The learning history of Smart Grid Lochem: A smart grid project initiated by an energy cooperative

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1. INTRODUCTION

The energy cooperative LochemEnergie participated in a project called 'Smart Grid Lochem' from June 2012 until June 2015. This project fell under the IPIN (Innovation Programme Intelligent Networks) policy programme, subsidized by Agentschap NL. Since this innovation policy programme, users have received special attention in smart grid development by various stakeholders. In this report, we present the smart grid development from a users' perspective, by examining what the participants learned in the project 'Smart Grid Lochem' on the basis of their experiences.

This first chapter describes why LochemEnergie is chosen as case study, the major events occurring during the project and the methodology of this case study. In the next chapter, chapter 2, the user experiences during key events are discussed. The last chapter, chapter 3, consists of a short discussion of the findings and the conclusion.

1.1 Why LochemEnergie

At the moment of writing there are 31 smart grid pilot projects in the Netherlands (Brouwers & van Mierlo, 2018). One of these projects is the IPIN-project Smart Grid Lochem. In this project, LochemEnergie, the energy cooperative, is a partner of the consortium. The energy system of the project consisted of solar panels (both domestic and collective) and an intelligent home system. The latter consists of a box and an app with graphs on energy use. The box connects to the smart meter and sends out data to the app, enabling real-time energy monitoring.
In addition to LochemEnergie, the DSO Alliander, Twente University and two software companies were involved. These partners were responsible for the technical aspects of the IPIN-project. The DSO focused on research on the grid and Twente University developed demand shifting models. A daughter company of the DSO designed and supplied the intelligent home system and the app. Users were represented via LochemEnergie and participated in workshops on energy saving and experimental projects of the technical partners, such as using electrical cars and a testing of the grid's capacity. They were approached to participate via e-mail, local information meetings, letters and living room meetings. (For more information about the involved stakeholders and their roles see the report of Brouwers, van Mierlo & Gültekin, 2018).
The project Smart Grid Lochem has been visited by researchers such as Naus (Wageningen University) and Beltman (Twente University) (Naus, 2017; Beltman, Vosslamber, Molderink, & Noordzij, 2016). LochemEnergie is also discussed by scholars for its presumed success (Hoppe, Graf, Warbroek, Lammers, & Lepping, 2015; Hufen & Koppenjan, 2015). Despite the focus on users and the focus on its success factors, it has not yet been examined how users experienced key events in the IPIN-project and what this means for future smart grid development.
As such, this report will provide an answer to the following question: *what do the experiences of the cooperative members mean for future smart grid development?*

1.2 Timeline

Figure 1 provides an overview of the key events in Smart Grid Lochem, defined by the participants of the project. The first of these events, is the bankruptcy of the small green energy supplier Trianel, which happened in December 2012. Specifics of this event and corresponding experiences of the project managers and participants are described in section 2.1. In section 2.2 it is described what project managers and participants experienced with regards to the smart meters and the energy intelligent home system. In 2.3 the experiences around the workshops on energy saving are described. Section 2.4 covers the experiences on the collective solar panel parks and 2.5 the so-called pressuretest. The structure of these events can be seen in the timeline depicted in figure 1, below. Each section gives further details on the event.

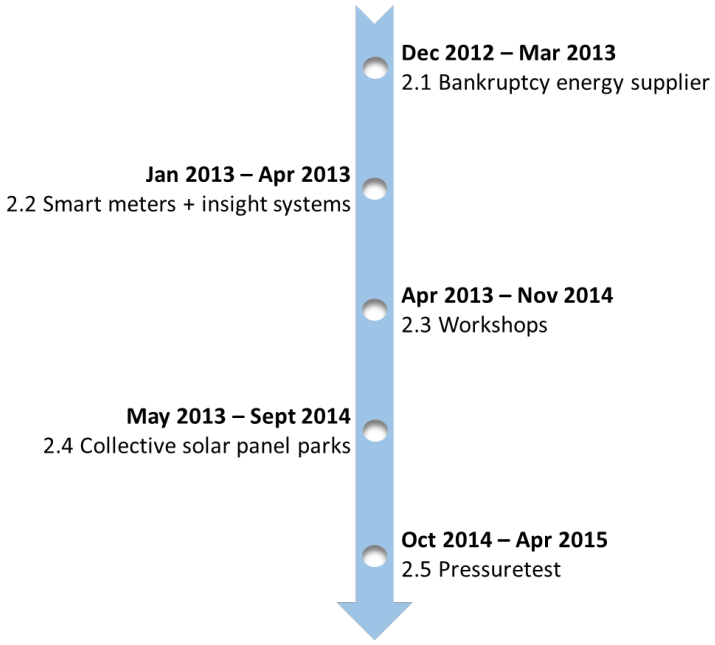

Figure 1: Timeline important events Smart Grid Lochem (numbers refer to sections in this report).

