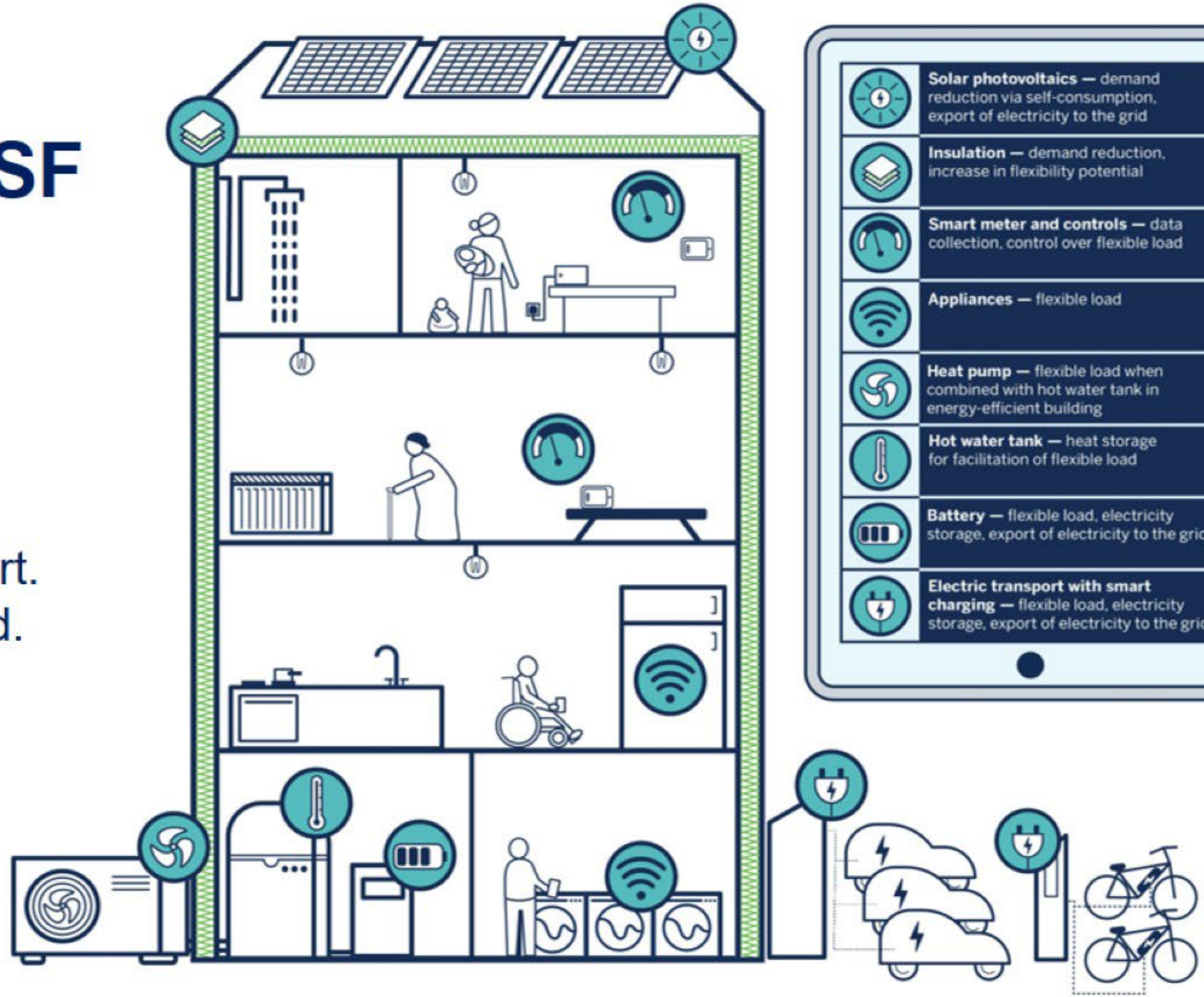
Theoretical 2030 demand-response potential in select countries (2016 estimate)



Source: European Commission. (2016). *Evaluation report covering the evaluation of the EU's regulatory framework for electricity market design and consumer protection in the fields of electricity and gas; Evaluation of the EU rules on measures to safeguard security of electricity supply and infrastructure investment (Directive 2005/89)*

What does household DSF look like?

- Controllable loads.
- Storage, including energy efficiency.
- Onsite use and export.
- Manual or automated.
- Mix and match.
- Shared assets.



What shouldn’t it look like?

Ironing clothes at night

Cogs in the machine

Flex vs inflex customers

3 Barriers to scaling

What's holding household DSF back?

