User-Centred Energy Systems

AN INCLUSIVE AND COMMUNITY-ORIENTED SOCIAL LICENSE TO AUTOMATE

First Insights

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PROJECT OVERVIEW

UsersTCP | Social License to Automate 2.0

Participating Countries:

Austria (coordinator), Australia, Ireland, Netherlands, Norway, Sweden, Switzerland

Runtime:

Nov 2022 – Oct 2024

Participating Institutions:

AIT Austrian Institute of Technology – Tomorrow Today

FH University of Applied Sciences Technikum Wien

Energie Institut an der Johannes Kepler Universität Linz

Chalmers University of Technology

Université de Genève

NTNU

UCC University College Cork, Ireland – Coláiste na hOllscoile Corcaigh

TU Delft

Western Sydney University

Financing of Austrian Contribution:

Federal Ministry
Republic of Austria
Climate Action, Environment, Energy, Mobility, Innovation and Technology

FFG Promoting Innovation.

IEA Forschungskooperation im Rahmen von open4innovation

Motivation & Background

- **DSM programs are typically still designed for generic users**, overlooking the impact user diversity has on their awareness, motivation, benefit perception, actionable knowledge and ability to participate
- Are typically addressing end-users as individuals, **struggling to achieve a sufficient reach** and are **missing opportunities** to harness the power of different types of **stakeholders** such as middlemen to help with achieving a social license
- **Fail to offer different types of involvement** to end-users depending on their ability and willingness to participate and expend effort, partly due to **missing insights and data** that would allow to differentiate between users with regards to their potential to respond to demand side needs

Objectives

1. **Understand the role of gender and diversity factors** in energy consumption flexibility and identify associated engagement approaches
2. **Identify the contribution potential of energy communities** (EC) and other community energy approaches towards establishing/ granting a *Social License* to automate
3. **Identify flexibility consumption profile markers via load profiles** and define **criteria for data quality and standardization** of flexibility profiles through a consolidated assessment

Image source: Freepik.com

Initial Results

Gender & Diversity
Literature analysis

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- Literature search identifiying articles published on demand side flexibility with diversity dimensions specifically addressed in the research
- 255 papers, 58 were included in the final review
- Diversity focus: gender, age, income
- Research questions:
  - Considered diversity dimensions (DD)
  - Role of DD in willingness/motivation to participate
  - Role of DD in ability to participate
  - Consequences of DSM in relation to DD

Image source: Freepik.com

Contributing countries: NO, SE, AT, IE, AU, CH

Gender & Diversity
Initial Results

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- Gender
  - DSM technology and communication is typically designed with male, technology-affine users in mind, not reaching women sufficiently
  - Gender roles challenge DSM implementation with the home as a feminine domain, technology as masculine domain
- Income
  - Energy saving practices are already part of the everyday life of the energy-poor but homes they live in are often energy-inefficient
  - Risk of excluding low-income households from the cheapest available energy when it is made dependent on being able to afford the necessary technology
- Age
  - Participation of the elderly is challenged by lacking digital literacy and apprehension towards new technology
  - Flexibility of younger consumers is limited by social constraints (lack of choices)

Gender & Diversity
Initial Conclusions

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- Gender, income and age impact motivations and ability to participate
- Scarcity of studies addressing the impact of diversity dimensions on DSM participation in an in-depth way
- DMS programs need to apply a user-perspective, considering implementation and effects within the everyday experiences of users
- Lower income group participation needs to be included as part of the program design; necessary technology needs to be provided as part of program participation, middle actors are crucial
- Participation of the elderly needs to be accompanied by digital literacy support, allowing the dynamic development of a relationship with the technology

Energy Communities
EC Initiatives Analysis

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- Energy Community (EC) initiatives were reviewed on a European and national level regarding their legislative background to understand key features, differences/similarities
- Core questions
  - How are social aspects (SA) addressed
  - Potential to gain a social license (SL)
  - Potential to gain a social license to automate (SLA)
- ECs were categorized according to type and identified potentials

