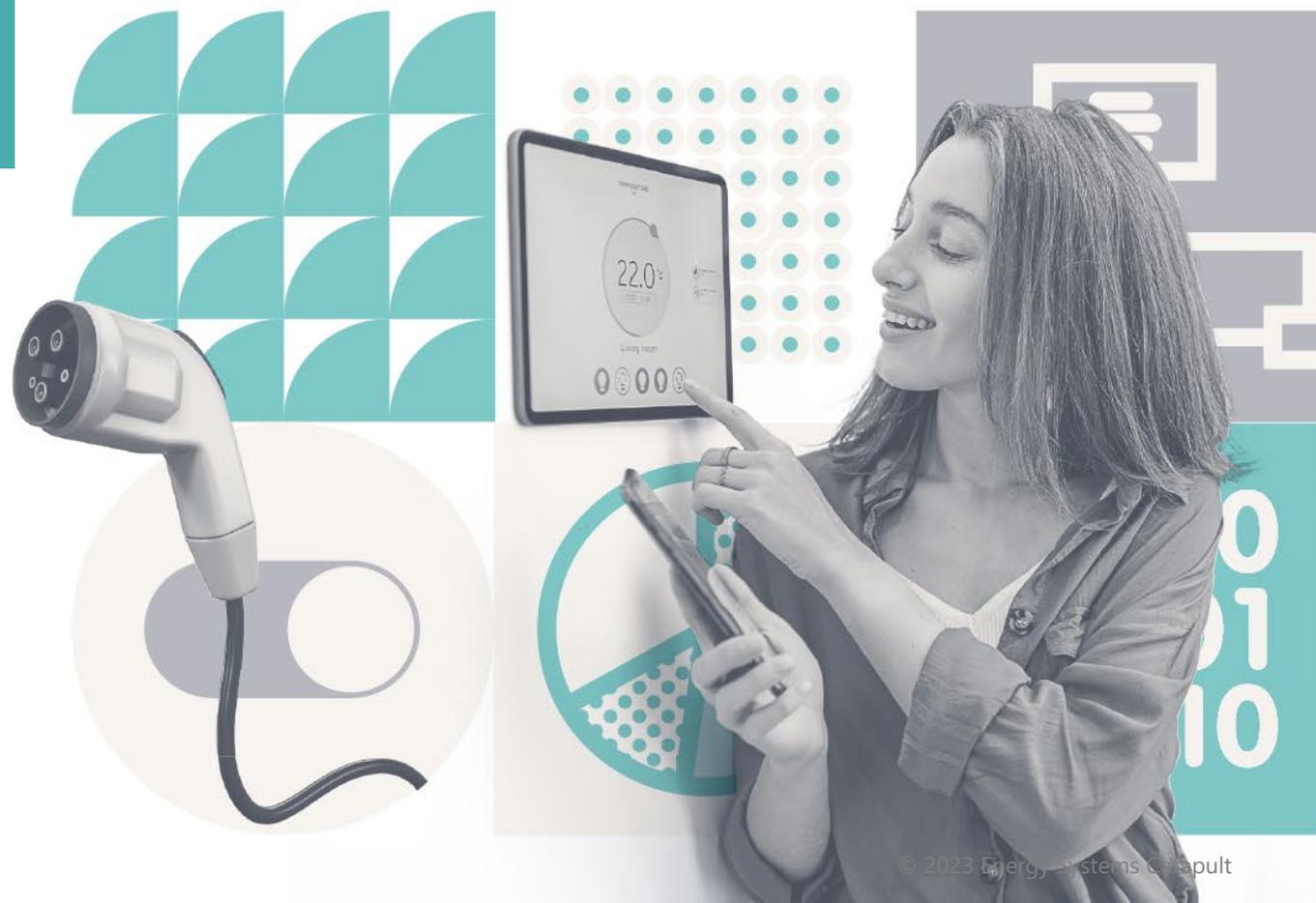


## Energising Australians: ECA - Foresighting Forum 2023

**'UK experience: Consumers at  
the heart of a whole energy  
systems approach'**

**15<sup>th</sup> February 2023**

**Paul Jordan**  
Business Leader, Innovator Support &  
International

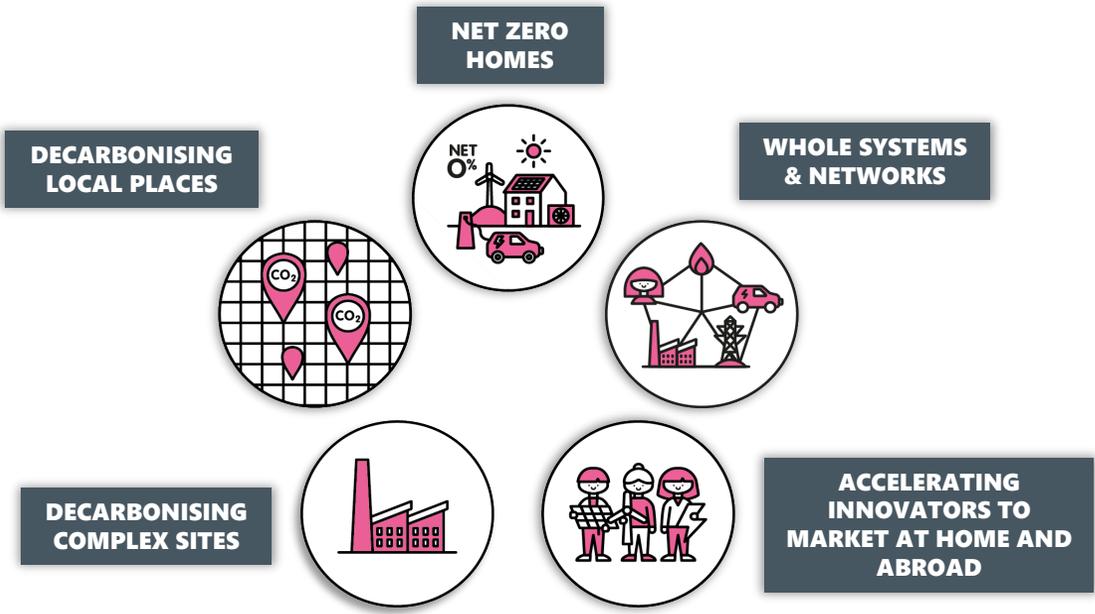


# CATAPULT NETWORK.

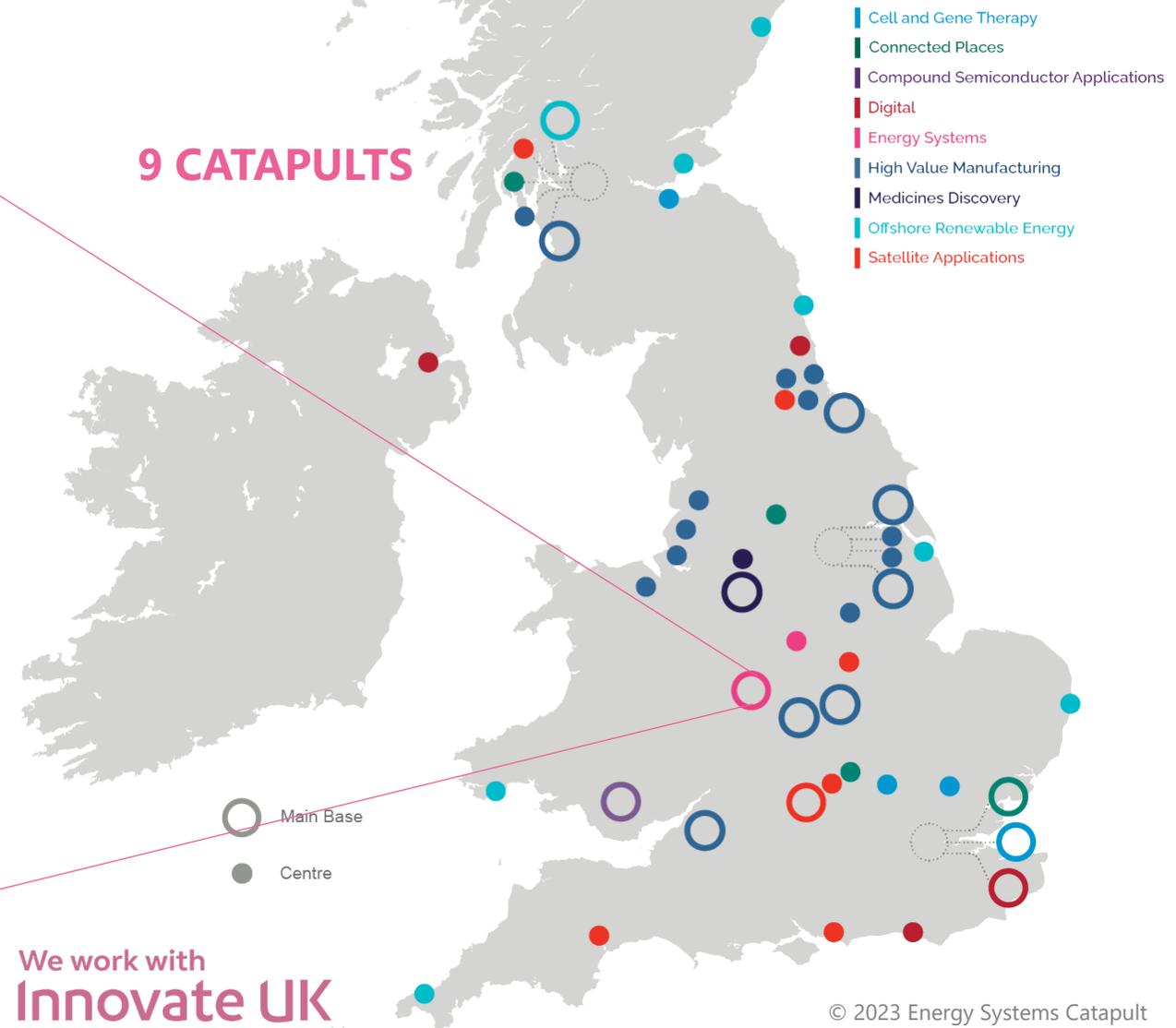
SUPPORTING BUSINESS IN TRANSFORMING GREAT IDEAS INTO VALUABLE PRODUCTS AND SERVICES.



