



CHANGeworks

Delivering positive low carbon living

Understanding the impact of batteries: lessons from real-world projects

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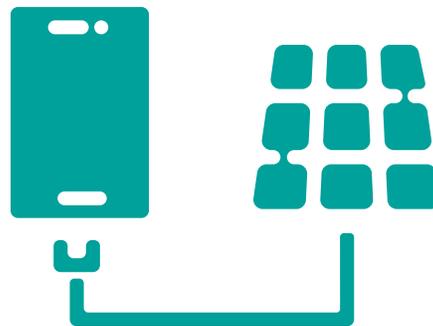
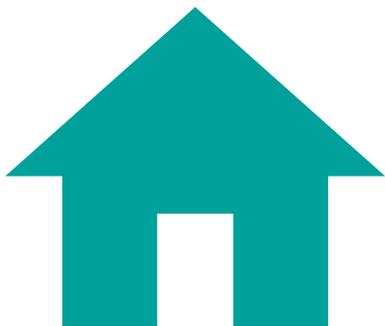
10th May 2023

Battery Impact Monitoring

- **Why** monitor impacts?
 - Benefit to householders, learn lessons for next project, value for money
- **Where** to get data from?
 - Balancing access with quality and reliability of data
- **How** to collect data?
 - Specific equipment, householder permissions or consent
- **What** information is needed?
 - Solar generation, battery usage, householder feedback
- **When** to collect data?
 - How to establish change over time, consider seasons

Our Monitoring Approach

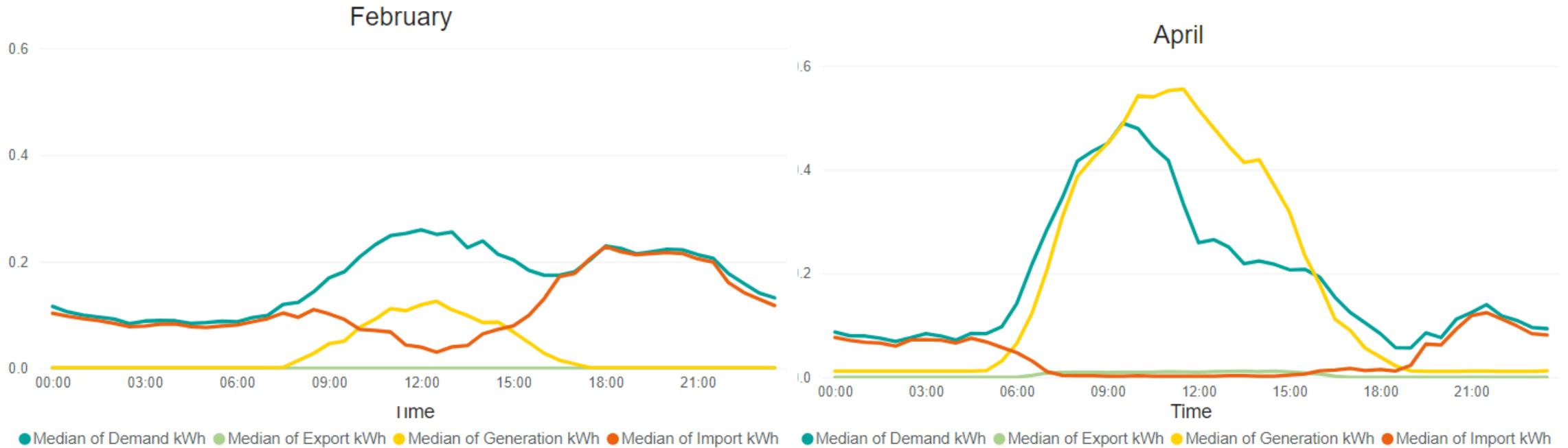
- 290 properties across three central-belt local authorities
- Battery data analysis
 - 18 properties monitored over three month pilot period
 - Data capture: Generation, Import, Export, Battery use
 - Calculations: Demand, Savings, 24-hour patterns
- Pre-install (29%) and post-install (16%) householder surveys with representative response rates