- Framing the challenge
- Poor metrics
- Wholesale pricing
- Market access
- Technology access
- Retail and risk

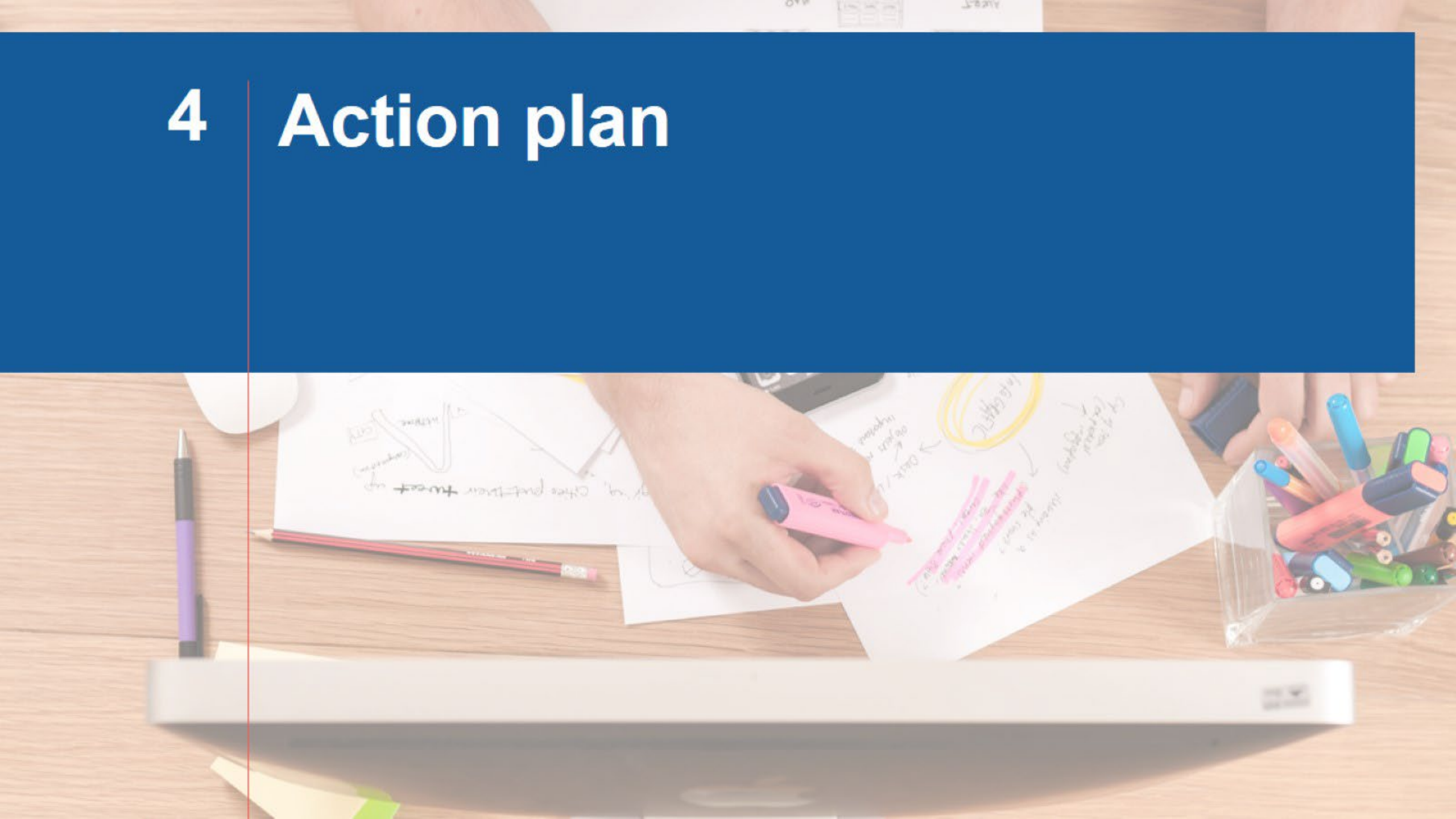
For DSF to scale, customers must be both willing and able to flex. Current policy strategies do not adequacy support this.