## ENERGY SYSTEMS CATAPULT

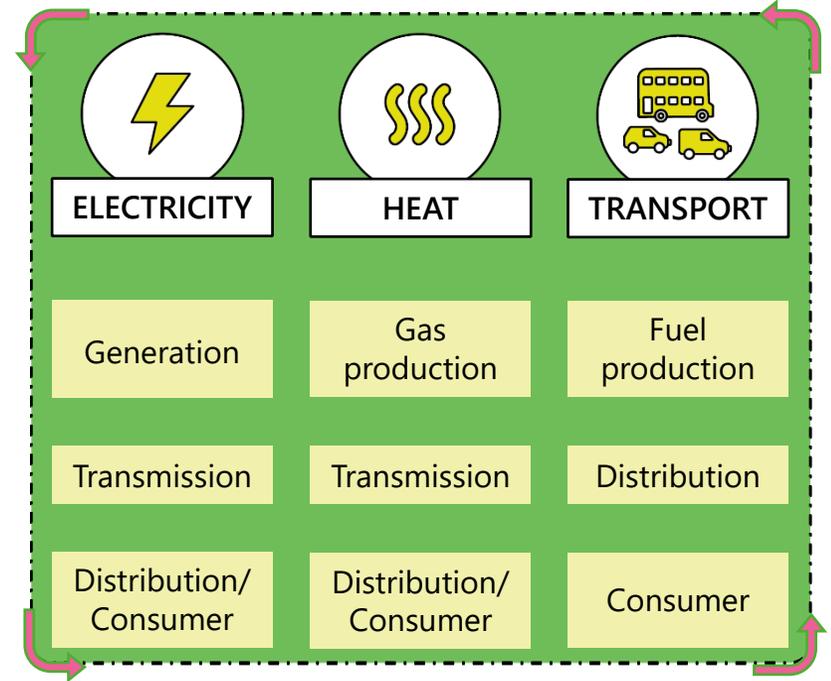
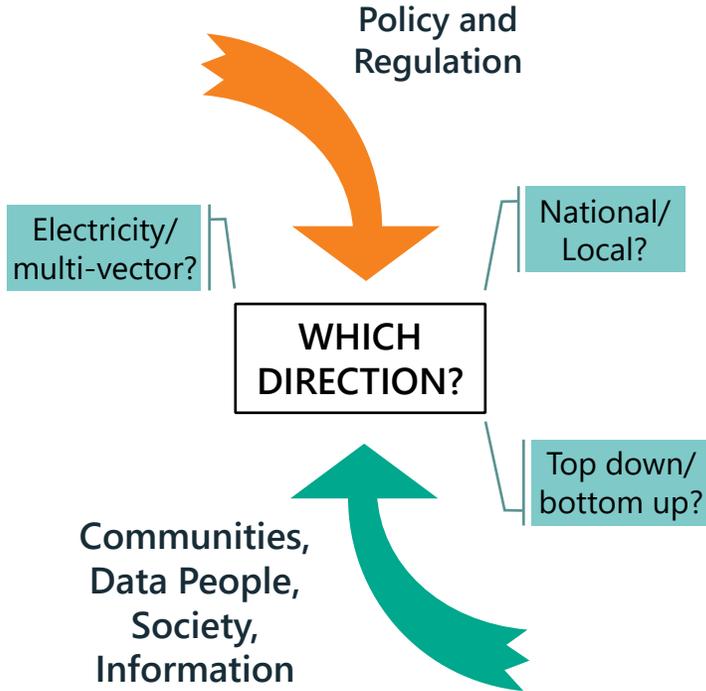
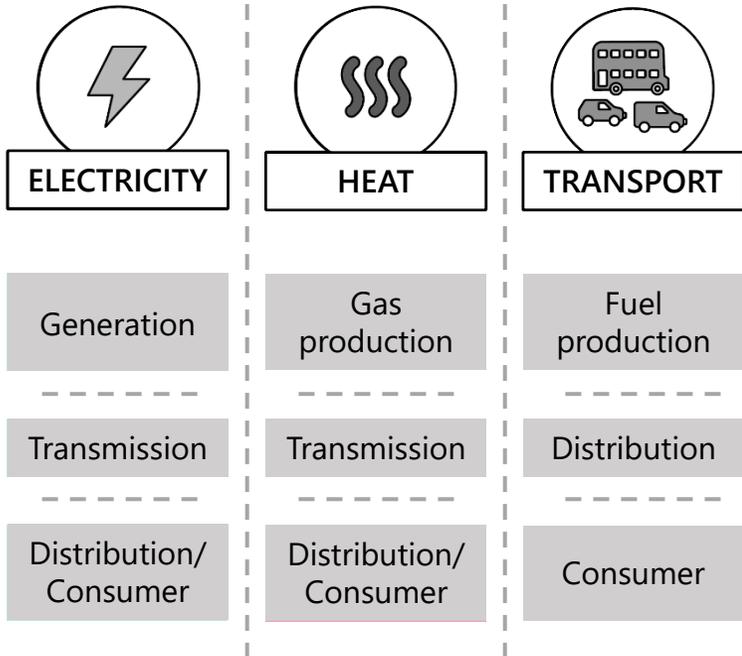


9 CATAPULTS



We work with **Innovate UK**

# THE ENERGY SYSTEM IS TRANSFORMING – ENERGY STREAMS INTERLINKING AND MORE CONSUMER-CENTRIC THAN EVER BEFORE



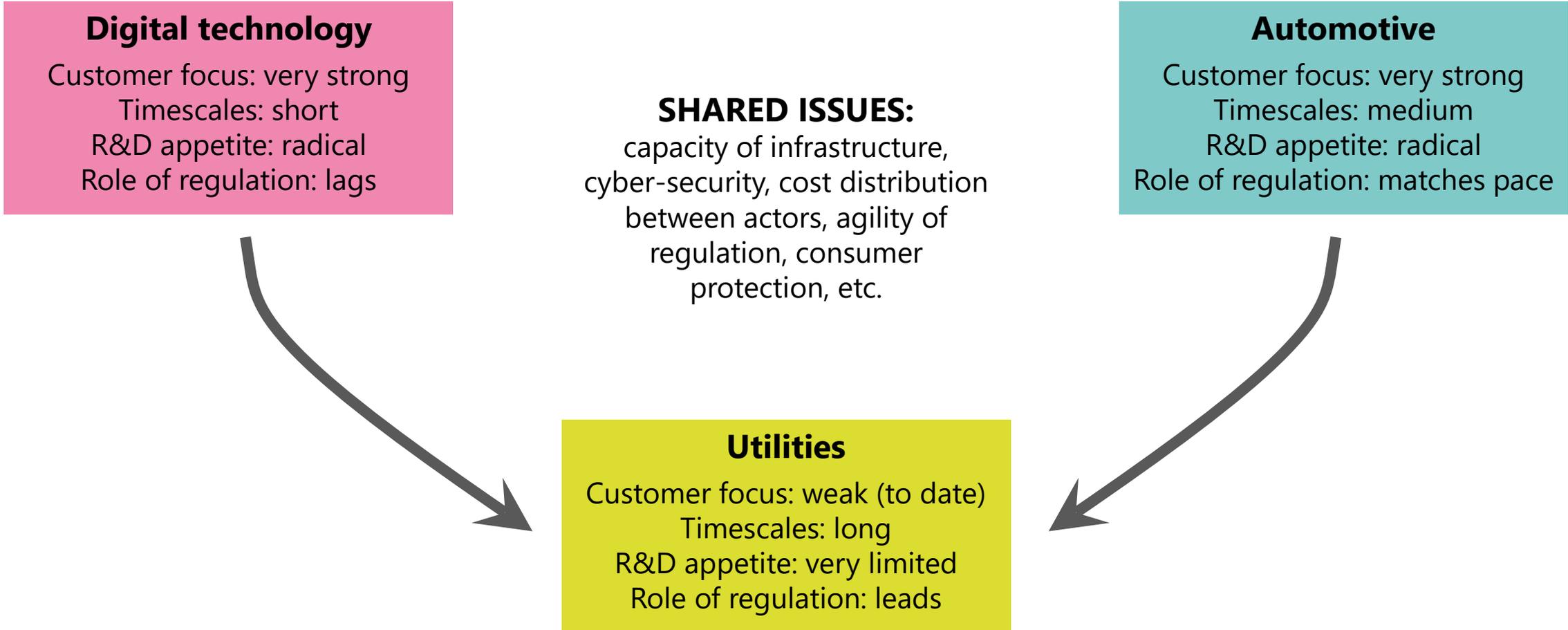
**DECENTRALISATION**

**DECARBONISATION**

**DEMOCRATISATION**

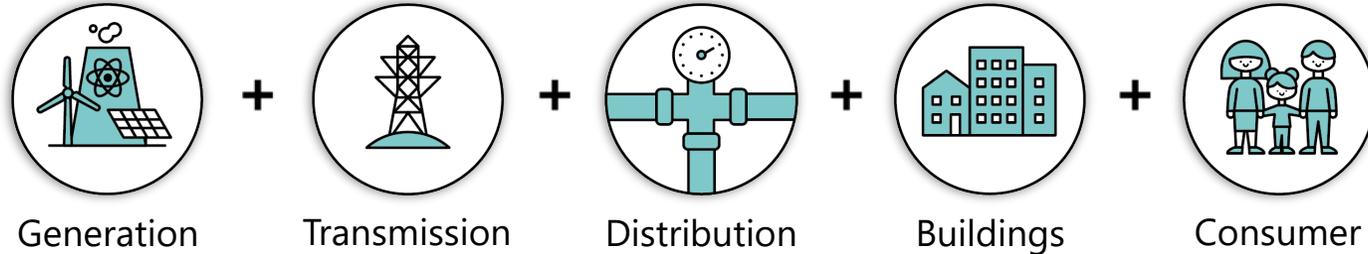
**DIGITALISATION**

# TRADITIONAL ENERGY MINDSET RADICALLY CHANGING – DRIVEN IN PART BY CLOSE COLLABORATION WITH OTHER SECTORS AND THEIR CONSUMER FOCUS

