

# **Good practice in Scottish social housing: energy, poverty, people and A.I.**

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**Grampian Housing Association**

# Practice and Innovation

- Why is energy a problem in Scotland?
- Action hierarchy
  - People and the building envelope
  - Heat and power, market intervention
  - Eco-bling
- Getting smart about energy
  - Demand management, storage and A.I.

# Energy Poverty in Scotland?



# 1500's solid wall

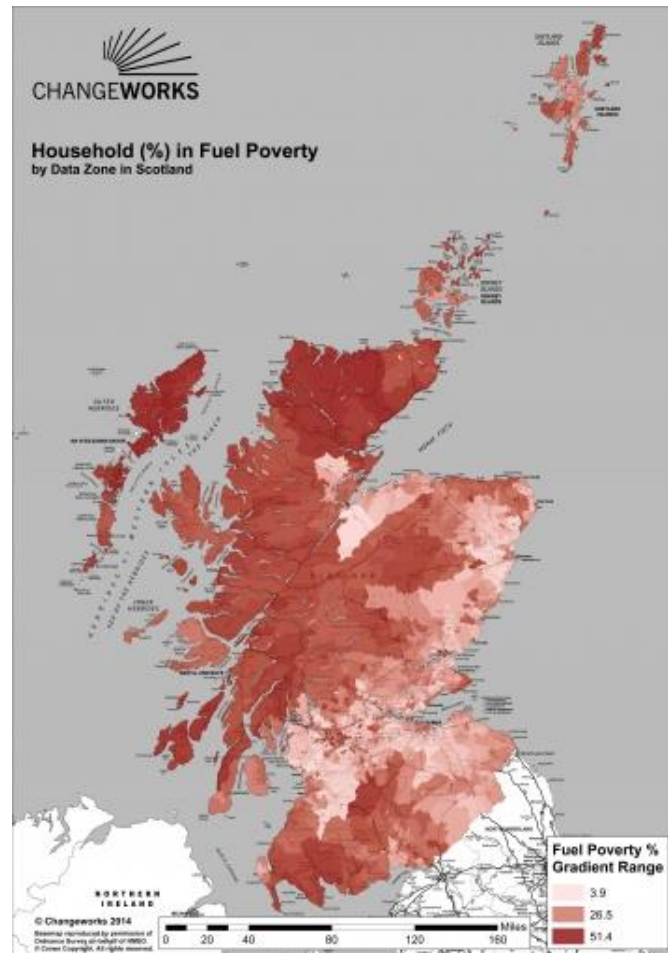


# 1950's concrete solid wall

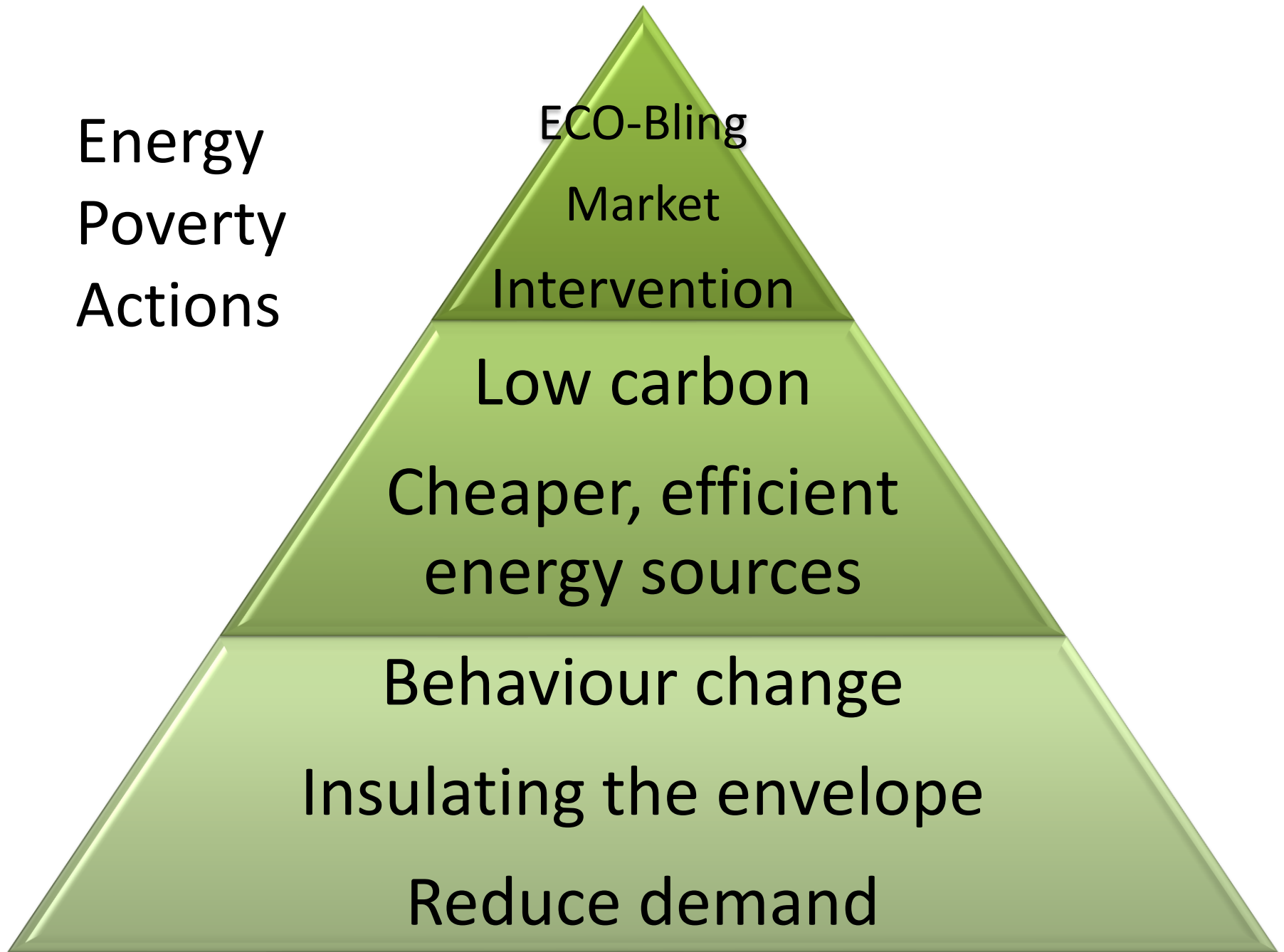




# Energy Poverty in Scotland



Energy  
Poverty  
Actions



# It's about People

- Habits, loyalty and expectations
- Advice – changing behaviours
- A person-centred approach
  - Islander has fuel bills quadrupled by improvements
  - Pensioner in granite tenement beats new build standards using common sense
- Theoretical targets don't always work



# Insulation & Heating

- A landlord's greatest tool
- The challenge of 19<sup>th</sup> century granite tenements, castles and 1950's houses
- Reliance on gas
  - Capital cost, regulatory bureaucracy, maintenance money pit, and a fossil fuel
  - But 4.6p kwh vs 12p kwh for electric heating
  - An impasse?