The overarching principle:

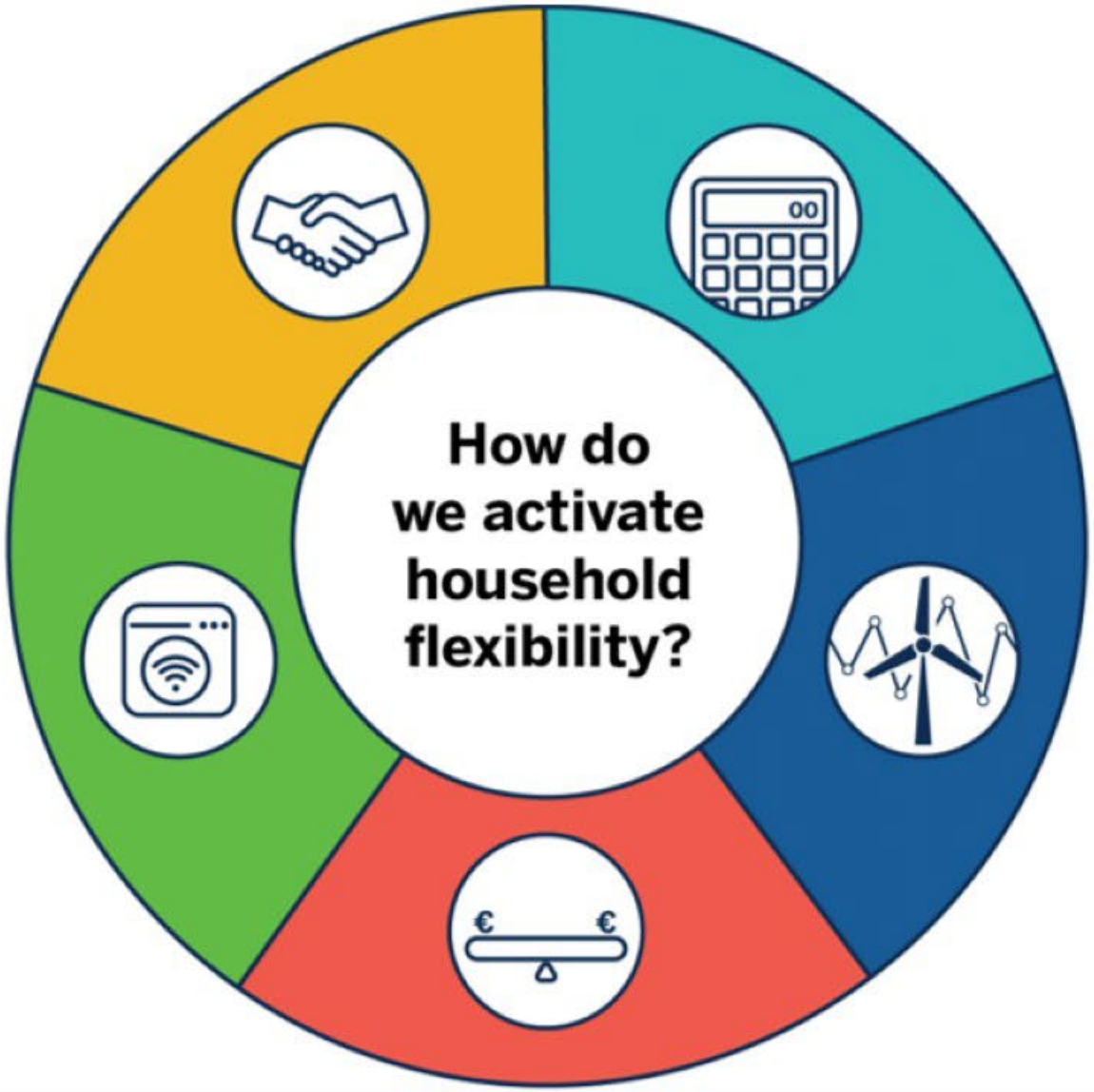
Approach household flexibility as a vital system resource

Demand-side flexibility is still framed as a path that customers are entitled to take for their own benefit. In reality, it is also a path that the decarbonised system needs them to take for everyone's benefit.

4 Action plan



Five-point action plan



Create robust tools for measuring and valuing customer flexibility

Incentivise flexibility through energy market price signals

Ensure a level playing field for demand-side resources

Accelerate installation of flexible assets in homes

Make flexible actions easy and safe for customers

Action 1: Create robust tools for measuring and valuing customer flexibility.

Why do metrics matter?

- Understand full potential contribution of DSF.
- Prevent unnecessary market interventions.
- Enable accelerator policies like supplier obligations.
- Set targets and track progress.