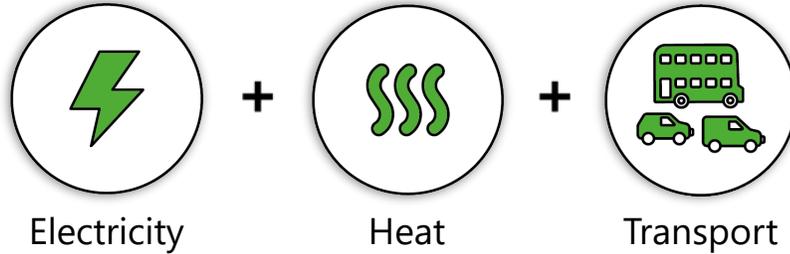


# WHOLE SYSTEMS THINKING IS CENTRAL TO OUR APPROACH, WITH THE CONSUMER AT THE HEART OF THE ENERGY TRANSITION

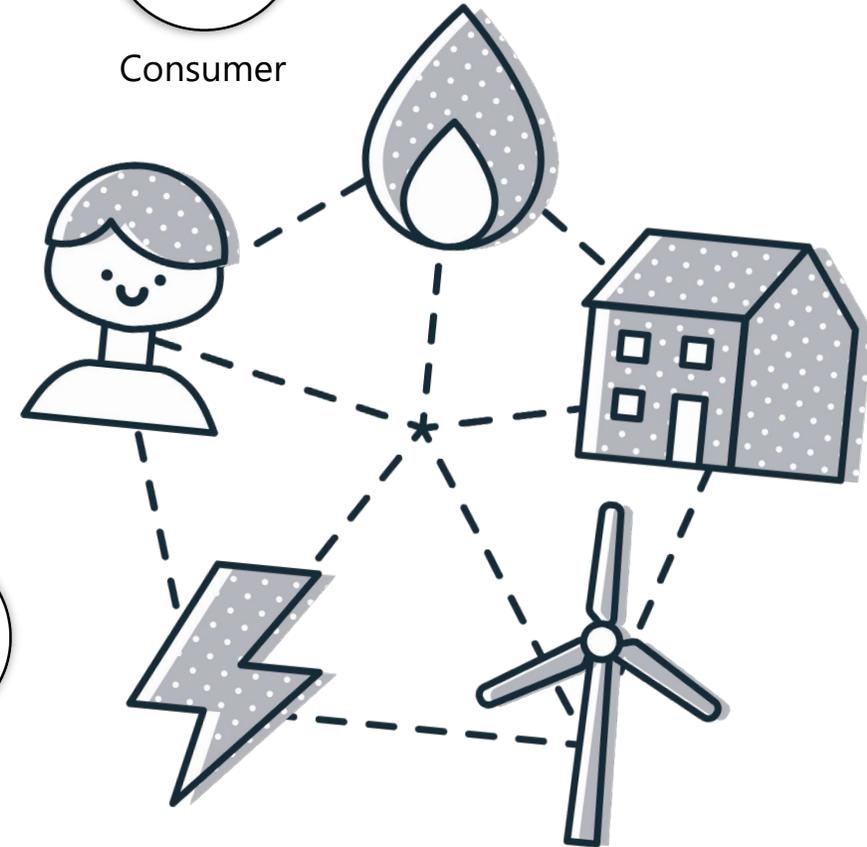
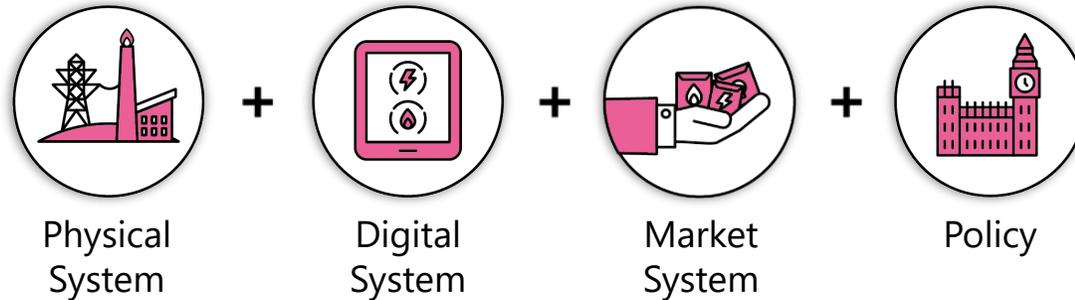
**JOINING UP THE SYSTEM FROM SOURCES OF ENERGY TO THE CONSUMER**



**BREAKING DOWN SILOS BETWEEN DIFFERENT PARTS OF THE ENERGY SYSTEM**



**JOINING UP PHYSICAL REQUIREMENTS OF THE SYSTEM, WITH POLICY, MARKET AND DIGITAL ARRANGEMENTS**



# Energy as a Service (EaaS)

**MANY SECTORS HAVE ALREADY MOVED TO A SUCCESSFUL SERVICE MODEL – OFTEN DRIVEN BY DIGITALISATION AND TRANSFORMING THE WAY WE LIVE**



Travel



Retail



TV



Energy

Your Gas & Electricity Bill	
Please pay £283.68 by July 31st	
<b>Billing Summary</b>	
Bill period: 01 January to 31st March	
Your last bill	£193.32
Payment received on 29th December	£193.32 credit
Balance before this bill	£0.00

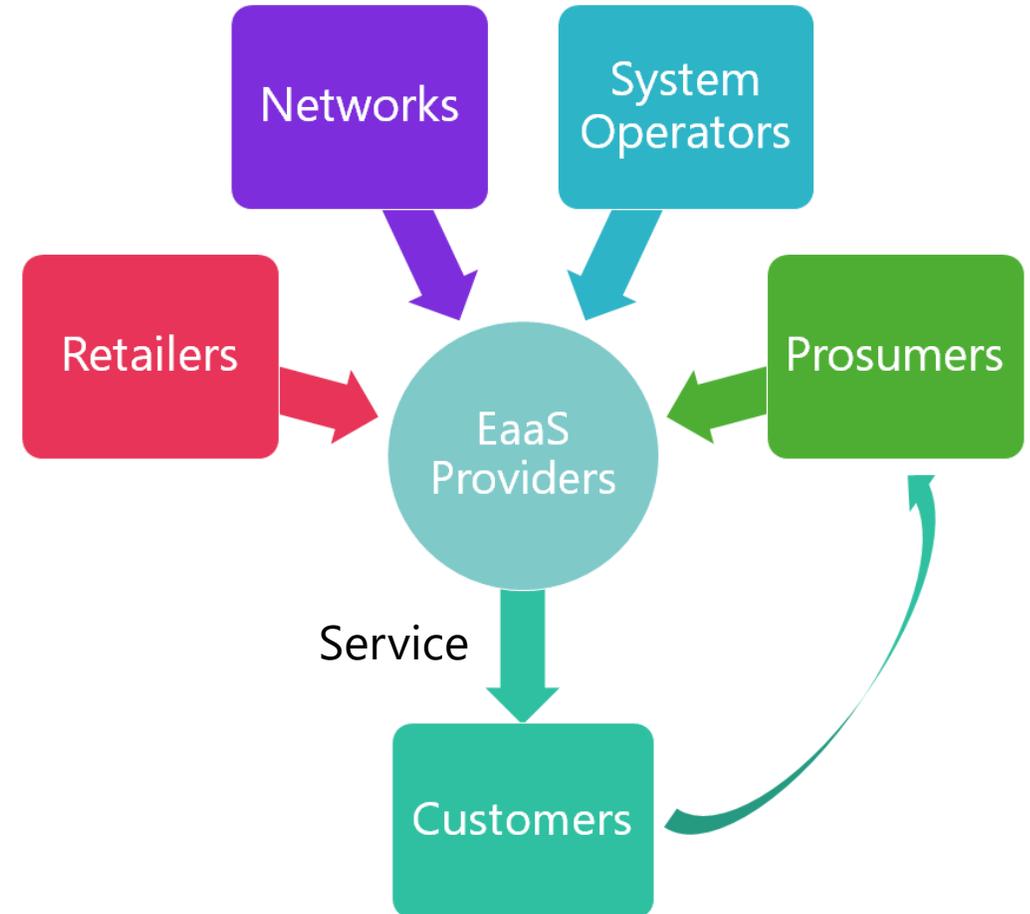


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Balance before this bill	£0.00

# ENERGY AS A SERVICE (EAAS) COULD UNLOCK SUBSTANTIAL BENEFITS, ENABLING A MORE CONSUMER LED APPROACH TO DELIVERY OF LOW CARBON SOLUTIONS

- Simple point of **system integration** – rather than relying on the consumer
- Service can **unlock additional consumer value** – assuming provider understands what they value
- Potential to **unlock additional revenue streams** (e.g. network ancillary services) – allows customer service to be market priced whilst maintaining overall return to provider
- Can apply **low carbon policies** on EaaS providers – much easier than targeting consumers
- Allows better targeted and cost-effective policy roll-out for **vulnerable / fuel poor customers**
- Could **bundle with other non-energy services** – e.g. social care, security, other utilities

## Potential revenue streams



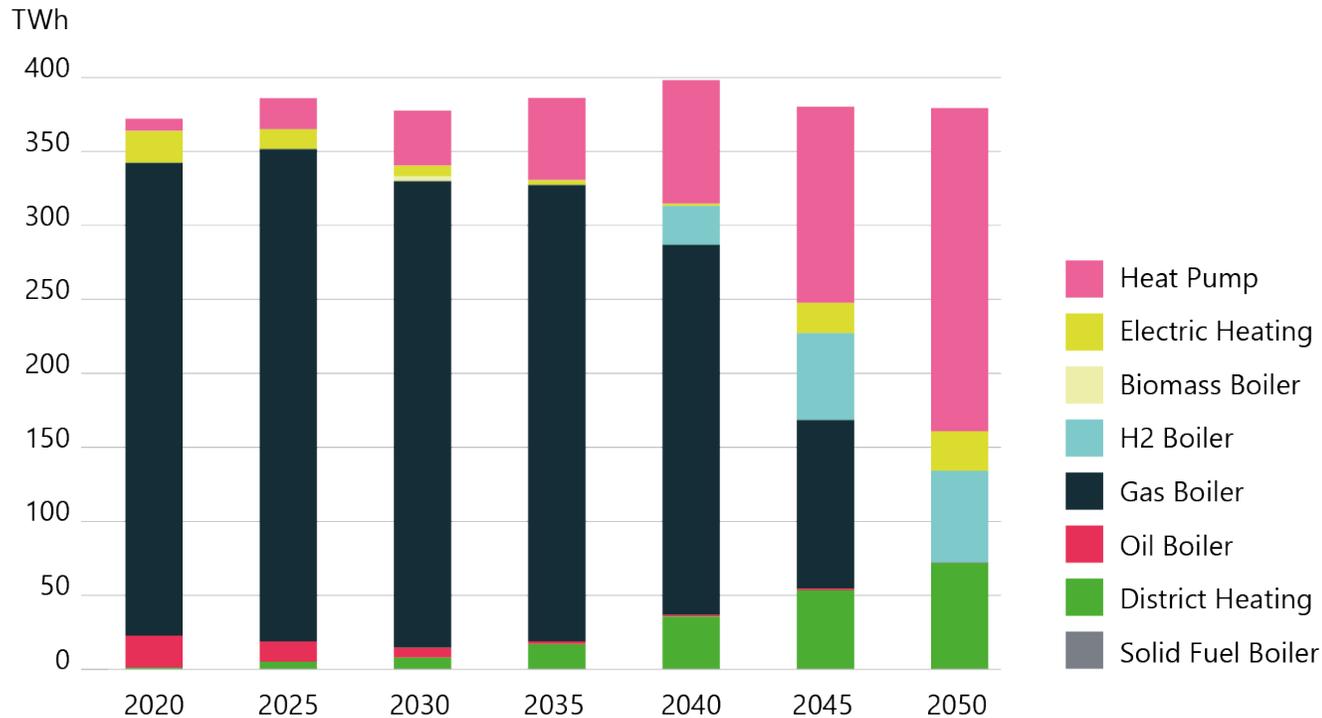


# BUILDINGS AND HEAT: the critical UK challenge?

<https://es.catapult.org.uk/reports/innovating-to-net-zero/>



## Clockwork Space Heat Output



## 2050 Capacity Innovation priorities:

- Whole house retrofit** packages innovation to reduce cost, improve performance.
- Smart multi-zone controls** can reduce energy use while maintaining levels of comfort.
- Hybrid heat pump and boiler** demonstration of integrated solutions.
- Heat storage** with potential to substitute for gas boilers as back up for heat pumps.
- 100% hydrogen networks** early demonstration essential to maintain this as an option.

