Emerging energy practices around storage

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For quality of life

outline

- Main project ‘emerging energy practices in the smart grid’
- Research proposal on small-scale storage
- Some (very) preliminary findings
- Next steps

Main project 'Emerging energy practices in the smart grid (2014-2018)

- Aim:

  To analyse and assess the development of new energy practices as they emerge in smart grids, as to reduce uncertainty about consumer appreciation and uptake of smart grids configurations.

- Main research questions:

  1. How do householders become enrolled in and empowered by sustainable, smart grid-enabled energy practices?
  2. To what degree do householders employ these "emerging energy practices" and (how) do they lead to more flexible and renewable energy consumption patterns?

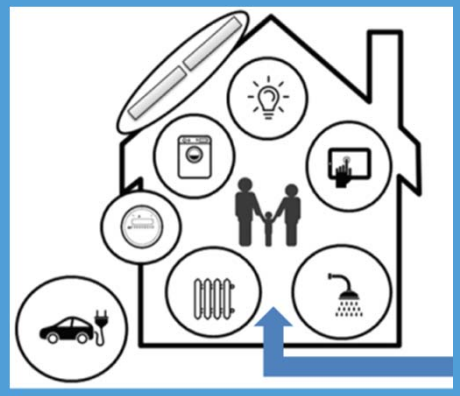
Framework

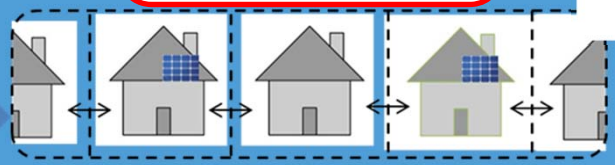
Moral Economy

Innovations

HEMS
Cooperatives
Storage

Energy practices
Generating, managing and consuming



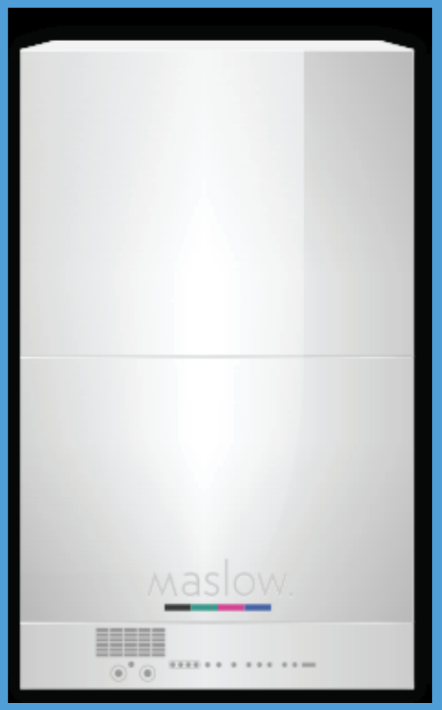


-> findings serve as input to stakeholderplatforms
-> recommendations and strategies for smart grid policies and programmes

Emerging energy practices around storage

- Subproject within the Emerging Energy Practices project
- Analysis of different sociotechnical configurations of small-scale storage in The Netherlands, UK, and Germany

Domestic storage



Research aim and questions

- Understand the different roles of end-users in the design and use of small-scale electricity storage and the (potential) consequences for power relations in smart energy systems

- *How do different modes of storage in different configurations of smart grids (potentially) transform energy practices and power relations in energy systems?*

Modes of storage

- Mode as a mix of technology and social organisation (Walker and Cass 2007)

Storage modes:

- afford (new) energy practices such as charging/discharging, and the exchanging, trading, monitoring and consuming of (stored) energy
- allocate roles and responsibilities
- distribute costs and benefits

Idealtypical modes

- Grid operator storage (Netherlands)
- Community storage (UK?)
- Householder storage (Germany)

- Netherlands: research in pilot projects of DNOs: Jouw Energie Moment phase 2, City-zen (?) (2016-2018)
- Germany: research on Sonnenbatterie and individual households (2016)

Research subquestions

- *How are end-users represented in existing storage projects and/or concepts*
- *What energy practices does the project and/or battery system afford?*
- *How are task and responsibilities distributed?*
- *How are costs and benefits defined and distributed?*
- *Which rationalities are connected to the storage projects and/or concepts?*