Key Finding 1:

Batteries can play a key supporting role in energy management of renewable energy sources, maximising savings throughout the year

Battery Data



Average 24-hour battery usage patterns for February and April

- Use of self-generated energy:
 - Winter – 10am - 2.45pm (~5 hours)
 - Summer
- Spring – 6am - 6.45pm (~13 hours)

Behaviour Change

- Householders moved their appliance use from evening / night to daytime – maximising use of solar generated energy.
 - Only 17% of householder used their washing machine in the evening, compared to 37% previously.

“Made me more likely to switch things off”

“Teaching us to save energy”

“Made us more aware of the cost of using appliances”

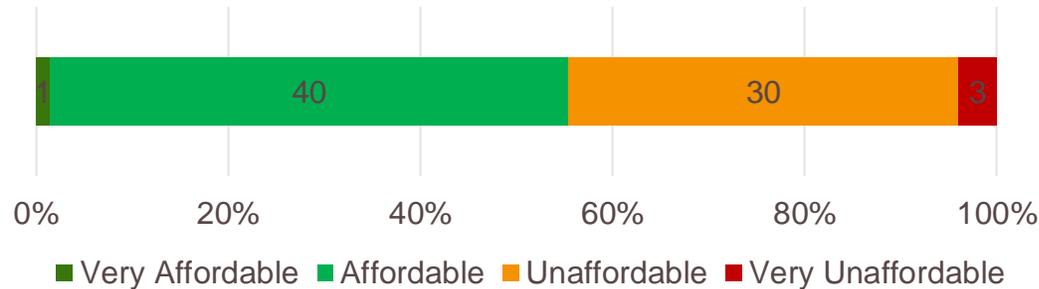
Energy & Carbon Savings

Month	Financial Savings (£)		CO ₂ e savings (kg)	
	Average per battery	Total	Average per battery	Total
February	18	319	16	282
March	37	662	32	584
April	49	889	44	783

- Average savings increase in line with solar generation
- Householders save on energy bills
- Optimisation:
 - Can provide further savings (up to 43% improvement)
 - Includes ToU tariffs benefits, maximising self-consumption