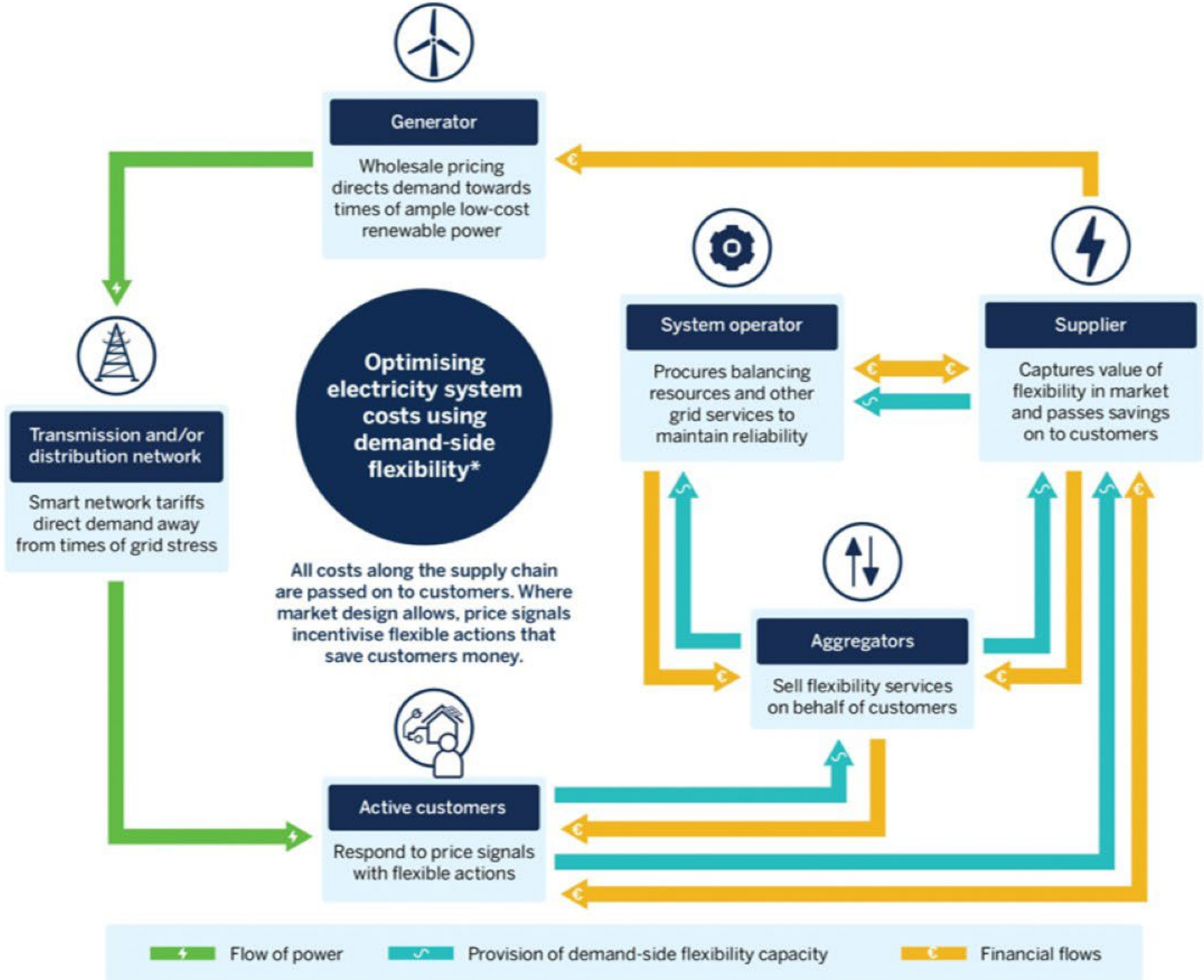
Recommendations: Measure and value flex

- Develop robust common methodology for assessing broad-ranging DSF contributions.
- Require full transparency of system operator planning assumptions.
- Support real-world trials, beyond pilots, which demonstrate value and test modelling assumptions.

Action 2: Incentivise flexibility through energy market price signals.