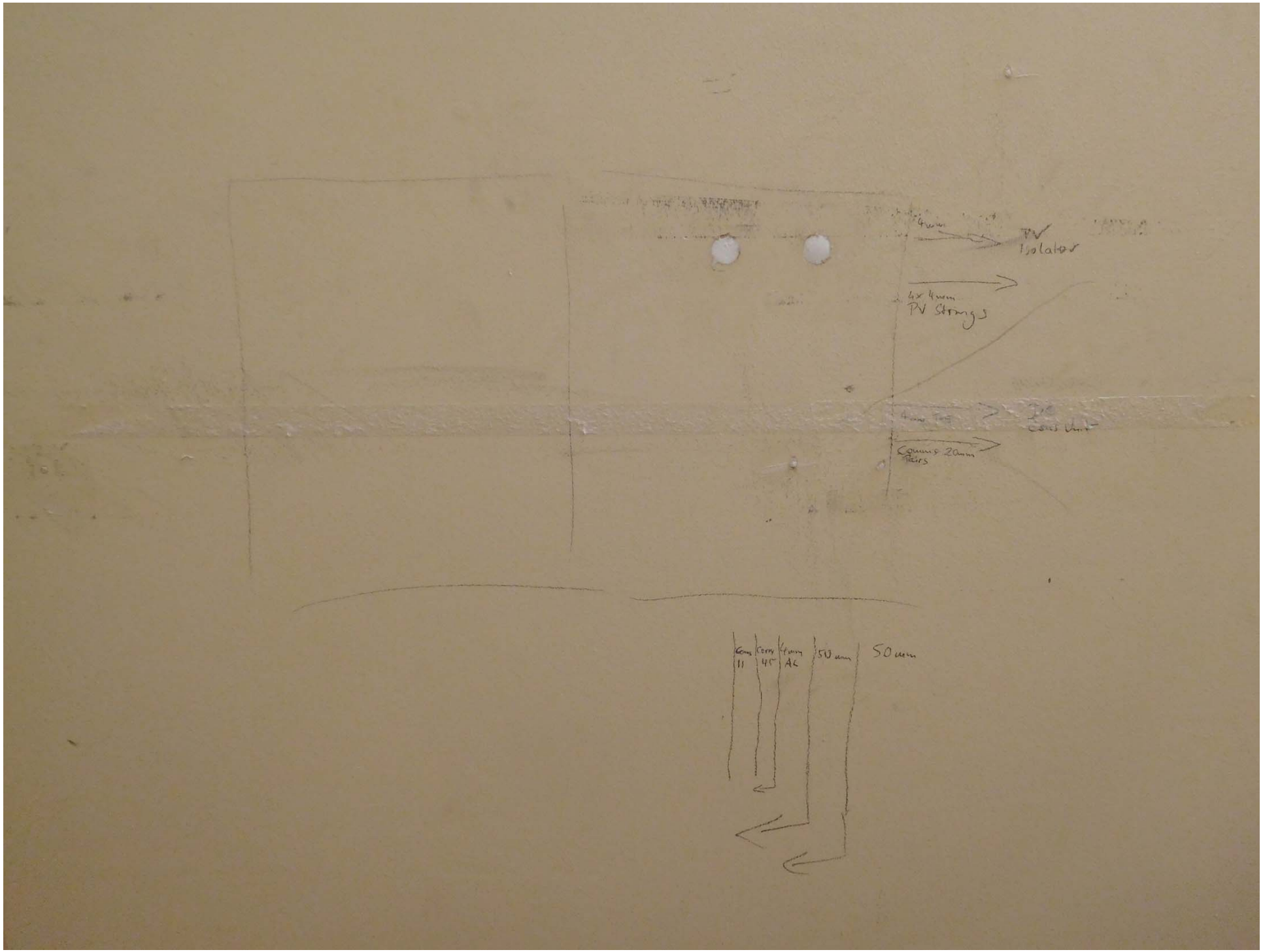
UK Approach

- Interviewing stakeholders: battery system developers, community energy groups, grid operators, etc
- Visiting pilot projects

- Sequenced visit: Sanneke, Nick (27 April-18 May), Robin (16 May-4 June)
- Geographical clusters: Southwest, Scotland, London

First steps in the field…

- 4 interviews in the South-West (Bristol/Oxford)
  - Project leader SoLa Bristol
  - Project leader ERIC
  - Storage consultant
  - Two Eco-home volunteers


4mm
PV
Isolator
4x 4mm
PV Strings
4mm
Comms 20mm
Pairs
Comms
11
Comms
45
4mm
AC
50mm
50mm

SoLa Bristol

This house is part of the SoLa Bristol trial to demonstrate a more efficient way of using and storing solar Photo Voltaic (PV). The Solar PV is connected to the downstairs DC lights and USB sockets in the kitchen, powering them directly from the PV panels and stored energy in the batteries.