In section 2.6, three events are described that the project managers of LochemEnergie considered very important, but were given no or not much attention by the members of the cooperative. The differences in their experiences are also described.

1.3 Methodology

In order to understand what the project has meant for participants, the method of a Learning History is used (van Mierlo et al., 2010). A learning history consists of a timeline that lists events in a chronological way and of a workshop in which the experiences and feelings of participants are uncovered.
The timeline is constructed with the help of interviews, conducted with two project managers of LochemEnergie and two participants of the project Smart Grid Lochem. Moreover, project documentation from the website and project-specific newsletters are used to gather specific dates and other information.
On the 29th of November 2018, a workshop was held in Lochem with 17 participants (12 male, 5 female). The group consisted of 14 active members of LochemEnergie, 2 project managers (who are also members and ex-participants of the project) and 1 employee from Alliander, who was involved in the project on the social and behaviour side of the project. It is thus important to note that this evaluation of the experiences of users is a representation of active users. The workshop started with presenting the timeline and participants were able to add details and events if these were missed. Participants were asked to make notes during the presentation of the timeline. Thereafter, they were given 15 minutes to evaluate for themselves which moments were key in the project and asked to write these on yellow post-its for positive experiences and pink post-its for negative experiences. The events that got 3 or more post-its are described in chapter 2, section 2.1 until 2.5. There were some events that got post-its, but not as many. These are therefore described in section 2.6 'Other events'. Participants discussed how they felt and what they experienced under guidance of a facilitator, who in turn used the post-its to guide the discussion.
The interviews with project managers and participants are furthermore used to better understand the experience and responses that arose during the project Smart Grid Lochem.

1.4 Expectations of members

The participants that attended the workshop, all members of the cooperative, had a range of expectations of the workshop. One stated that he found it important to be active within LochemEnergie, as it would otherwise slowly bleed out. Sustainability was an important value for him and a project such as Smart Grid Lochem also helps to explain difficult technical concept. Others wanted to see several people, wanted to keep up to date about issues regarding energy saving (as he was an energy coach) or were interested in a more general way. Lastly, one person stated that he wanted to know if he could unplug the databox that stopped working several months after the project ended.

2 EXPERIENCES DURING SMART GRID LOCHEM

In this chapter it is described what participants experienced during Smart Grid Lochem. Section 2.1 until 2.5 each cover an event that was deemed critical by both project managers and participants. Section 2.6 covers three events, that were deemed important by the project managers but not indicated as critical by participants during the workshop. For each section the same structure is used: first the event is described in further detail, after which the experiences of users are elaborated upon.

2.1 Bankruptcy energy supplier

Figure 2: timeline of the bankruptcy of the first energy supplier.

At the end of December 2012 participants were informed via e-mail that the energy supplier had requested bankruptcy. In January 2013 the request was affirmed. See Figure 2. After the bankruptcy, participants were automatically and randomly transferred by Dutch authorities to other Dutch energy suppliers. Participants received an offer from a new supplier and could choose to either accept this offer or switch to an energy supplier of their own choosing (LochemEnergie, 2013a).
According to the project managers, they held participants up to date with e-mails and newsletters. Still they received a lot of phone calls from participants during which they often answered questions and provided further explanation.
In March 2013, participants were informed via e-mail and the newsletter that Eneco would become the new energy partner of LochemEnergie. Participants could switch to Eneco and get 50 – 75 Euros cooperative discount (LochemEnergie, 2013b).

Experiences

The notes of participants are summarised in figure 3. As can be seen in this figure, the bankruptcy of Trianel is regarded as a negative experience.
When the first of the participants referred to this event, he stated: *"Well, that bankruptcy was of course most tiresome."* Most people immediately responded in agreement. A couple of participants referred to the loss of money due to the bankruptcy. One said to have lost approximately 60 Euros and another participant said to have lost over a 100 Euros.
One other participant covered extensively the troubles of switching energy suppliers each time:

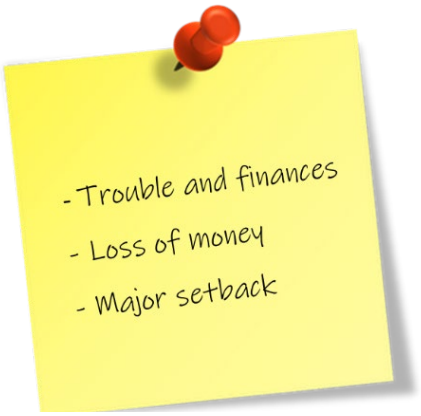

Figure 3: participants' feelings during the bankruptcy.