Energy bills are like layer cakes

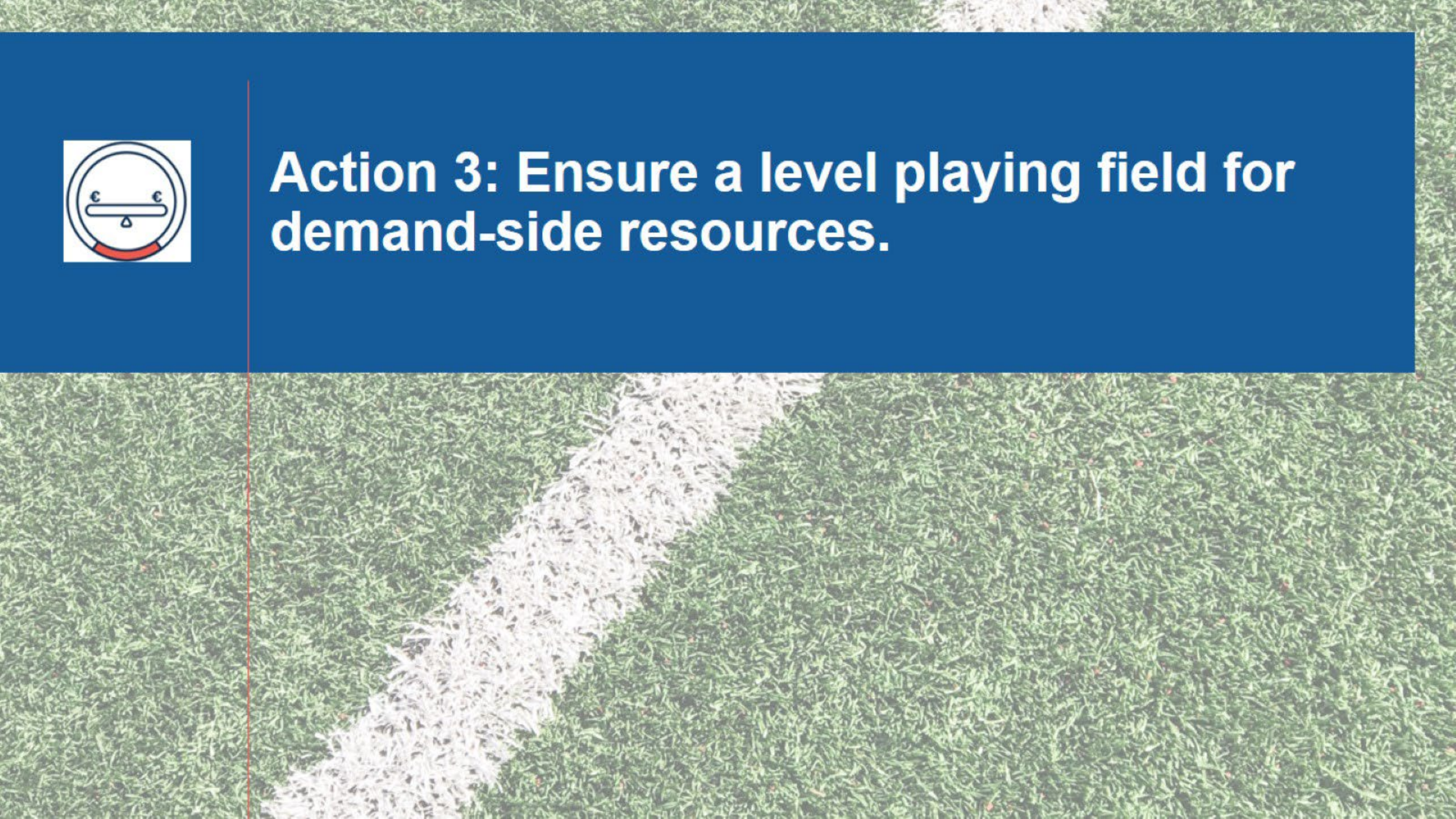
- Retail suppliers = gateway between customers and market.
- Network fees, wholesale prices, balancing services and policy levies stack up (plus profit margin).
- Interventions and competition barriers block flow of value.



Suppliers can only pass on value they can capture in the supply chain.

Recommendations: Clear market signals

- Smart network tariffs: time, location, direction of flow. Performance-based remuneration.
- Limit fixed bill elements to genuine per customer costs.
- Wholesale pricing should reflect system conditions. Motivate supplier ‘balancing’ via DSF.
- Extreme prices: need safeguards to protect customers, especially vulnerable.



Action 3: Ensure a level playing field for demand-side resources.

Explicit DSF markets not accessible in practice

- Art 11 Electricity Directive requires market access but poorly implemented.
- Direct discrimination and implicit bias.
- Pending DSF network code. Looks at data and access barriers.

Recommendations: Level playing field

- Technology inclusivity not just neutrality. Policy design list in report Annex.
- Robust consultation and minority stakeholder engagement.
- Streamline flexibility markets to enable value stacking.
- Data transparency and EE1st to give DSF grid services equal footing.

Action 4: Accelerate the installation of flexible assets in homes.

Increasing technical flex capability

- Flexible assets supersize potential for flexibility.
- We need joined-up strategies across power, buildings, transport, telecoms and heat sectors.
- EU Fit for 55 Package: building and product standards, info and advice.

Source: Your Energy Your Way

Recommendations: Flexible assets in homes

- Prioritise flexibility of newly electrified loads. Mandate smartness and interoperability.
- Make metering and control tech standards outcomes-based to avoid lock-in and stranding.
- Energy efficiency PLUS: Integrate flex assets (e.g., heat storage) into home upgrades
- Energy crisis: targeted support that pays long-term dividends.

Action 5: Make flexible actions easy and safe for customers.

“People don’t want raw kilowatt-hours… They want hot showers, cold beer, comfort, mobility, illumination.”