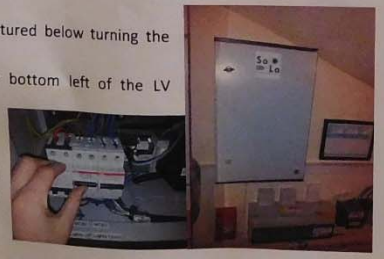
In the event that:

1. **All the lights downstairs are not working**
2. **All the lights in the Kitchen are not working**
3. **All the Offices, Bedroom and Bathroom lights are not working.**

Please check the DC MCB's (circuit breakers) in the SoLa Bristol LV Consumer Unit located on the first floor.

To check the DC MCB's:

- Please open the LV Consumer unit pictured below turning the plastic key clockwise on both sockets.
- Locate the DC MCB's (located in the bottom left of the LV Consumer Unit)
- Check all three DC MCB's; they should be in the **UP** position.
- If any of the MCB's are in the **DOWN** position, reset them by moving them to the **UP position.**



If the MCB trips again, please leave it in the off position and contact Philip Bale on 07525241432 or 01332827442.

In the event that an individual light bulb is not working

Individual light bulbs have a very long life span and should not need replacing. In the event an individual light bulb is no longer working, replace with a SoLa Bristol Light bulb found in the EcoHome Office. If aditional light bulbs are required contact Philip Bale on 07525241432 or 01332827442.

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SoLa Bristol

Accessing the other Equipment

Only competent electricians should access to the DC/DC converter, please consult the single line diagrams and GA's before opening the cabinet (A copy of all SoLa Bristol designs are in the Blue folder by the DC/DC converter and on the notice board in the small downstairs office).

If in doubt – please contact Philip Bale (07525241432 or 01332827442) or Paul Court (BCC)

To disconnect the Batteries and Turning off the Studer Inverter.

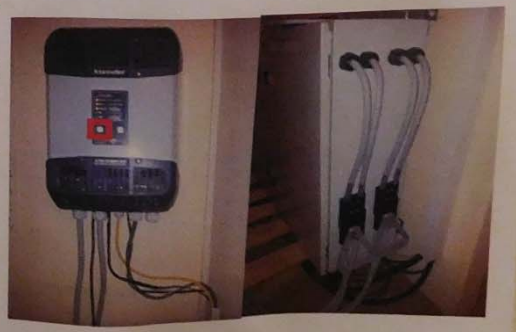
Always turn off the Studer Inverter before disconnecting the batteries

The Studer Inverter is turned off by pushing the button in the red box, all lights will go off except the Red OFF light.

When the Studer Inverter is in the off Position the Battery connectors (Picture on the right) can be removed by pulling down.

DO NOT TURN THE STUDER INVERTER ON WHEN THE BATTERIES ARE NOT CONNECTED.

Failure to do so may damage the SoLa Bristol equipment



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SoLa Bristol (2012-2016)

- Led by Western Power Distribution (DNO)
- 26 households (city council housing, pre-payment meter)
- Aims:

• solve the network problems that arise when a number of customers in a local area connect PV solar panels to their house

• investigate how a battery installed in a property can help customers to manage their energy usage and save money on their bills

• test how customers respond when offered different electricity tariffs throughout the day

• explore the benefits of utilising direct current (DC) in the home (WPD 2016)

Emerging energy practices

- grid services
- self-consumption of PV (and stored energy?)
- charging/discharging: remote control by DNO
- monitoring (co-design of user-interface)

SoLa Bristol user interface

Initial findings

Benefits for householders:

- financial reward for ‘demand reduction’ brought by PV and demand shift brought by battery storage
- ‘keeping the lights on’ (+charging DC appliances) (problem during winter)
- saving on bills

- grid operator experimenting with battery strategies
- hh no insight in dynamic tariffs and battery strategies
- Household(er) as a load (type), solar consumer (and battery watcher)

Project ERIC (2015-2018)

- Led by battery system developer Moixa and Bioregional
- 82 households (mix of council+social housing and homeowners)
- Aims:

-increasing self-consumption of pv within the community

-reducing peaks in electricity export and demand

-giving households control over their use

Emerging energy practices

- self consumption of PV
- self consumption of stored energy during peak times
- grid services
- charging/discharging (based on learning algorithms about household demand)
- monitoring
- ‘sharing’

Initial findings

- Virtual energy community: ‘sharing’, neighbourhood electric vehicle
- Different algorithms: carbon saving, cost-saving, self-consumption, grid services.

- Householders as a virtual energy community, DC consumers with individual profiles

(very) preliminary general findings

- Batteries are hard to find and tend to be removed…
- New roles and responsibilities are emerging
- Householders' control is limited
- Embedded values and choices in the design of systems
- Algorithms

Fieldwork Plans UK
Storage and energy communities

- ~~May 4-5 All Energy exhibition and conference in Glasgow~~
- Connect to relevant projects/organisations, hopefully visit
- Community Energy Scotland

- Learn more about CLNR – visit Newcastle Uni (Bulkeley/Powells)