# Energy Supply Chain Intervention

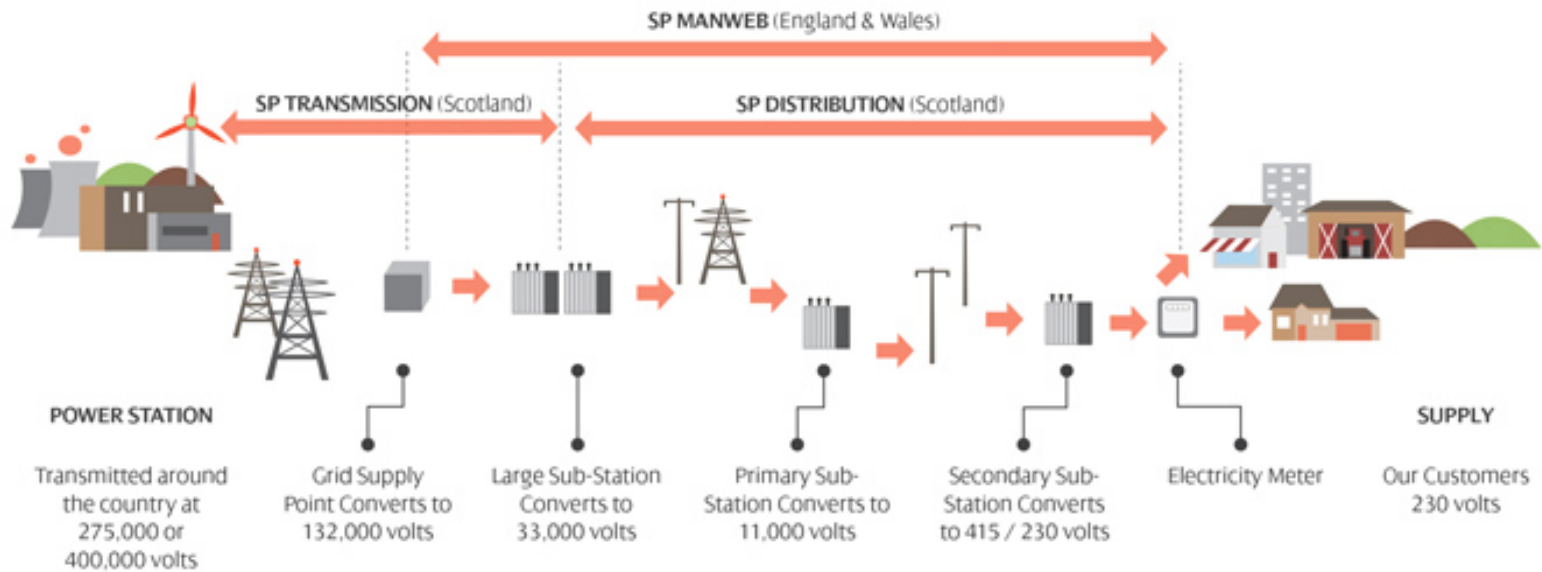


Image courtesy of SP Energy Networks

# Co-operative power





## What were we hoping to achieve?

- Reduce fuel poverty
- Address market inequities: meters & areas
- Deliver excellent service & innovate
- Socialise benefits of renewable generation

# Demand Aggregation (Cunninghame Housing Association)



# Introducing Sunamp Heat Batteries

Sunamp Heat Batteries are probably the world's most energy efficient Thermal Stores.

And they're certainly the most compact, packing in three to four times more Energy Density than hot water tanks.

High power (>30 kW per cell) means high flow rate hot water and heating on demand is assured.

Very reliable and safe. Non toxic, non flammable, >26000 cycles proven, 10 year warranty as standard (longer negotiable).

A Made-in-Scotland product enabling new solutions for energy efficiency, and fuel poverty reduction.