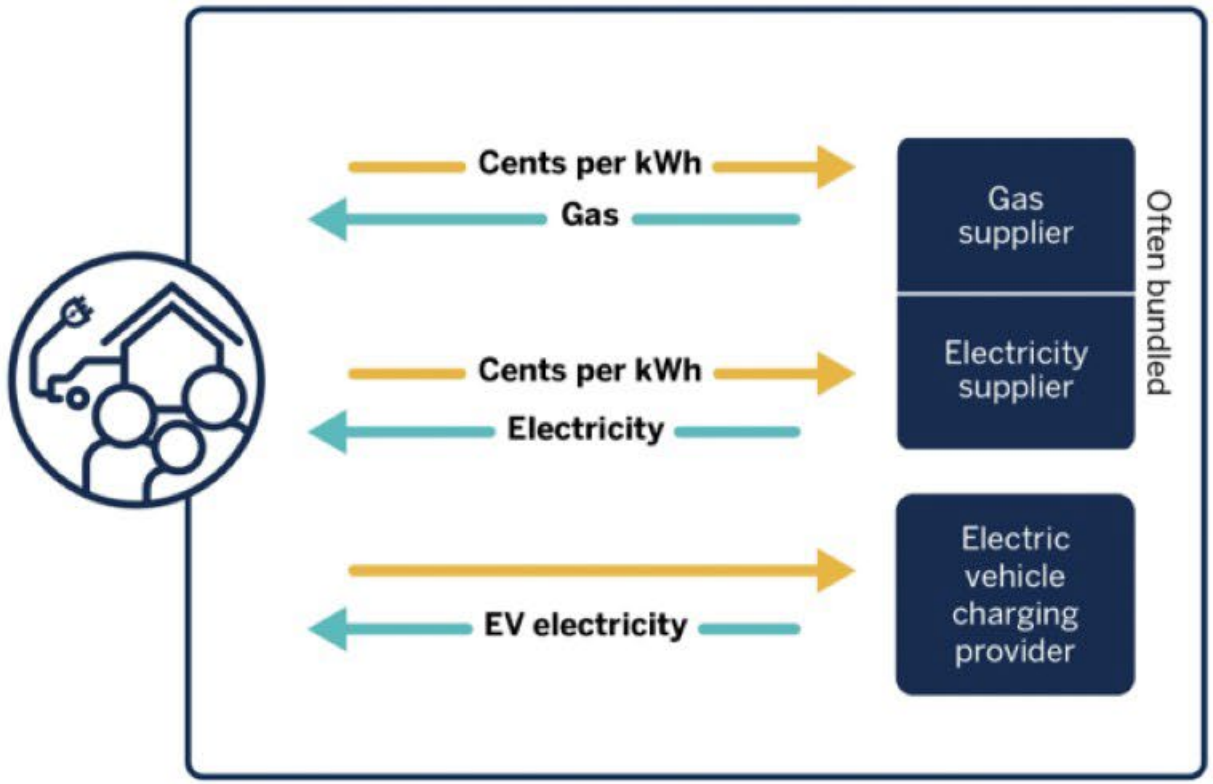
Amory Lovins,

Rocky Mountain Institute

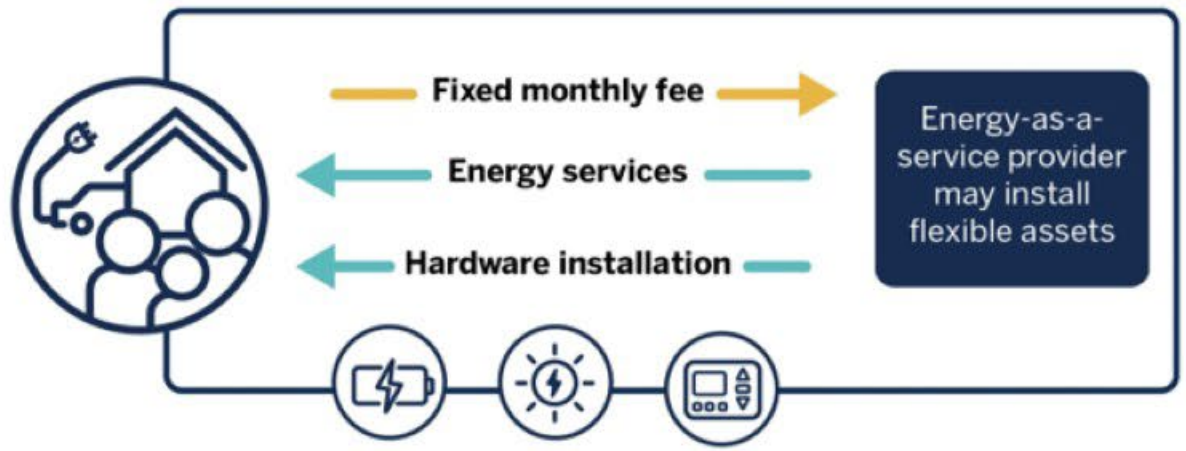
Simple, low-risk and hassle-free flex

- New energy models: Energy as a service, energy communities, lifestyle products and data-driven services.
- Mix and match: time-of-use/dynamic tariffs, fixed rates with flex bonuses.
- Goal = protect without stifling innovation or choice.
- Foster trust and confidence.