**Note, total UK electricity consumption today is c. 330 TWh/yr**

# CASE STUDY: HEAT AS A SERVICE (HAAS) – TRY MOVING AWAY FROM HARD TO UNDERSTAND KWH BILLS, TO A SERVICE PEOPLE WANT AND VALUE

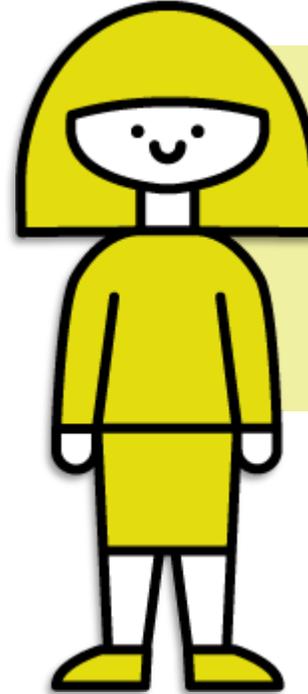
## Today people buy

- kWh of gas
- kWh of electricity
- Heating systems
- Maintenance



## Tomorrow they could buy

- A warm home
- Everything included (apart from the carbon)



# LET'S FIRST INTRODUCE OUR LIVING LAB – AN IMPORTANT VEHICLE TO TRIAL SOLUTIONS AND GATHER DATA TO UNDERSTAND CONSUMERS

Living Lab is a national asset for consumer-focused energy system innovation

A unique trial and demonstration facility

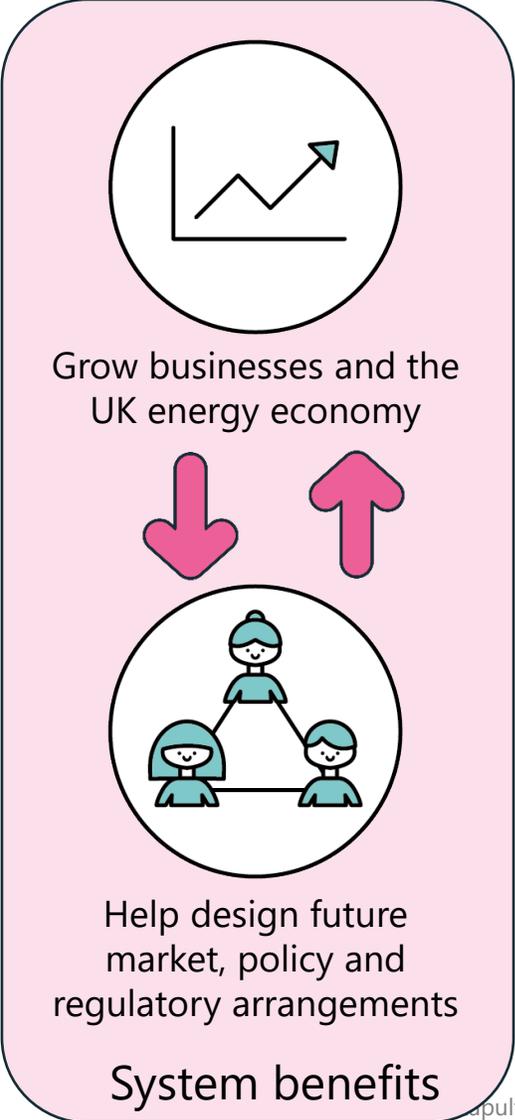
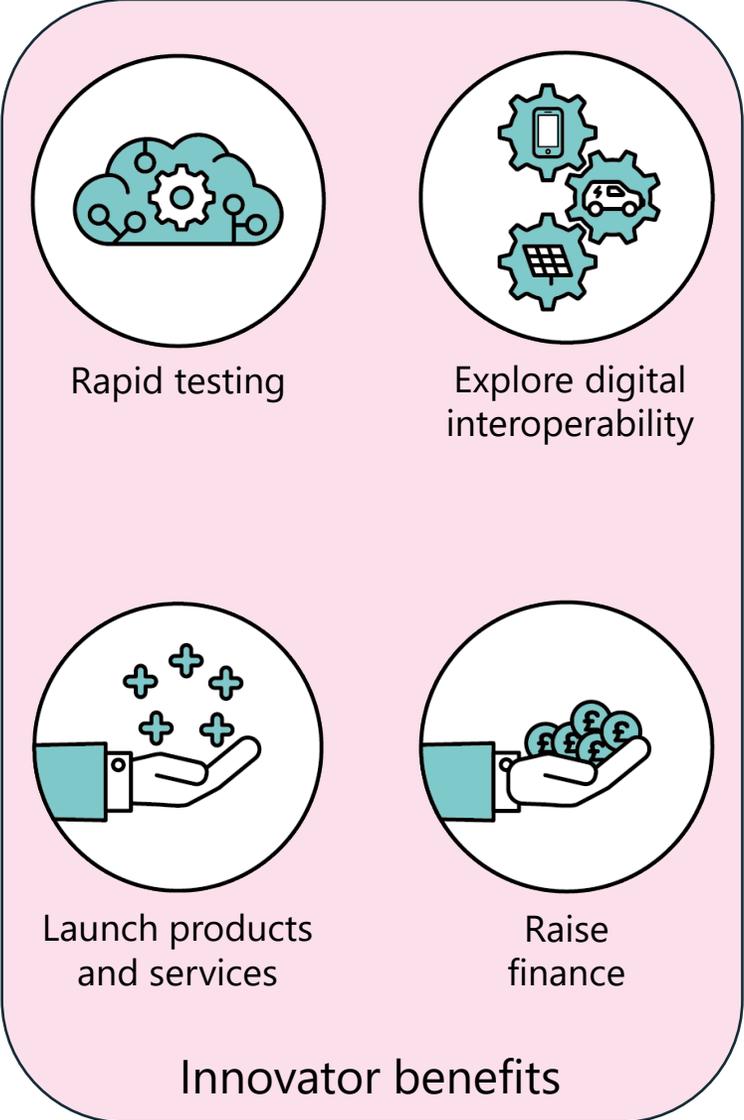
Powered by an independent platform

Provides quick and low cost access for innovators

A place to test future market design

Where multiple innovators can do business together

Key enabler for the digitalisation of energy



# WITH OVER 1,700 HOMES (AND GROWING), OUR CURRENT LIVING LAB CENTRES AROUND REAL PEOPLE IN REAL WORLD ENVIRONMENTS

Simple interaction with consumers

Easy to modify to include new technologies

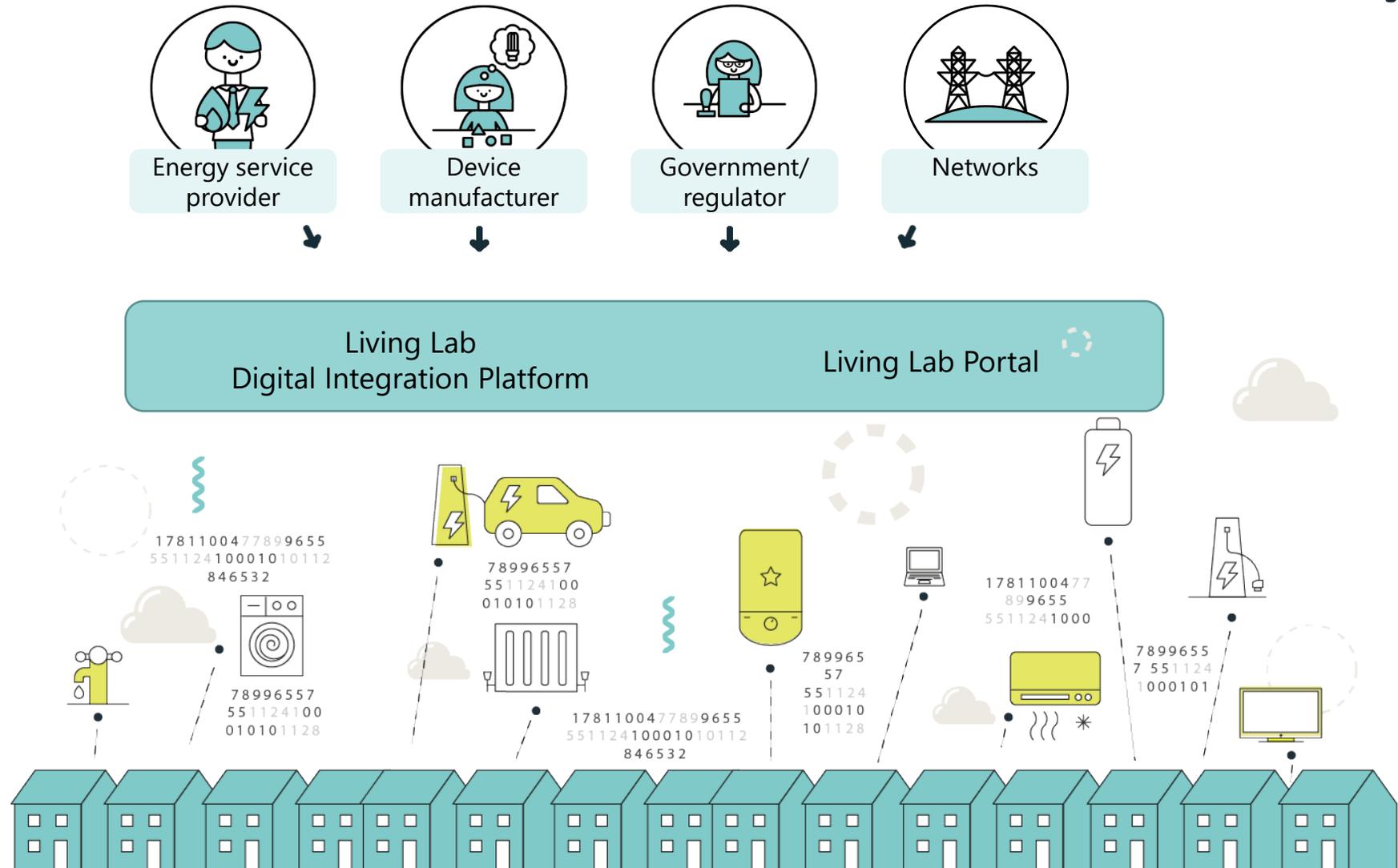
Supports multiple trials

1,700+ homes have signed up to take part

Variety of consumers, homes and technologies

Scalable to '000s of homes

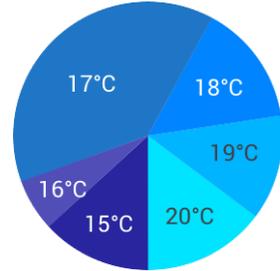
Combines consumer insight and digital analysis