> *"So I just left Nuon and then you get two energy suppliers: one for gas for which I got Nuon again and one for electricity and that was Eneco. And then LochemEnergie joined hands with Eneco so I myself had to make sure I got rid of Nuon. So yes, a lot of troubles and indeed it costed quite some money."*

This trouble was recognised by others as well, but it is interesting to note that this did not impede the motivation of at least one participant, as she said: *"Where LochemEnergie goes, I go."*

2.2 Smart meters and insight systems

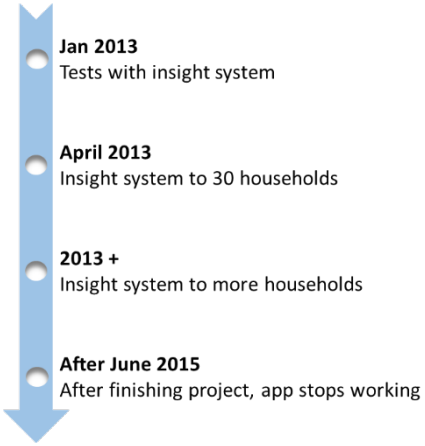

Figure 4: timeline of the smart meters and intelligent home systems.

Smart meters were installed when people enrolled in the project Smart Grid Lochem. See Figure 4. These were delivered and installed by Alliander. Along with smart meters participants got the 'Intelligent Home System' from a daughter company of Alliander, MPare. The system consisted of a box that was connected to the smart meter, which then transferred the smart meter data to an app which could be used on a phone. The app showed real-time energy usage and displayed several graphs on energy use, for instance from the last 5 minutes. The smart meter data could also be accessed via the website smartmeterportal.nl. However, this data was from the previous day and not real-time.

Figure 5: the box that connects to the smart meter.

The delivery and installation of both the smart meters and the intelligent home system caused several problems. See Figure 5. Firstly, according to LochemEnergie delivery of the smart meters was delayed. The home system was not fully developed yet and did not work during the first tries. In January 2013, the system was tested at 4 houses and in April 2013 the system was given to 30 more houses. As some people did not have a smart meter yet, those with smart meters were prioritised (LochemEnergie 2013a; LochemEnergie 2013b). Over the course of the project the smart meters and insight systems were further distributed.
A few months after the project Smart Grid Lochem, Alliander discontinued their daughter company MPare. As a result, the databox and the app of MPare stopped working. See Figure 6.

Figure 6: the app of MPare.

Experiences
According to the project managers, the acceptance of smart meters was a hurdle for people that wanted to enrol in the project. For the participant group of this workshop it appears that it was not a major hurdle, as they did not utter any objections about a smart meter.
Regarding the smart meter and Intelligent Home System, the project managers mostly referred to the disappointment and frustration that these technologies were delayed, in some cases even months. According to them this was demotivating for participants. See Figure 7. In addition to the disappointment regarding the delays, one of the project managers was appalled by the unwillingness of MPare to design a new app for the project Smart Grid Lochem.

"I found this the worst thing of the project, when MPare and Alliander told us that it was not the intention to develop new apps together. Huh? This was a pilot project right? There was an app, App One, but we had all these ideas what else we wanted to know and how we could play games with teach other. We had so many ideas about that. And then all of the sudden we heard that that was not the purpose and that LochemEnergie could hire an external party if they wanted to."

Participants stated that they noticed that such discussions were held about the app. Still, the experiences they shared focus mostly on the importance of the app for gaining insight in their energy use and the frustration that it does not work anymore.

The first participant that spoke on the smart meters stated:

"I found it very important to gain insight and to know where my used energy goes. So I found it very positive that those boxes came and you could follow your energy use in real time (…) to save in that way."

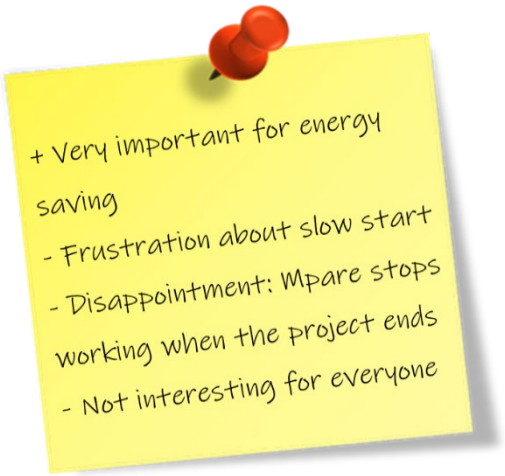

Figure 7: participants' feelings about implementation smart meters and home system.