ENERGY TARIFFS MODEL



ENERGY-AS-A-SERVICE MODEL



Hypothetical energy-as-a-service plan

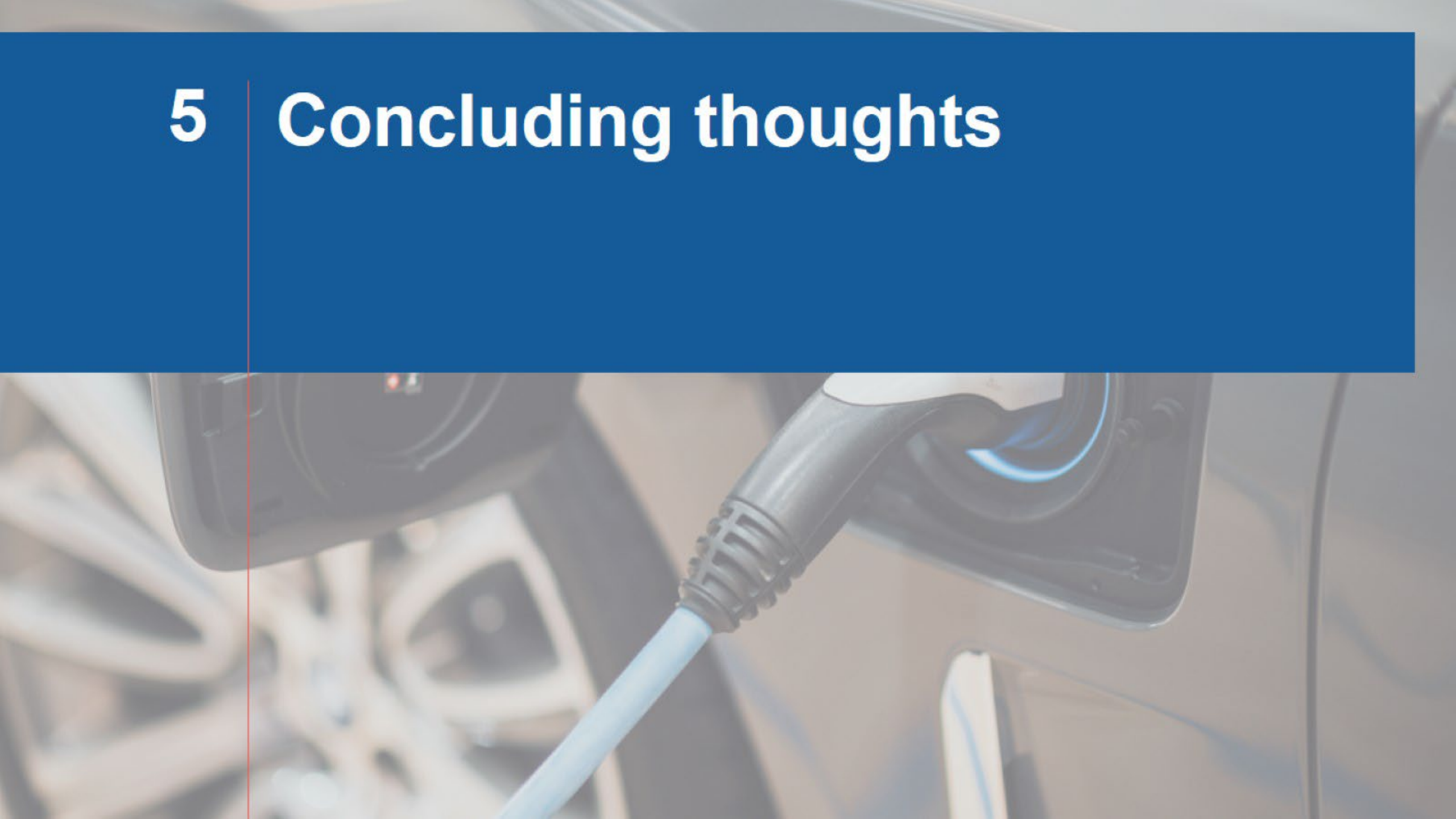
X euros per month	Heat	Transport	Electricity
No sign-up cost	Target 20°C with agreed +/- tolerance	Annual mileage package 10,000 km	Unlimited
Contract 24 months			

Source: Based on Everoze. (2019). *Swarm governance: Flying to a future of domestic energy-as-a-service – addressing demand-side response barriers*

Recommendations: Easy and safe flexibility

- Dedicated regulatory oversight. Focus and accountability.
- De-risk flex via price protection, upside-only offers (critical peak rebate), early bill warnings and supplier hedging.
- R&D funding for inclusion by design. Best practice codes and accreditation schemes for emerging sectors.