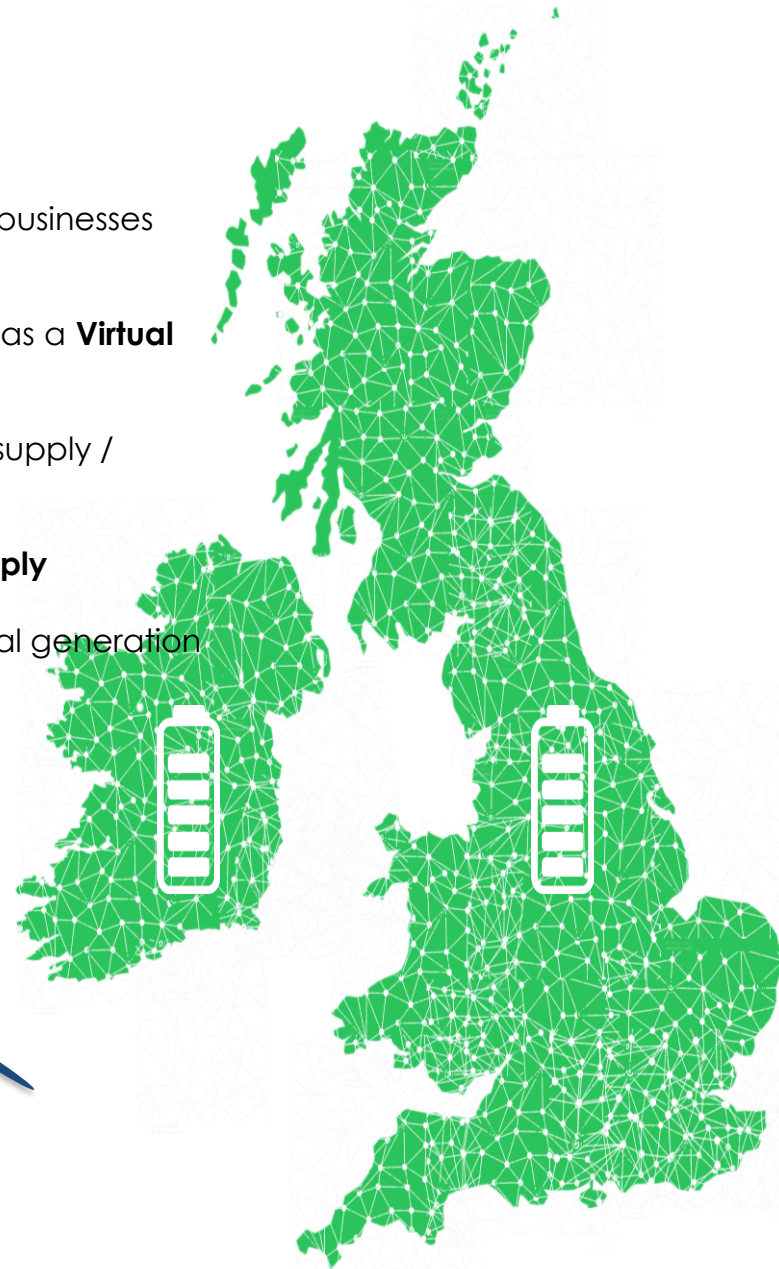
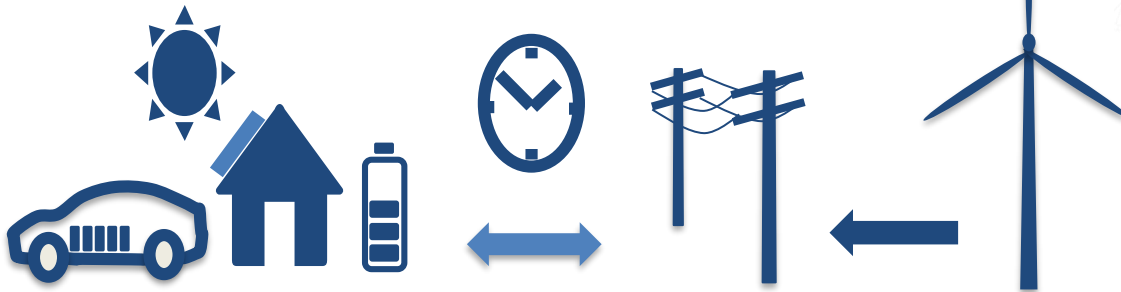
# Is there a 21<sup>st</sup> Century Solution?

- What if we brought together ... ?
  - Our Power market intervention
  - Eco-bling – PV, air sourced heat pumps
  - Domestic scale storage batteries
  - Aggregation of demand, generation & storage
- Then add Artificial Intelligence ... ?
  - Balancing and supply: domestic and regional
  - Energy as a service
  - A human interest in gaming the system



# Solo business model

- Solo offers **free battery** and **V2G charger** installation in homes and businesses across the grid
- **FlexiGrid** aggregation platform centrally controls distributed assets as a **Virtual Power Plant**
- facilitate greater use of local **renewable generation** by balancing supply / demand
- **partner with energy suppliers** to offer low cost **100% renewable supply**
- blockchain-based **P2P energy trading** platform to share excess local generation
- goal – **lower energy bills and transition to 100% renewables**