Image source: Freepik.com

Contributing countries: CH, AT, NL

Energy Communities
Initial Results

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- Renewable/citizen energy communities
  - High potential for all SA, SL & SLA to EU directive demands (energy poverty, citizen engagement), incentivisation, wide reach, automation opportunities common
- Energy community projects
  - High for SA due to high sense of responsibility & community, medium for SL due to remoteness & limited reach but local awareness and acceptance
- Energy cooperatives
  - SA potential low due membership mechanism through purchase, high number of participants and geographical distribution; SL potential high through joint investments and wide reach; SLA potential low as direct incentive is missing
- Micro-scale energy communities
  - Very high potential to address SA due to small number of participants and high levels of trust & responsibility but medium for SL & SLA (need for proximity, geographical constraints, limited rooftop areas)

Energy Communities
Initial Conclusions

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- Strengths and weaknesses vary between the different types of identified EC initiatives
- In order for successful scaling of EC initiatives and a contribution towards the building of a social license (to automate), social impacts need to be considered
- A clear understanding of how different EC features such as initiating actors, financing models and included technologies impact the potential of an EC to address social aspects and further the granting of a social license (to automate) can play a key role in the success of an EC initiative

Flexibiliy Profiles
Use Case Analysis

- UC1: ECHOES
  - Looks at factors impacting energy-related behaviour
  - Survey with approx. 18,000 households, 31 countries
  - Questions: Attitude towards and willingness to allow DLC,
  - Diversity Dimensions: Gender, age, social status
- UC2: PEAKapp
  - Evaluation of HEM app
  - Field study, ca. 1,500 households over 17 month, 152 single hh
  - Questions: Load profile differences over weekdays / seasons
  - Diversity Dimensions: Gender
- UC3: Flash Eurobarometer 514 Survey
  - Examines European response to energy challenges
  - Survey with 19,872 usable responses, 27 countries
  - Questions: Actions taken to respond to challenges
  - Diversity Dimensions: Gender, age, household size, children…

Contributing countries: AT, NL, CH, IE

Image source: Freepik.com

Flexibility Profiles
Initial Results

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- ECHOES
  - Women and younger consumers are more likely to see the benefits of DLC
  - Higher education and higher social status makes acceptance of DLC more likely
- PEAKapp
  - Males have higher baseline consumption
  - Women have higher consumption peaks, especially in winter
  - Males are more likely to respond to price discounts with behaviour changes
- Flash Eurobarometer 514 Survey
  - Older people and females are more likely to turn off lights, unplug devices, reduce temperature
  - Males are more likely to invest (equipment/devices, RE technology, retrofitting)

