Empowering households to energy sufficiency through co-designed, app-based community energy challenges

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Supported by:
Technology improvements in the building sector (efficiency) are essential components of the energy transition.

However, human activity has a tangible impact on energy consumption in buildings.
Need for

Sufficiency
Reduce energy demand

Flexibility
Shift energy demand to increase use of renewable-based energy

Behaviour change
Present behaviour → Goal Intention → Target behaviour → Action → Habit formation

Behaviour change as a process through stages

Based on Ohmacht et al, 2017; Artho et al, 2012; TPB-model
Community-based engagement strategies

• They build a sense of community, shared values and goals
• They favour cohesion where otherwise individual action feels insignificant
• They allow the sharing of good practices
• They reinforce positive change in social norms
Social Power

An app-based electricity-saving game between teams of households, exploiting smart meters

Collaborative or competitive game-setting

Average 8% electricity savings in the short-term
Social Power Plus

Four challenges

1. Maintain energy savings in the long term
2. Reduce drop-outs and early abandon
3. Include energy consumption for heating purposes
4. Include flexibility of consumption
The Social Power Plus «Community energy challenge»

- Engage potential users in the co-design of the app’s features (Living lab approach)
- Exploit already existing real-life relations
- Favour sharing of experiences
- Combine virtual, app-mediated activities with in-person activities
- Address energy saving potentials, as well as concrete daily practices, both inside and outside the house
The Social Power Plus «Digital toolbox»

Provide feedback on energy consumption (heating/large electricity appliances):

• load disaggregation algorithms
• electricity and gas smart meters and IoT sensors

Provide reminders to avoid relapse to previous energy consumption behaviour
Three pilot regions across Switzerland

- 100 households involved in each region
- Schaffausen - Elektrizitätswerk des Kantons Schaffhausen AG (EKS)
- Winterthur - Stadtwerk Winterthur
- Wil - Technische Betriebe Wil (TBW)
- Different metering systems and technology equipments
• Test the effectiveness of the «SPP Community energy challenge»
  • creation of commitment and engagement over time
  • energy saving
  • flexibility in energy consumption
• A before-after, quasi experimental design (questionnaires and energy consumption data collected by utilities)

Treatment group
(self-selection)

Control group
(matched to treatment, random selection between utilities’ customers)

• Develop guidelines and make the digital toolbox openly accessible
Co-design in the living labs

Recruitment of interested households in the three regions

<table>
<thead>
<tr>
<th></th>
<th>Schaffhausen</th>
<th>Wil</th>
<th>Winterthur</th>
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</thead>
<tbody>
<tr>
<td>Participants</td>
<td>15/18</td>
<td>9/12</td>
<td>20/24</td>
</tr>
<tr>
<td>Number of families</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Average age</td>
<td>58</td>
<td>45</td>
<td>65</td>
</tr>
<tr>
<td>% Female (number)</td>
<td>16% (3)</td>
<td>15% (2)</td>
<td>26% (6)</td>
</tr>
<tr>
<td>% Owner (vs. renter)</td>
<td>100%</td>
<td>62%</td>
<td>95%</td>
</tr>
<tr>
<td>% PV owners (number)</td>
<td>42% (8)</td>
<td>31% (4)</td>
<td>18% (4)</td>
</tr>
</tbody>
</table>

- Motivation to join:
  - Climate and environmental concerns: more needs to be done and hopefully this project helps
  - Technology orientation: many photovoltaic (PV) and electric vehicle owners, aiming at improving their competences
Which behaviours do we want to improve?

Heating
- Reduce temperature by 1°C
- Reduce heating in certain rooms
- Only short airing of house

Washing
- Use dryer less
- Use washing machine when the sun is shining
- Only run washing machine when full

Kitchen/ appliances
- Use dishwasher when the sun is shining
- Only run dishwasher when full
- Turn off standby appliances
- Use oven less and more efficiently
Co-design in the living labs

- So far, two online meetings in each region (very low drop-out rates)
- Discover the previous Social Power app
- Develop user stories and get specific feedback on design elements
- Provide inputs on how to favour engagement and commitment for change (sufficiency, flexibility and efficiency)
Next steps

• Identification of the features of the Social Power Plus Community energy challenge and of the related game mechanics

• Development of a mock-up and further advice by living lab participants

• Development of the Toolboxes in parallel with recruitment of participating households

• The Community energy challenge will start on early 2022 and last for three months, followed by nine months of reminders and feedback at the individual level

• Assessment of its effects will be assessed after one full year
Thank you for your attention!

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