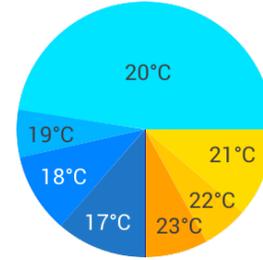
# WITH LIVING LAB, WE CAN GATHER DATA TO UNDERSTAND WHAT PEOPLE WANT ...EVERYONE ENJOYS BETTER CONTROL, BUT THEY USE IT VERY DIFFERENTLY

Controls		Heating ON <input checked="" type="checkbox"/>	
20° 17°	Lounge 20° at 20:00	+	-
18° 18°	Mum & Dad's room 18° until 21:00	+	-
22° 22°	Kitchen Override until 19:32 EDIT	+	-
22° 22°	Jack's room Laundry Dry until 19:17 EDIT	+	-
24° 17°	Bathroom 24° at 20:00 Long warm-up expected	+	-

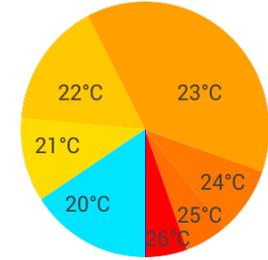
### Cool Conservers



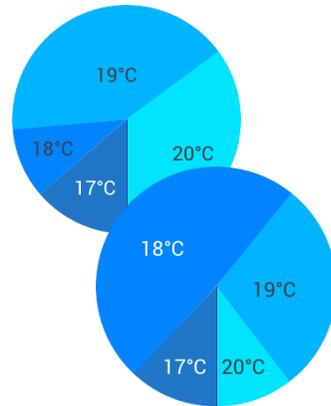
### Hot and Cold Fluctuators



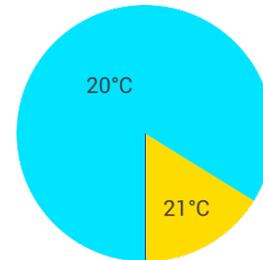
### On-Demand Sizzlers



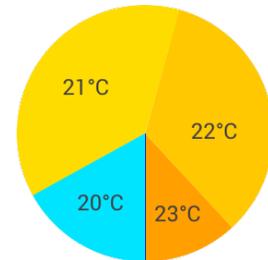
### Steady and Savvy



### On-off Switchers



### Toasty Cruisers



# HAAS – WE CREATED A NEW HEAT PLAN THAT COULD CATER TO ALL SEGMENTS, UTILISING THE CONCEPT OF WARM HOURS

...A SIMILAR CONCEPT COULD APPLY TO COOLING, FOR HOT CLIMATE COUNTRIES

**Warm hours**  
Hours any room is warm



**Pence per warm hour**  
Like "mpg" for heating

**Schedule**  
Temperature of rooms at any time

**Extras**  
Cost of warmth outside the schedule

# HAAS: PARTICIPANT'S RESPONSES TO THE HEAT PLANS WERE POSITIVE, SOME OPTING FOR THE UNLIMITED VERSION DESPITE NOT INCREASING ENERGY

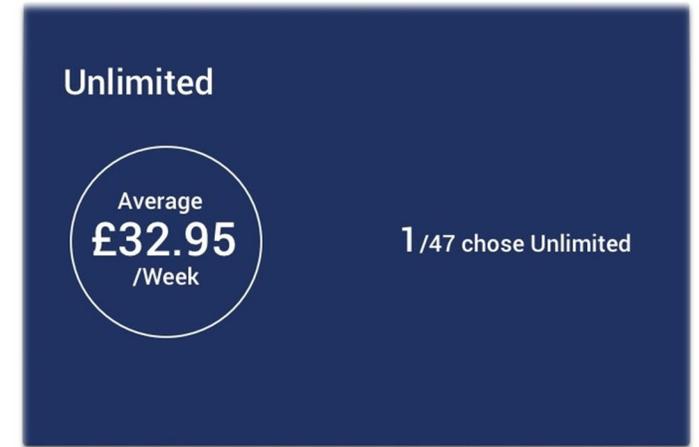
More than half of the 100 homes in the trial, bought a Heat Plan



- Used most of their plans
- More likely to use Extras



- Used less of their plans
- Never used any Extras

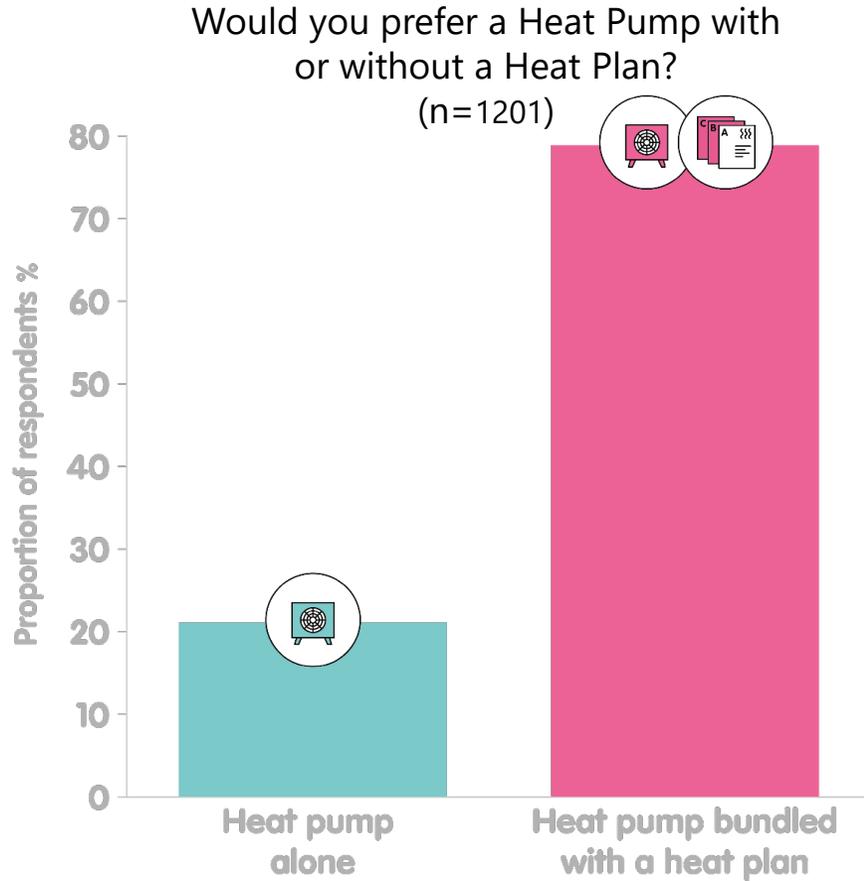


- Six upgraded in 'flash sale'
- Did not increase energy use

FlexiTime was the most popular plan

[See this link for lots more information](#)

# WE HAVE FURTHER DEMONSTRATED THAT LOW CARBON HEATING IS MUCH MORE ACCESSIBLE TO PEOPLE WITH COMFORT-BASED HAAS



**85%**

## Does experience of a Heat Plan make people open to low carbon heat?

of people who bought heat plans were open to alternatives to gas when replacing their boiler (vs. 1/3 for people who have not)

**45%**

## Would services be a more popular approach to decarbonising heat?

were positive to energy services vs. 38% for a home improvement loan, 30% for a boiler ban and 22% for a carbon tax

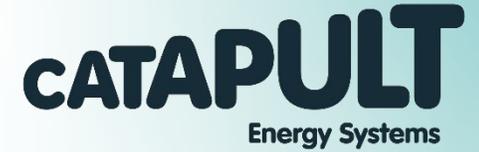
**Play Heat as a Service  
Participant's interviews video**