Flexibility Profiles
Initial Results

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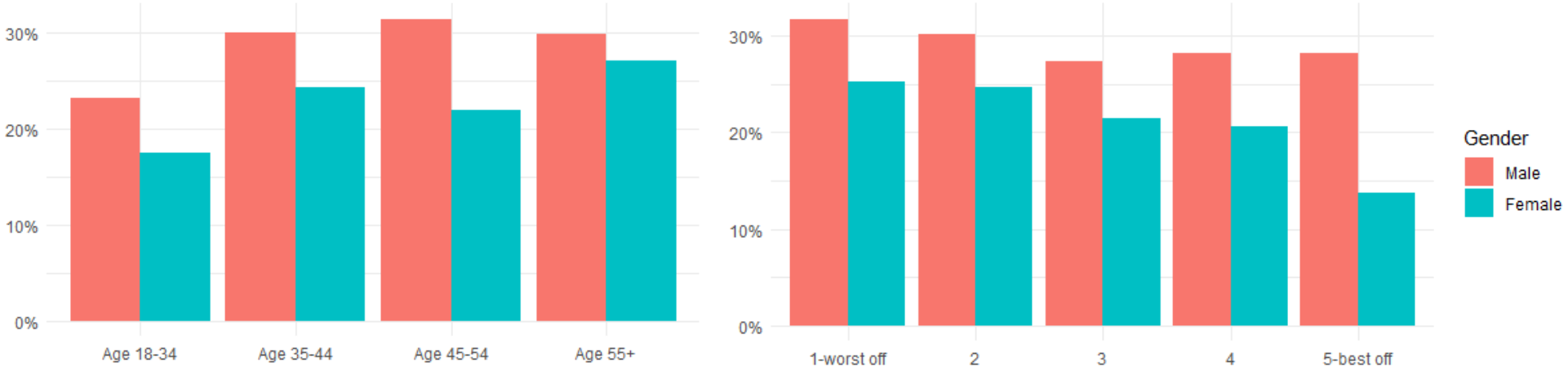
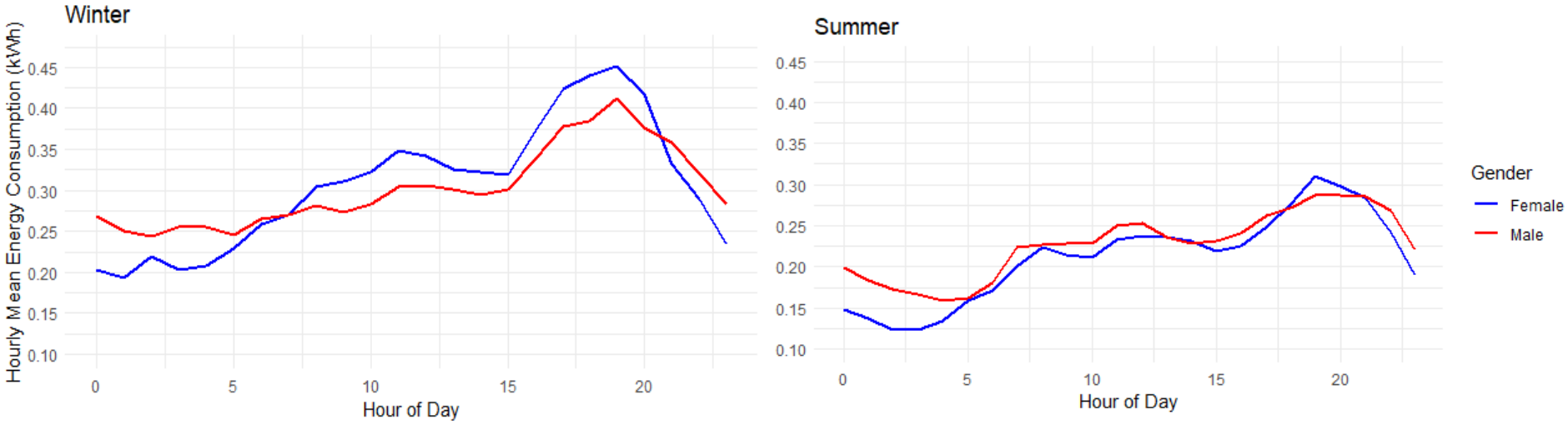
ECHOES: Unwillingness to accept DLC

Gender, Age, Social Status



PEAKapp: average seasonal load profiles

Gender



Energy Communities
Initial Conclusions

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- Women with more openness to automated DSM, more behaviour-based saving strategies and more pronounced peaks as promising consumer group for behaviour-impacting low- to medium automation strategies for DSM → non-financial incentives to be explored
- Men with higher baseline consumption and higher likelihood to invest in equipment as targets high-automation, low impact solutions and emphasis of financial incentives

Towards a more inclusive and community-oriented social license
Initial Recommendations

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- Contextualize impact of (automated) DSM within the household to make it more accessible and tangible for non-technology affine users
- Consider how social factors such as price flexibility and different ways to participate when setting up an energy community; for this it is crucial to allow and encourage such flexibility already through the policy and regulatory framework
- Develop solutions that allow for participation through different strategies and enable integration and access on household level

Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

FFG
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TOMORROW TODAY

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THANK YOU!

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Center for Technology Experience

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