Energy Affordability

Householder Perception of Energy Bill Affordability



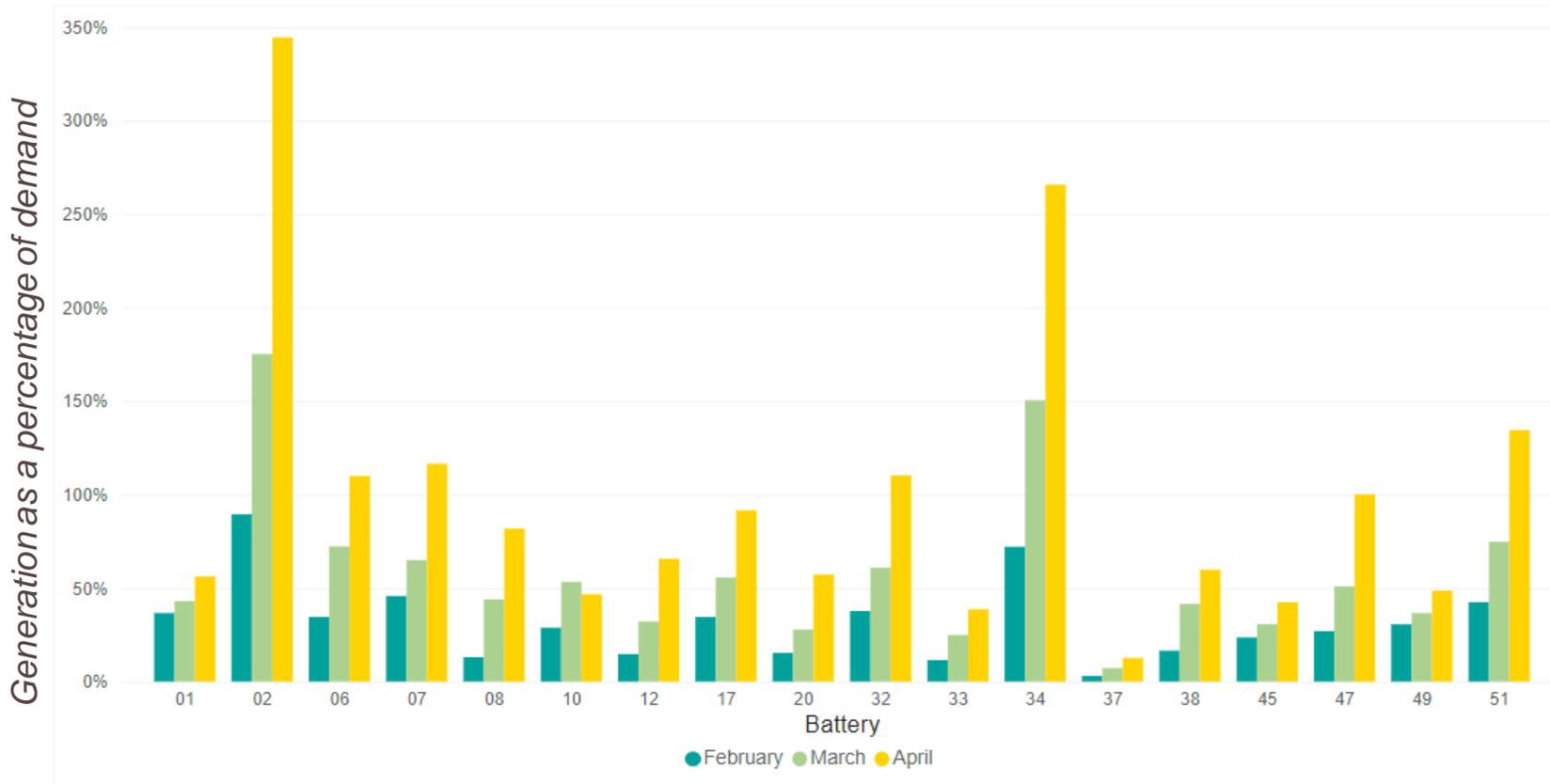
“I do feel the Solar battery especially is the cause of my electricity DD payments being reduced this year.”

- 42% felt that their solar PV / batteries had made their bills **more affordable**
- 26% felt **less anxious** about their bills
- 31% had to take action to manage heating costs **less often**

Key Finding 2:

One size does not fit all. This is advanced technology and should be treated as such

Battery Data



- In April, batteries export to the grid approx. half the time:
 - Generation exceeds demand
 - Batteries are fully charged
- Batteries become more useful as daylight hours increase

Key Finding 3:

We have not yet fully realised the full potential of battery storage in the journey to Net Zero - more data is needed

More Monitoring = More Data

- Longer monitoring period – fuller picture across the year
- Data on energy demand pre-install can help battery sizing
- More robust data can:
 - Support funding applications
 - Improve future householder engagement
- Optimisation benefits



Summary

- Batteries become more useful as daylight increases BUT **there are benefits even in the winter months**
- Average carbon / financial savings increase towards summer months – good for tenants and landlords
- **Optimisation can further increase savings**
- Technologies can **support behaviour change**
- Impact evaluation & monitoring can:
 - Support current projects – e.g. battery sizing
 - Engage households / behaviour change
 - Support future projects / funding applications.

Key findings

1. Batteries can play a key supporting role in energy management through renewable energy sources, maximising savings across the year
2. One size does not fit all. This is advanced technology and should be treated as such
3. We have not yet fully realised the full potential of battery storage in the journey to Net Zero - more data is needed

Any questions?



Changeworks Impact Evaluation

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