## **What about transport?**

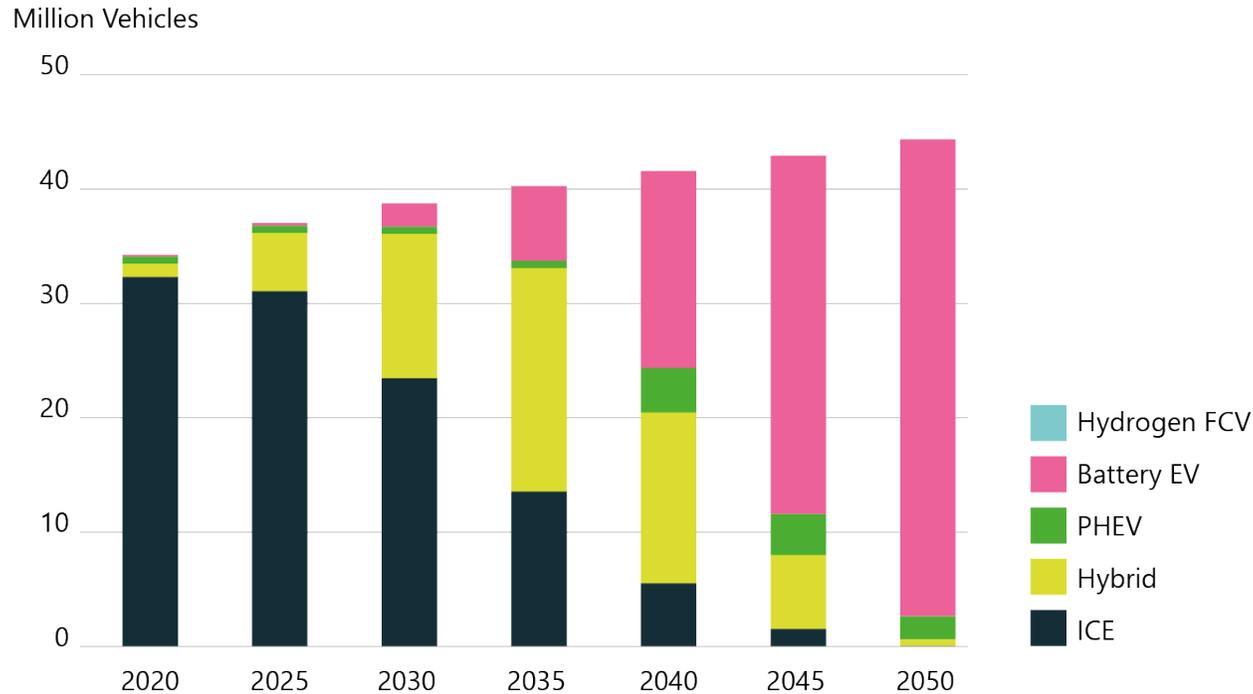


# TRANSPORT: For Net Zero, the road ahead looks clear

<https://es.catapult.org.uk/reports/innovating-to-net-zero/>



## Clockwork Deployment of cars



### Innovation priorities:

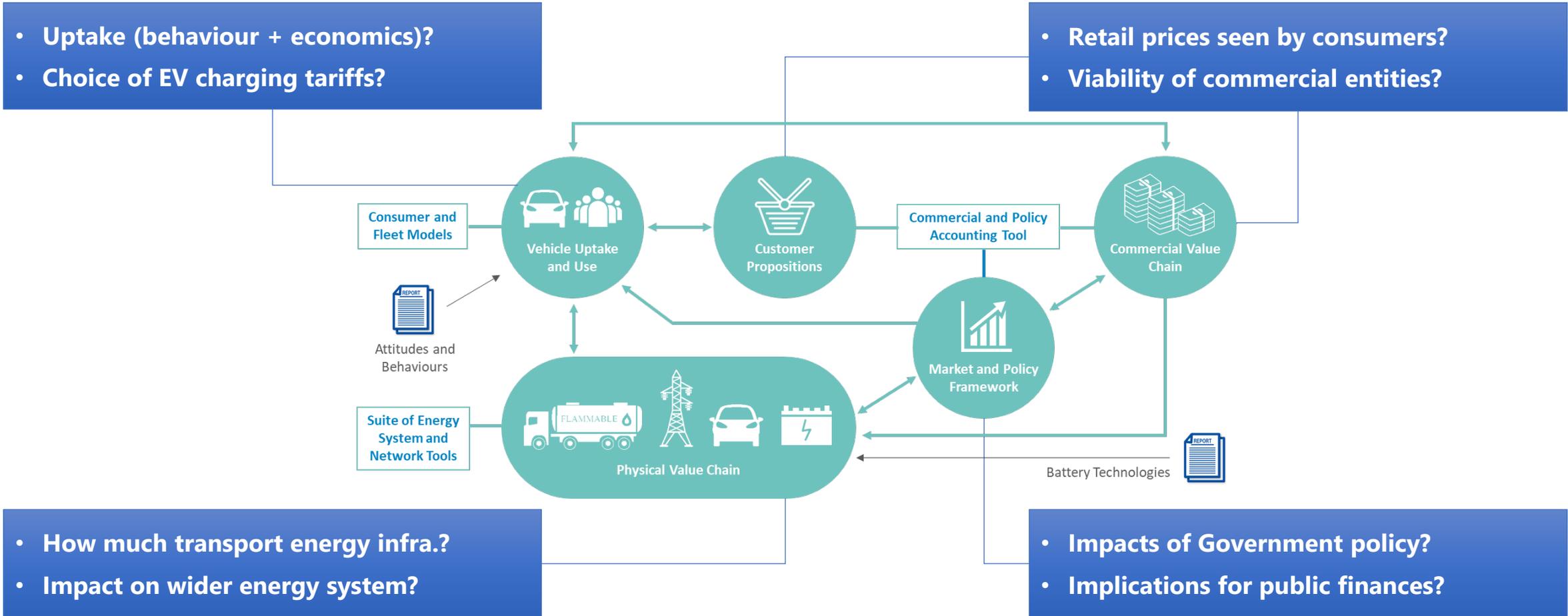
**Smart charging** can assist with grid integration.

**Public charging** infrastructure to support mass adoption.

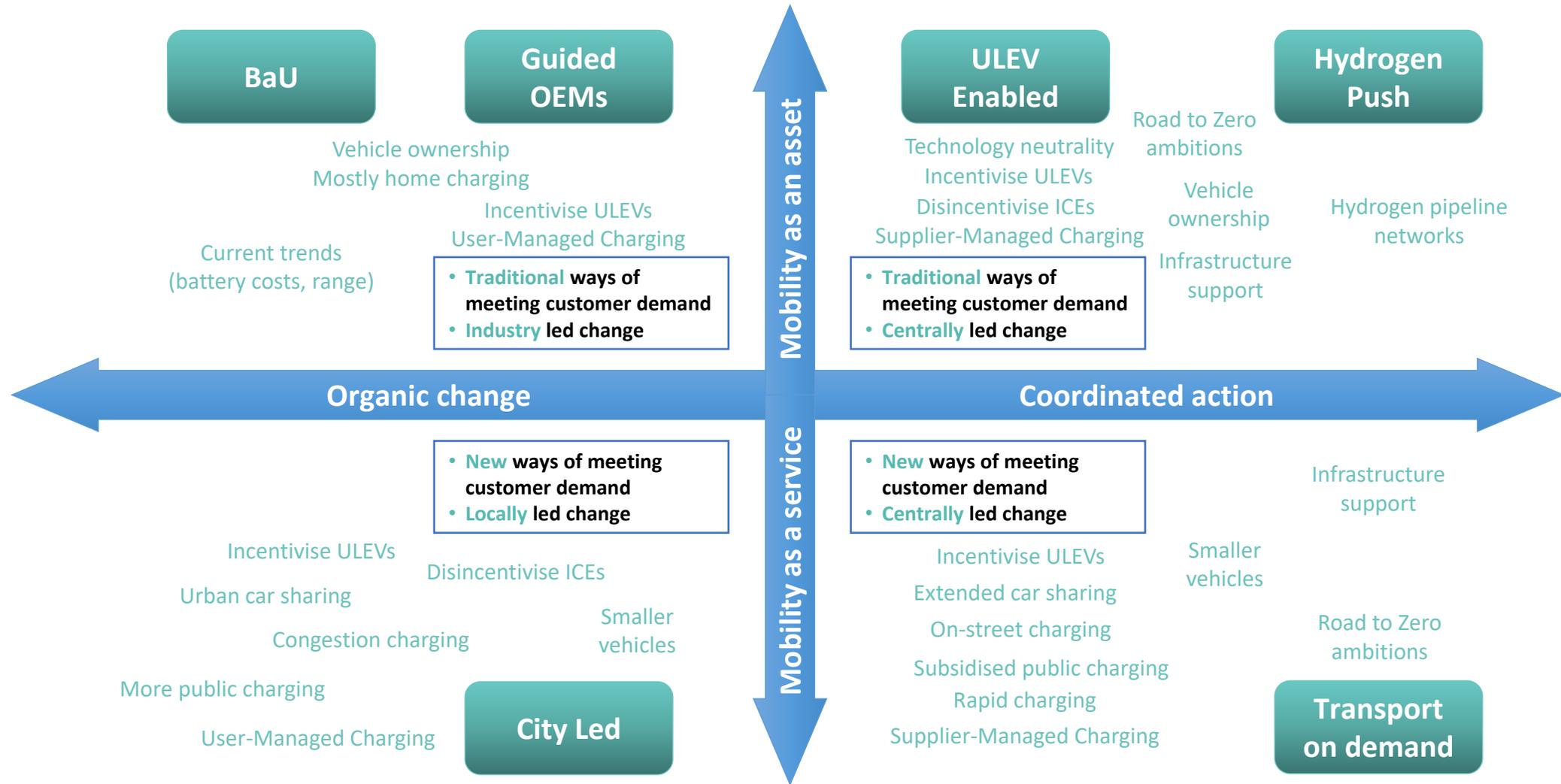
For **heavy duty vehicles**: the potential for natural gas stepping stone requires consideration.

**Hydrogen shipping** looks attractive but will require international coordination.

# TACKLING THE NET ZERO CHALLENGES FOR TRANSPORT, AGAIN WOULD BENEFIT FROM AN END-USER FOCUSED WHOLE SYSTEMS APPROACH



# WIDE RANGE OF OPTIONS FOR FUTURE TRANSPORT SECTOR, MANY ARE HIGHLY PLAUSIBLE...BUT WILL THE CUSTOMERS ULTIMATELY DECIDE?



# CONSUMER VEHICLE AND ENERGY INTEGRATION (CVEI) TRIALS - £5M PROGRAMME ASKING MANY QUESTIONS, INCLUDING: “WHAT ARE THE TECHNICAL IMPLICATIONS OF ANY CHANGES AND HOW MIGHT PEOPLE RESPOND TO THEM?”

## Charging Behaviour Trial

- Assessed response to different tariff propositions – user-managed (UMC) (ToU tariff) versus (simulated) supplier-managed charging (SMC)
- 247 consumers, 2 months with a vehicle, (parallel) BEV and PHEV trials
- Same type of car – VW Golf
- Data on use and charging with additional questionnaires and choice experiments

## Vehicle Uptake Trial

- To enhance understanding of adoption of EVs
  - 200 consumers, given 4 days with each of 3 vehicles in turn (BEV, PHEV, ICE)
  - Additional questionnaires and choice experiments (with reduced ‘psychological distance’)
- <https://es.catapult.org.uk/case-study/consumers-vehicles-and-energy-integration/>
  - [Andrew Haslett’s insights report](#)