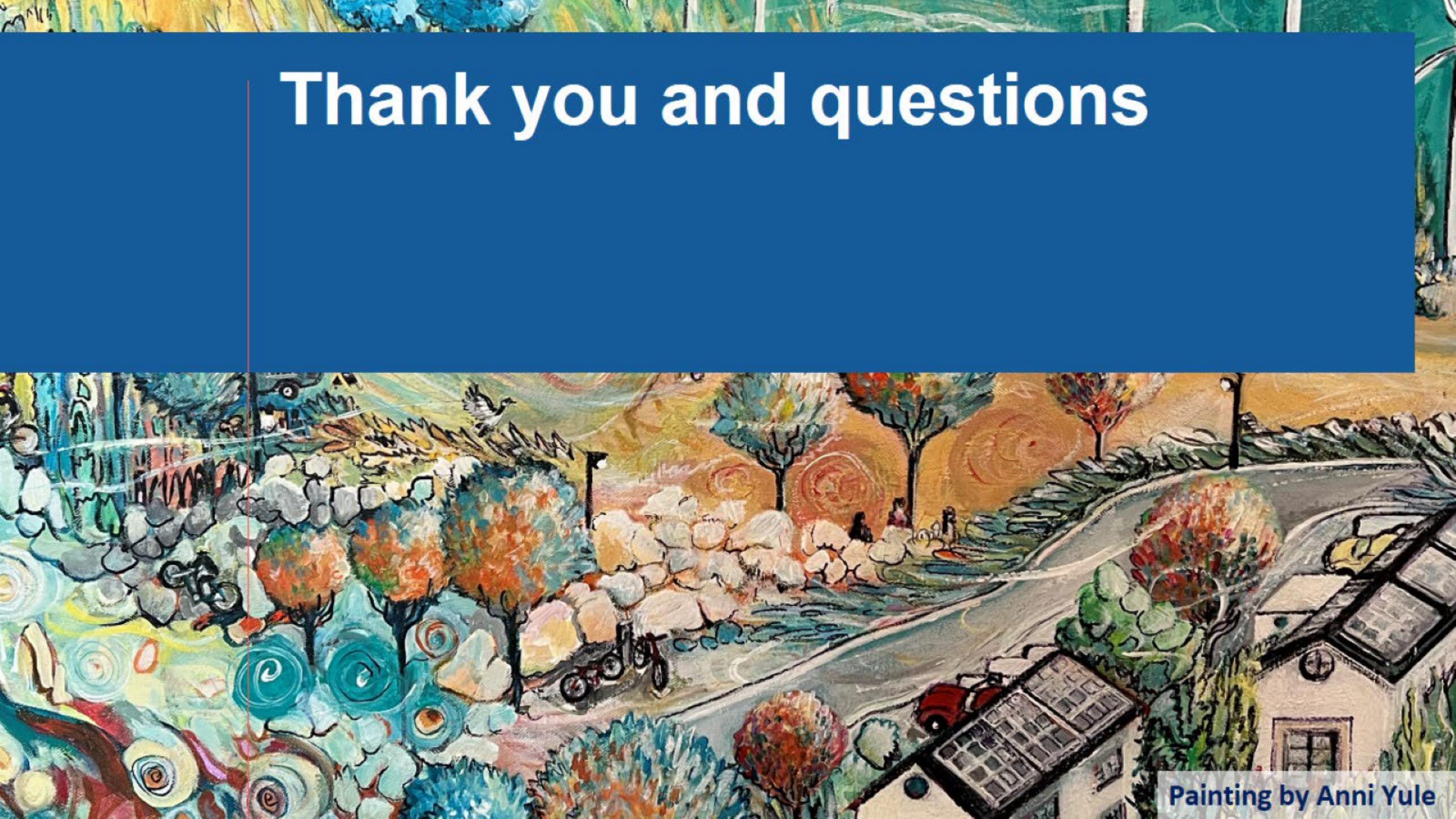
5 Concluding thoughts



How can we unlock household flex?

- Support household DSF like other essential energy infrastructure.
- Find ways to align household needs with system needs.
- Innovation doesn't happen in a vacuum, need market signals. But 'price and pray' is not enough.

Thank you and questions



Painting by Anni Yule

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organisation dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

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