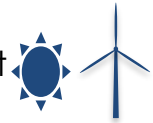


# FlexiGrid aggregation platform



Grid signals

Weather Forecast



FlexiGrid™



Data analytics

Electricity Price



solo  
energy



Cloud

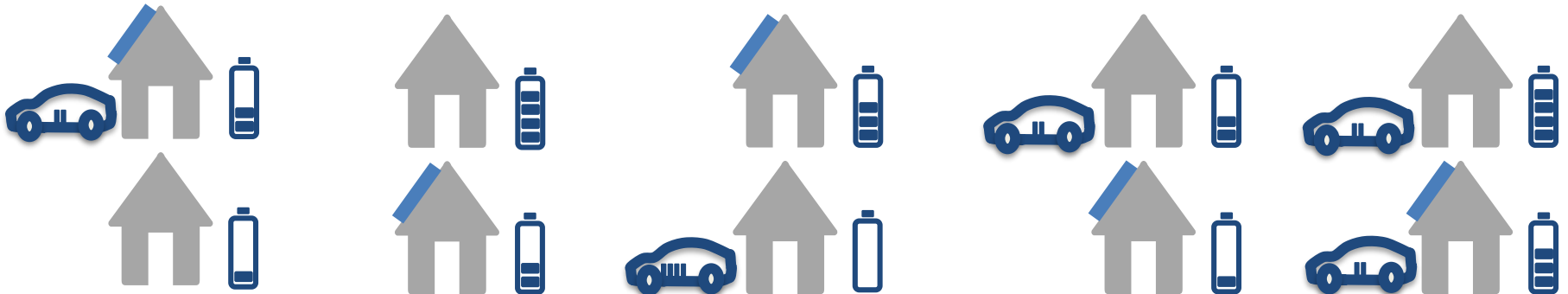


Consumers

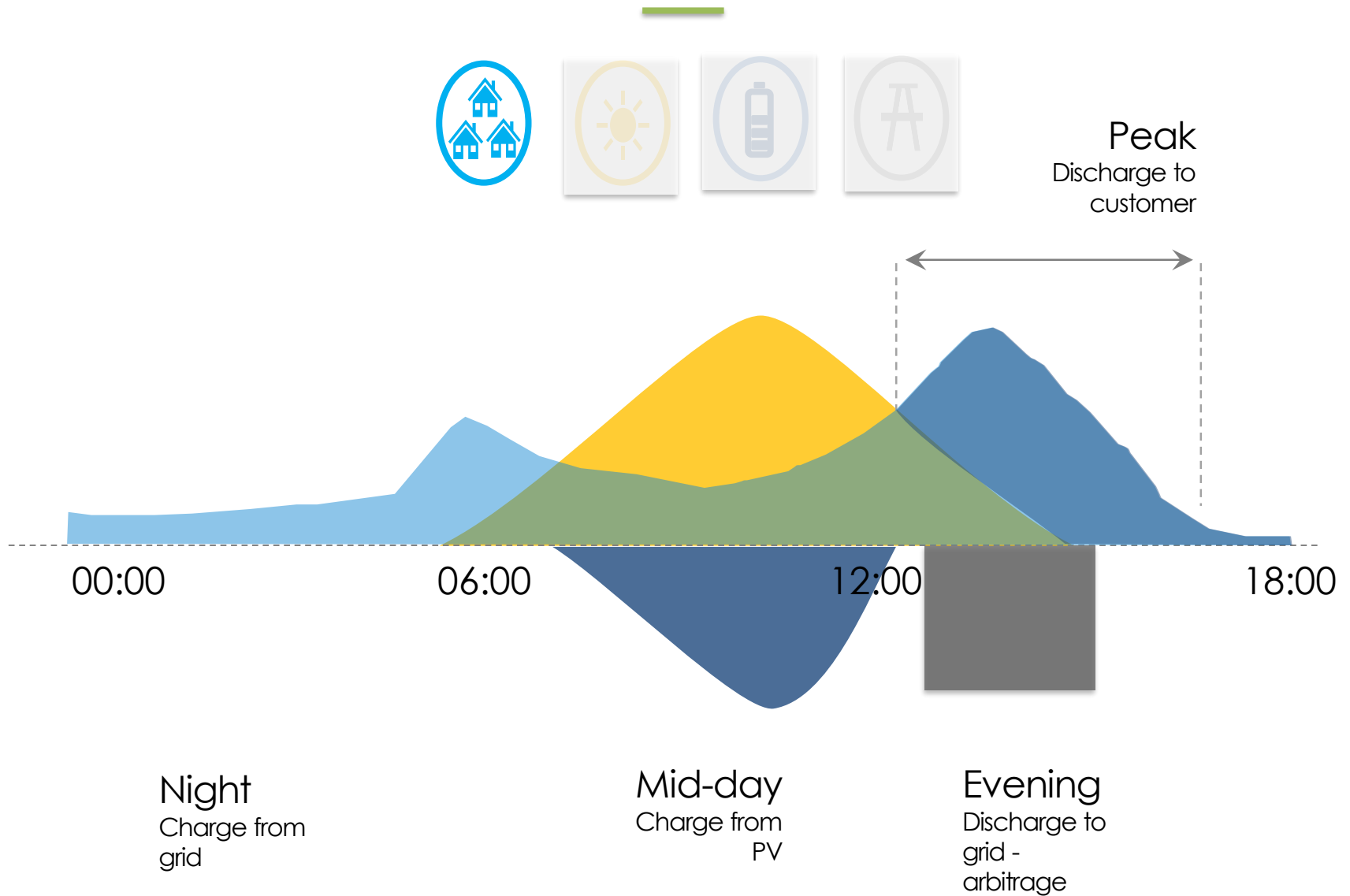
Data



Charge / Discharge Scheduling

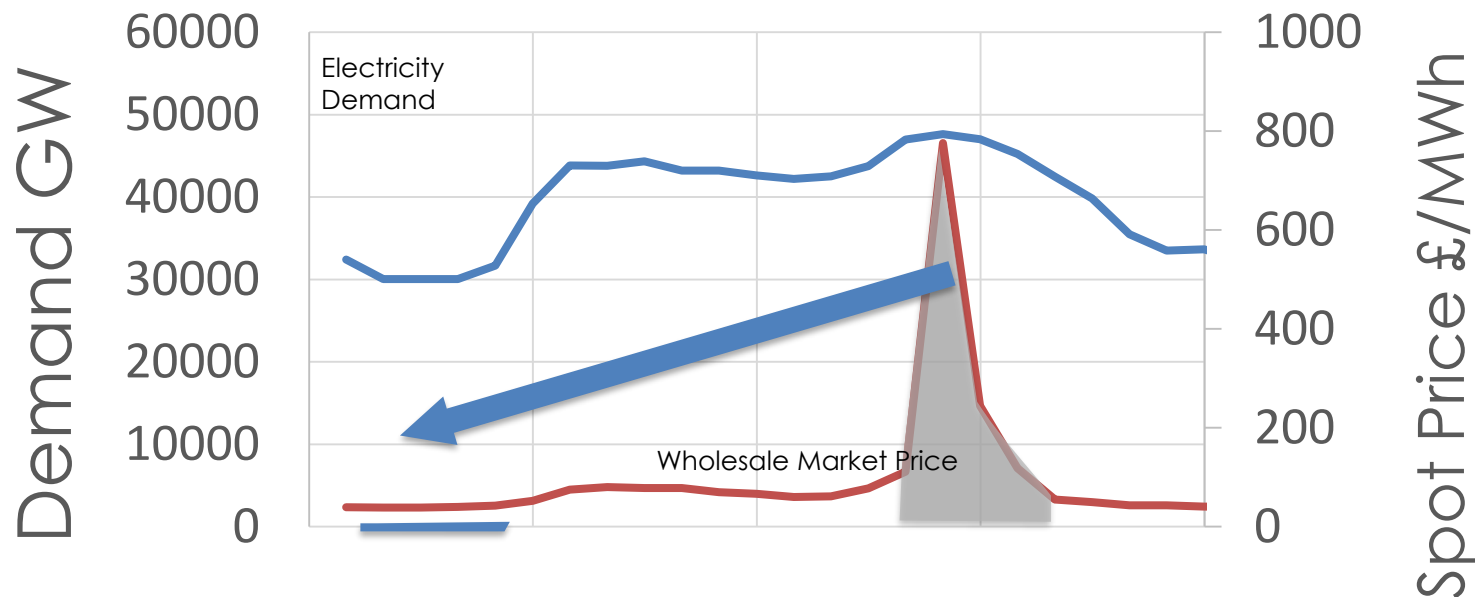


# typical VPP charging profile - **summer**



problem? → opportunity

## UK Demand vs Spot Price (24 hour period)



- Wholesale electricity prices are volatile, often varying by a factor of **10x or more within a day** in spot / prompt markets
- Volatility increasing – **peak demand drives prices up; peak renewable generation drives prices down**
- Solo's disruptive energy supplier business model uses **demand-side energy storage to create a customer-base with entirely flexible demand** allowing us to **shift supply to periods of low price / peak renewable generation**

# And in the future ... ?

- JVs Linking local renewable generation to communities via housing associations
- Affordable housing as a utility bundle
  - heat, power, broadband, phone and rent
- Add EV's and triple domestic capacity
- Democratised energy?
- Solve the renewable energy problem
- Cut my maintenance spend

# In conclusion ...

- It has to be very person centred
- Action hierarchy counts
  - People and the building envelope first
- We need to get smart about energy
  - If quasi-market, HAs can use PV, storage and balancing to create a virtual power station, and game the energy market;
  - If no market, demand that state monopolies help