BEV



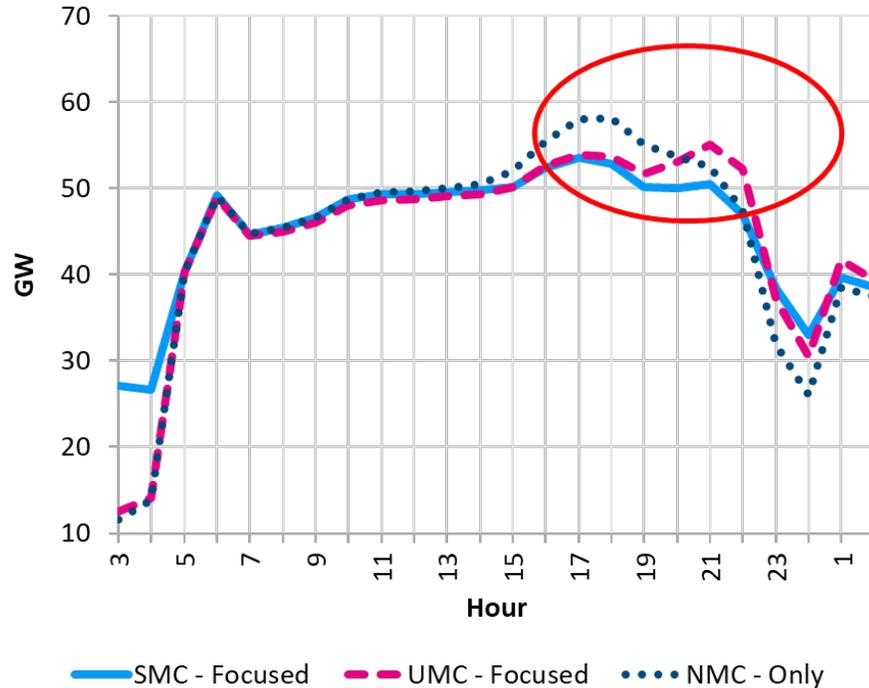
PHEV



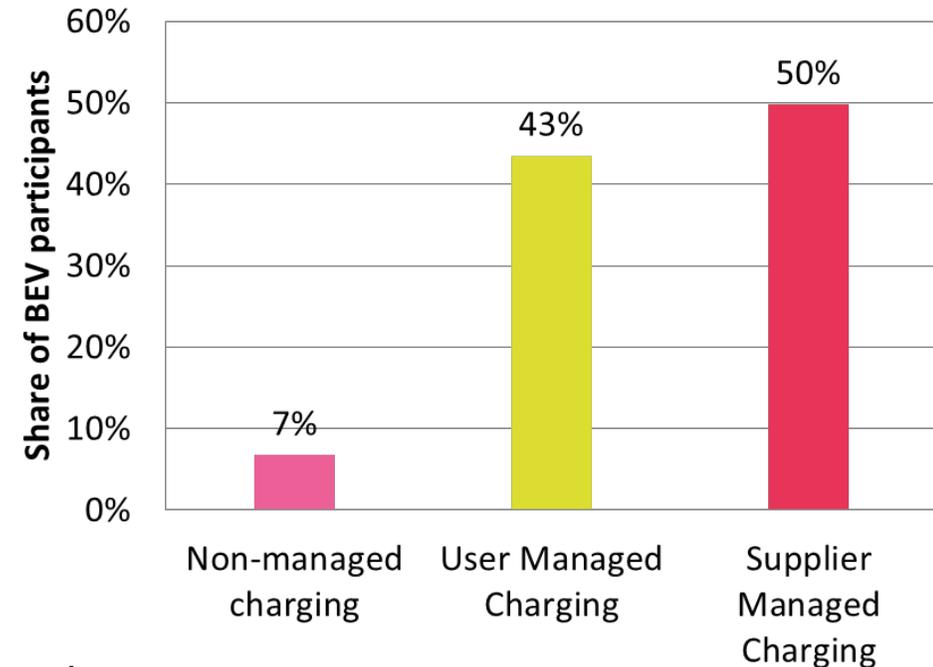
ICE

# TRIAL PARTICIPANTS APPEAR RESPONSIVE TO TARIFFS, SIGNIFICANT ABILITY TO MANAGE LOAD, BUT POTENTIAL UMC 'HERDING' IMPACTS TO CONSIDER

Total demand – winter weekday - 2030



Predicted choice of charging scheme



Note that:

- NMC – No Managed Charging, flat rate tariff, users charge as they wish
- UMC – User Managed Charging, time of use tariff, move from peak hrs
- SMC – Supplier Managed Charging, shifting response to static hourly prices, where control delegated to 3<sup>rd</sup>-party (e.g. flexibility aggregator)
- Communication on the additional benefits of Supplier Managed Charging is needed
- Market arrangements need to evolve to ensure clear routes-to-market and market signals that represent the value of flexibility

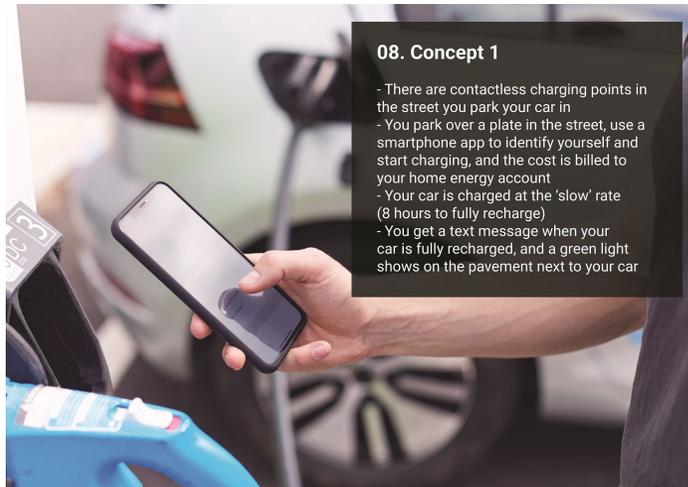
# FOLLOWING CVEI, THE NEW EV ENERGY TASKFORCE ENCOURAGED A STUDY ASSESSING CONSUMER RESPONSE TO 3 CHARGING SOLUTIONS

For the first time, the 'EV Energy Taskforce' brought together the energy and automotive industries to plan for the changes as a result of rising electric vehicle use.



CVEI only included households with off-street parking (who could charge at home), but **~30% of UK households have no access to off-street parking**. It was assumed that public charging infrastructure would enable households without off-street parking to adopt and use EVs...ESC decided to test this assumption...

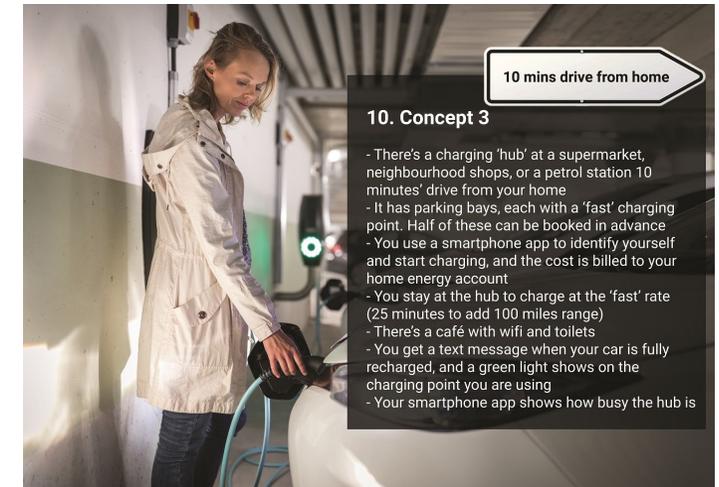
## On-street charging



## 7kW charging hub within walking distance of home and with secure parking



## Fast charging hub 10 mins drive away



# CONSUMERS INDICATING STRONG DESIRE FOR THE NEAR HOME CHARGING OPTIONS AS OPPOSED TO RAPID CHARGING HUBS FURTHER AWAY

## Findings

### Current EV users

- Users without off street parking who have an EV prefer an overnight hub over on-street, and prefer both over rapid charging hubs

### Drivers currently without an EV

- Rapid charging hubs can encourage uptake
- Potential future EV users express a desire for both On Street Residential and Rapid Hubs
- ICEV users who are not likely to buy an EV in the next 5 years show a greater preference for Rapid Hubs

## Recommendations

- Relevant authorities should be identifying routes to deploy each of the near home charging options, to be able to encourage the widest uptake of EVs.
- Ongoing decisions about deploying near home charging solutions should:
  - Factor in the changing preferences\* of car and van drivers;
  - Consider the needs and preferences\*, in particular, of those who reside in and use the locality

\*Drawing on up-to-date and credible information

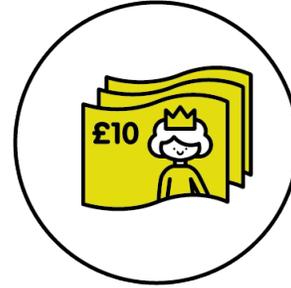
**Fair Future for all**

**A DEEPER UNDERSTANDING OF ALL CONSUMER SEGMENTS, COULD ALLOW US TO BUILD A FAIR FUTURE FOR ALL. OUR MISSION SHOULD ENSURE...**



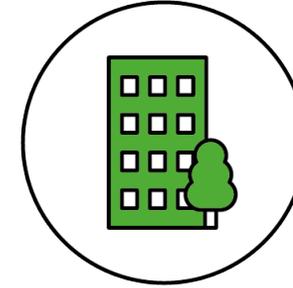
**12m people in UK can take part even if not online**

*(12m people can't use internet for basic tasks)*



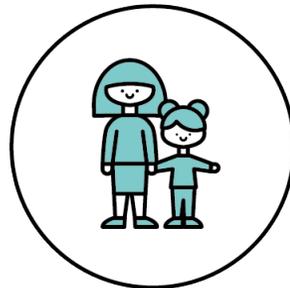
**Adults can take part even if don't have savings**

*(34% of UK adults have less than £1k in savings)*



**Everyone can travel from A to B**

*(30% of UK households have no space for off-street parking)*



**People can enjoy good service without constantly switching**

*(Older and vulnerable consumers switch less than other consumers)*

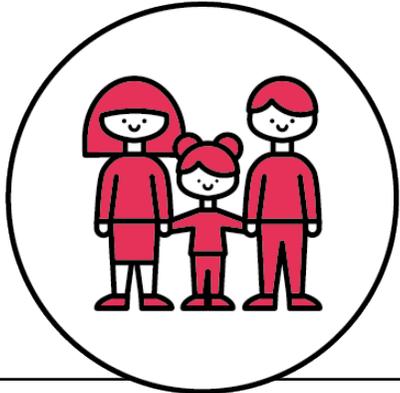


**Everyone can understand their energy bill**

*(75% of dissatisfied energy customers could not understand their bill)*

## CASE STUDY – WARMTH ON PRESCRIPTION

### THE CHALLENGE: PROBLEMS PAYING HEATING BILLS HARMS PEOPLE EVERY WINTER AND COULD IMPACT THE SCALE AND PACE OF NET ZERO IF NOT ADDRESSED



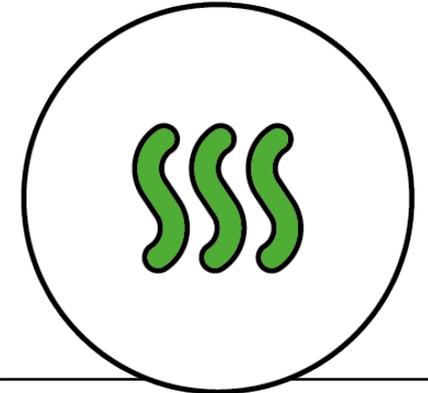
Millions struggle to pay for their heating



This costs the health sector c.£1bn/year



It also causes c.10,000 avoidable deaths



Net Zero needs to work for all to achieve national targets

- Kept 28 people warm and well at home
- Cut health care costs
- Reduced pressure on the NHS
- Energy charity scheduled in some energy upgrades
- Gloucestershire NHS are scaling support this winter
- The summary report can be found [here](#)
- Recent media coverage can be found [here](#) and [here](#)



severn wye

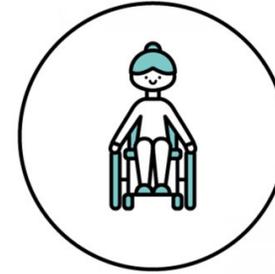


**Play Warmth on Prescription video**

# WE HAVE LOTS OF OTHER WORK UNDERWAY IN OUR FAIR FUTURE PROGRAMME THAT YOU MIGHT BE INTERESTED IN...



Helped EDF design a [Net Zero Town](#) with all local residents



Adding disabled people to our [Living Lab](#) to enable more inclusive innovation



Created and tested smarter [consumer protections](#) for new energy products and services



Pioneered this approach to help [Ofgem and BEIS](#) design a fairer retail market



