

APPENDIX A. Expert interviews

Interview procedure, questions & reasons for inclusion.

Table A1. *Overview of the six interview participants.*

Code	Function	Reason for inclusion
PP1	Consultant	Direct contact with prosumers, the organization advises municipalities on policy.
PP2	Senior researcher at independent research organization	Area of expertise is PV and self-consumption, plus the organization advises municipalities on policy.
PP3	Senior researcher at Dutch university	Area of expertise is energy systems, plus the interviewee fulfills an advisory role on behalf of the IPCC.
PP4	Consultant	Direct contact with prosumers, the organization advises municipalities on policy.
PP5	Prosumer	To include at least one explicit prosumer perspective.
PP6	Senior researchers (2) at independent research organization	Area of expertise is PV (integration), plus the organization advises the Dutch government on policy.

Summary of the interview procedure and the analysis of the qualitative results.

Procedure.

Potential participants were reached out to via email or phone. Once participants were informed on the research goal and expressed their interest in participating, the interview's time and date was set via email. A week before the interview all participants were provided with an informed consent form via email, to be signed by the participant as well as the researcher. The stated goal of the interviews was the mapping of barriers which make self-consumption (and loadshifting in particular) difficult for Dutch prosumer households. All interviews took 45 minutes to one hour and were conducted online via video call using MS Teams. This was preferred over in-person interviews, as data collection took place for three weeks in February 2022 when COVID regulations were still uncertain in the Netherlands. Furthermore, interviews could easily be recorded within MS Teams and automatically uploaded to the first author's personal TU Delft OneDrive account for backup, making sure the recordings are inaccessible to others. Following full transcription, the transcripts were emailed to participants for final approval.

Qualitative analysis and tools: Thematic content analysis in ATLAS.ti.

The six anonymized transcripts were transferred to ATLAS.ti version 22, a tool used to store, centralize, manage and organize all information for the qualitative section of the current study. The data was analyzed through a combination of content analysis and thematic analysis. In the current study, the *themes* are the factors of the newly constructed framework as well as demographics and the dependent variable (loadshifting). *Code groups* refer to the elements of meaning, material, internal and external competences of the framework. The *codes* within these code groups refer to the eight factors under study (see also Table A2). Since the framework and accompanying codebook were initially created *before* the interviews took place, the qualitative analysis was mainly conducted through a deductive approach. Meaning, the predefined factors of the model (the codes) are applied to the transcribed data to test this framework in practice

Table A2. Findings from the interviews, per framework element and the eight predefined factors.

Barrier	Frequency of being mentioned	Description	Quotes	Overlap with factors from literature
<i>FRAMEWORK ELEMENT (CODE GROUP): MEANING</i>				
<i>Predefined factor (code): Sufficiency attitude</i>				
Low sufficiency attitude	1/6 (PP3)	People seem to appreciate energy which comes from (close to) home, parallel to people appreciating e.g., food that is produced in their own region.	PP3: “See how important people find it to eat locally... people think that’s nice... that is something which speaks to their imagination.”	Sufficiency attitudes & beliefs (Wittenberg & Matthies, 2016; Wittenberg & Matthies, 2018)
<i>Predefined factor (code): User beliefs</i>				
Passive user beliefs	1/6 (PP3)	Prosumers may become more active, which if combined with improved monitoring skills or know-how, could benefit loadshifting. However, most prosumers may continue to have a systematic rather than individual view on the energy system.	PP3: “You often hear that people with solar panels also become more involved with their usage. Because they get a feeling for quantities, what appliances use, or they use a smart meter for that.” PP3: “I think people do not really think beyond the system.”	Technology affinity (Wittenberg & Matthies, 2018)
<i>FRAMEWORK ELEMENT (CODE GROUP): MATERIALS</i>				
<i>Predefined factor (code): Feedback provision by the system</i>				