Department for Business, Energy & Industrial Strategy



Created [a manual](#) that helps innovators protect vulnerable consumers



Defined [a vision](#) for a low carbon future without fuel poverty

**Finally, a quick word about  
start-up innovators**

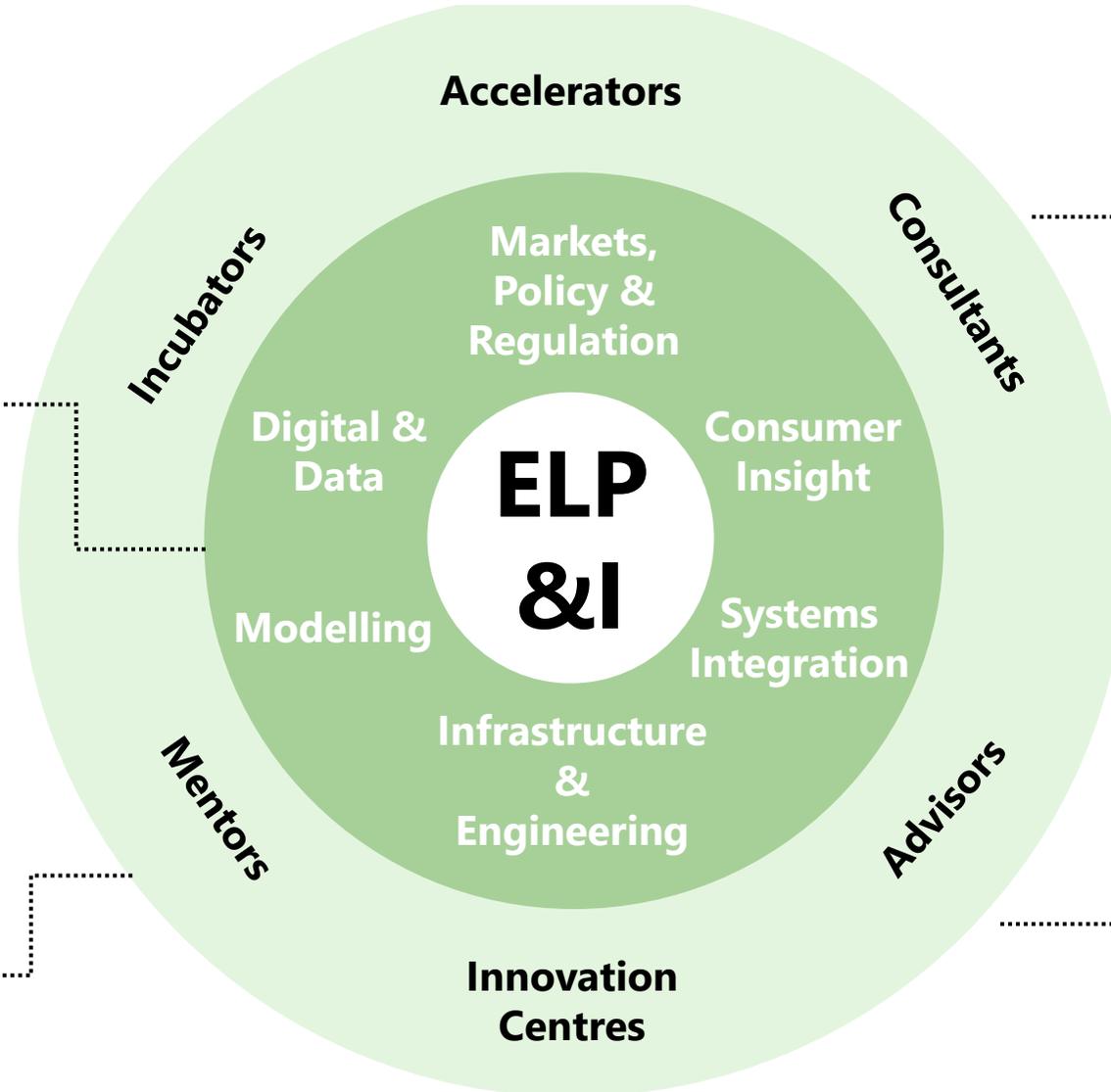
## ENERGY LAUNCHPAD & INTERNATIONAL.

INCUBATION AND ACCELERATION SUPPORT, COUPLES OUR WHOLE SYSTEMS EXPERTISE WITH EXISTING SUPPORT NETWORKS.



We help open routes to market by applying **ESC assets and capabilities** to navigate the energy transformation systemic barriers

Dedicated **Incubation Managers** to help mentor and accelerate the SMEs **Innovation Journey**



tailored business growth assistance through access to our **Delivery Partners**

**Investment Readiness** and Investor Introduction

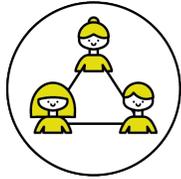
# ENERGY LAUNCHPAD & INTERNATIONAL.

## AN SME'S JOURNEY WITH ESC.



### WHOLE SYSTEMS

SMEs benefitting from countries and stakeholders redesigning their energy systems, market and/or policies fit for the energy transition, leading to accelerated progress with move to Net Zero



### UNIVERSAL

Start-ups can gain insight into the UK energy system, find partners, access events and workshops, funding calls, investors and international opportunities.



### INCUBATOR

SMEs can access our capabilities and tools, and those of our delivery partners, as well as identification for Acceleration support.



### ACCELERATOR

High-impact potential SMEs can access more in-depth support, as well as our labs, engagement with potential clients and investors, and links to international opportunities.



### COMMERCIAL SCALE UP

Continued support to scale, through our SME Community, investor networks and events programme. Support into CR&D bids and commercial opportunities.



### INTERNATIONAL

SMEs can join ELP&I in accessing international markets and opportunities, engaging with international stakeholders and innovations.

***ESC has now supported over 300 SMEs through Energy Launchpad since 2018 with these innovators raising over £105m in public and private funding***

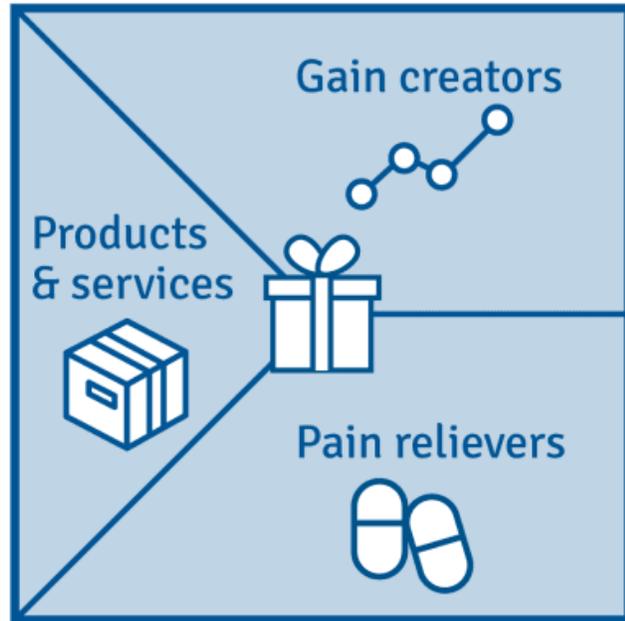
# BUSINESS MODEL INNOVATION IS CRITICAL FOR FUTURE ENERGY SYSTEMS – MAJORITY OF INNOVATORS WE SUPPORT NEED HELP TO VALIDATE CONSUMER INSIGHTS

## Value Proposition

## Customer Profile

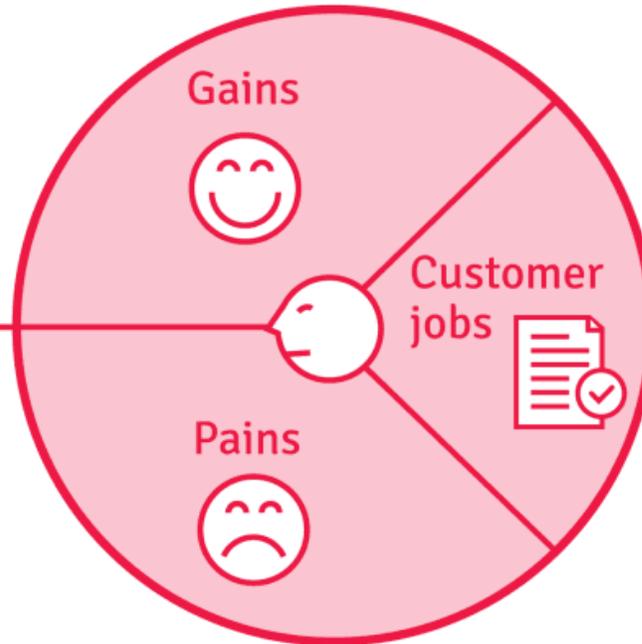
In other words...

**Consumer Benefits**



In other words...

**Consumer Needs**



# INNOVATORS NEED SUPPORT TO UNDERSTAND THEIR CUSTOMERS TO ACCELERATE THEIR COMMERCIALISATION – A COUPLE OF EXAMPLES:

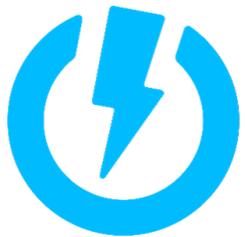
The logo for sero, featuring the word "sero" in a bold, lowercase, orange sans-serif font.

## **SERO: Accelerating energy-optimised homes and zero-carbon communities**

**Business and service model development**, using our market & policy knowledge to help Sero innovate new consumer service agreements and explore value through the Sero Energy platform.

**Testing home buyers' attitudes to smart homes** & 'comfort-as-a-service' value propositions to help housebuilders and others in the supply chain understand value & opportunities.

**Raised £5.5m investment in January 2022, from Legal & General Capital & Hodge**



**equiwatt**

## **EQUIWATT: Community Virtual Power Plant enabling consumers and energy companies to save cost and carbon through flexibility.**

**Consumer Insight**, conducted user needs analysis to aid development of the product messaging, usability testing of the app and recommendations to improve onboarding journey and higher conversions to active customers, and UX design for integration of Heat Pump control.

**Raised £300k seed investment in Oct. 2020, continuing to grow**

*"It's the combination of energy and consumer research. There are not many market research companies who specialise in this sector. So getting this type of support would have been difficult and probably quite expensive.*

*Also the Consumer Insight Team have experience of working with consumers through the Living Lab on actual real homes, which has a massive role to play in the quality of the output they provide"*

## SUMMARY OF THE THOUGHTS I'D LIKE TO LEAVE YOU WITH...

1. Current energy sector transformation is unprecedented – our response needs to **adopt a whole systems approach with the consumer at the heart of the transition.**
2. **Energy as a Service is a viable way to unlock the adoption of low carbon solutions** – our work with Heat as a Service and the EV Energy Taskforce has shown encouraging signs
3. Data is key and **real world, consumer orientated, demonstration environments** such as our Living Lab are critical enablers for a wide range of stakeholders from innovators to policymakers
4. A deeper **understanding of consumers can allow us to ensure a fair future for all**, as well as bringing forward new win-win solutions such as Warmth on Prescription
5. Validating **consumer insight is essential for innovators**, especially start-ups, in order to develop the right value proposition and future business models needed for Net Zero solution commercialisation

# Thank you

...and I'm looking forward to seeing the Ashes  
return home this summer!

## OUR MISSION

TO UNLEASH INNOVATION  
AND OPEN NEW MARKETS  
TO CAPTURE THE CLEAN  
GROWTH OPPORTUNITY.



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