Lack of feedback provided in real time	1/6 (PP2)	Providing real time feedback on energy production and consumption could help improve loadshifting, especially for those with lower monitoring skills and those who find it difficult to interpret their bills or meters.	PP2: “...you shouldn’t just be providing general information, but help people self-consume in real time... show the way in a more playful manner... an app that gives people a sign when it’s beneficial to self-consume.”	System of provision (Gill et al., 2015)
<i>FRAMEWORK ELEMENT (CODE GROUP): EXTERNAL COMPETENCES</i>				
<i>Predefined factor (code): Practical knowledge provided</i>				
Little to no practical knowledge provided to prosumers	4/6 (PP1, PP2, PP4, PP5)	Consultants feel they have an important role in distributing information regarding self-consumption, and do this through webinars, municipal meetings, or at prosumer homes. However, not every prosumer is provided with this knowledge.	PP1: “Information spreading would begin at organizations like X. Occupants value our opinion, because we are independent.” PP5: “We had a consultant back then, who made beautiful calculations, but he didn’t say you should do this or this... But I think that would be a good tip... it’s not just about awareness, it’s also about selling the message, people need to see the benefits of it.”	Sources of advice/information (Gill et al., 2015)
<i>FRAMEWORK ELEMENT (CODE GROUP): INTERNAL COMPETENCES</i>				
<i>Predefined factor (code): Habits</i>				
Strong laundry habits	4/6 (PP2, PP3, PP4, PP5)	Prosumers may not consciously think about the issue of self-consumption, or are not aware of the issue, or are forgetful about the issue.	PP4: “...many people who say they will do it (loadshift), they work during the day and forget to press the button.” PP5: “We’re not consciously thinking, let’s not switch the laundry on tonight... You just do things the way you always did.”	Everyday practices / habits (Gill et al., 2015; Maréchal & Holzemer, 2018)

<i>Predefined factor (code): Hassle</i>				
Loadshifting the laundry feels is perceived to be a lot of hassle	5/6 (PP1, PP2, PP4, PP5, PP6)	Prosumers may want to loadshift but they do not want to think about it too much, preferring to live their lives as usual. Automatic loadshifting is often discussed to relieve prosumers of this burden.	PP1: <i>“People prefer to be lazy... they’re just waiting to see what happens.”</i> PP2: <i>“People want convenience, they don’t want to worry about it and just want it to work. It’s easiest if the system does this automatically so you can relieve people... for a large group of people it may be complex or abstract or boring...”</i> PP5: <i>“We try to live as consciously as possible, but I don’t want to measure or regulate myself to death.”</i>	de Vries et al., 2020; Ebrahimigharehbaghi et al., 2021
<i>Predefined factor (code): Know-how</i>				
Little know-how	2/6 (PP3, PP4)	Prosumers may lack a degree of know-how which could improve loadshifting, e.g., how the energy system works and how appliances relate to each other in terms of energy consumption.	PP3: <i>“I think people have no clue... Electricity comes out of the socket, but they don’t know what’s behind it all... People also don’t have insights into what makes a difference, they don’t have feeling for how much an appliance uses or how a car or fridge relate to each other.”</i>	Knowledge on PV functioning and why self-consumption matters (Gill et al., 2015; Niamir et al., 2020)
<i>Predefined factor (code): Monitoring skills</i>				
Low monitoring skills	4/6 (PP3, PP4, PP5, PP6)	Prosumers may not be skilled enough to monitor their levels of production and consumption. Exceptions exist, e.g., prosumers interested in tech who keep track of their patterns using an app.	PP4: <i>“People never know their KWh usage; they just think it’s average but don’t know quantities.”</i> PP6: <i>“...you really need to look closely, when are you producing and using? That becomes complicated.”</i> PP6: <i>“I do look at my production patterns on my mobile, and not just because I’m a nerd, also the non-technocrats enjoy doing that I think.”</i>	Awareness of (self-)consumption through monitoring (Ebrahimigharehbaghi et al., 2021; Gill et al., 2015; Wittenberg & Matthies, 2018)

Interview questions translated to English (distributed to participants in Dutch).

Start interview – 5 minutes

- Welcome
- Smalltalk
- Repeat informed consent
- Repeat goal
- Discuss “Agenda” (time, content, order)
- Introduce myself
- Introduce participant:
 1. For which organization (X) do you work, and what does your job entail?

Core questions – 30 minutes

2. In which way do you / X concern yourself with self-consumption of solar energy?
3. How important is self-consumption, in your opinion?
4. How important is self-consumption to prosumers, as far as you know?
 - a. Do you notice a difference in the type of prosumer who does or does not value self-consumption?
5. To what extent does the topic of self-consumption come up in your research / contact with prosumers and in your advice to prosumers?
6. In your research / contact with prosumers, what kind of factors come up which hinder self-consumption?
7. How do you think policy, such as the proposed changes to the net-metering scheme, influence these (aforementioned) hindrances?
8. What kind of factors which can hinder or promote self-consumption are, in your opinion, overlooked by policymakers?
9. How do you as an advisor / researcher try to influence these (aforementioned) hindrances?

Close interview – 5 minutes

- Summarize key takeaways
- 10. Is there anything you still want to share with me, which I forgot to ask about?
- 11. Do you know other people or organizations who could be relevant for me to speak to?
- 12. Are there any relevant documents or reports you can recommend to me?
- Thank you