Several other participants shared their experiences and elaborated why they were happy with the app. One refers to an interaction with his son:

"I travel a lot. I was in the United States and I was able to see exactly how much electricity my son was using. He was in bed and I already knew that, but still the amount of electricity we used was enormous. So then I just called him and said like 'you can turn all those things of because that is not necessary at all'."

All participants who were happy with using the app, also emphasised their disappointment that the app stopped working after the project ending.

A couple of participants did not work with the app, for which they gave a range of reasons. One of the participants stated that there was a single log-in account, which was used by her husband. Another participant preferred to make use of Excel, to keep track of energy usage. For one participant in the workshop, the box and app never worked properly, despite various efforts from the project managers and internet providers. He stated on this:

"It does make me very sad if I hear all these positive notions, because it never worked for me. (…) That was a disappointment, because I very much wanted to be involved."

Some participants currently monitor their energy use in other ways than the app, and some not at all.

Participants admitted that after a while they stopped using the app, because "you know what is going on". Someone else said it would be quite neurotic to still keep checking such an app all the time. Yet, one of these participants also shared a story that his heat pump turned on in this year's hot summer, due to the high temperature in his house. He used this story as an argument monitoring of energy use should be done regularly and you should not let it slip. The perception of why energy monitoring should be monitored thus diverges from a continuous effort or a tool to gain insight in energy use.

2.3 Workshops energy saving

Figure 8: timeline of the workshops on energy saving.

In April 2013, LochemEnergie organised the first working groups on energy saving. See Figure 8. Participants in the working group worked together to find out in what ways energy could be saved. They focused for instance on energy saving measures such as LED-lighting and reducing standby power.
In the working groups sometimes workshops were held, facilitated by for instance a resident who was in previous working groups or a social researcher. Over the course of 2013 3 working groups were held and in November 2014 2 more working groups were held (LochemEnergie 2014a; LochemEnergie 2014b). In the closing phase of the project a closing meeting was held to discuss the difference in focus per working group, share experiences and present the results of the extent to which energy usage was reduced.

Experiences

The experiences of members and the project managers did not differ much. See Figure 9. One of the project managers facilitated the workshops and was therefore present at every series. For each series he set himself a new challenge. He stated that he is very grateful for the various series of workshops, as he took so many steps to improve his own homes energy efficiency. He believed that he would not have done so many steps so quickly without the workshops.
The same project manager also stated that the workshop series starting in November 2014 were much more valuable than the first series, because at this moment they could finally make use of the app that worked well. Members did not recognise this difference explicitly, most likely because they did not attend so many series of workshops as the project manager.

Figure 9: Participants' feelings about the workshops.

The experiences of participants almost all consider how they were able to save energy. One participant explained how her children, who saw her energy use increased when they came over, started to use less high-energy consuming electrical devices at her home.
Four participants did not go to workshops, for which they all gave different reasons. One lacked the tools (the energy insight system) to work effectively in the workshop. Another workshop participant did not see added value: *"Saving is something I can do on my own. Just common sense tells you what to do*." Another participant explained that this was more of interest to her husband. Various other participants recognised these dynamics in their own household as well, as their wives did not interact as much with the project or the app as themselves. One of them explained that his wife became enthusiastic after a while: *"After the first year we had saved a 1000 Kwh. At first my wife was like: "You with that nonsense", but then, we went out for a nice dinner, because we deserved it!"* Expanding on relationships within households, participants also spoke about children. Many participants found it difficult to engage their teenage children in energy saving.

2.4 Collective solar panel parks

After enrolment in the project participants who did not have solar panels yet were supposed to choose between domestic solar panels or participating in the collective park. Participants who chose the option of domestic solar panels were brought into contact with solar panel installers. As such, an appointment would be made and the participant would get their solar panels installed.

Figure 11: frame of first solar panel park.

The participants who chose for the option of participation in the solar panel park could rent or purchase 5 or 10 solar panels in the park. In May 2013 the first of the 200 panels of the first park were built on the roof of the city hall. In June 2013 the solar panel park was completed and it started to deliver electricity to the grid and indirectly, to the project participants. The official opening of the park was on September 15, 2013 (LochemEnergie, 2013c).

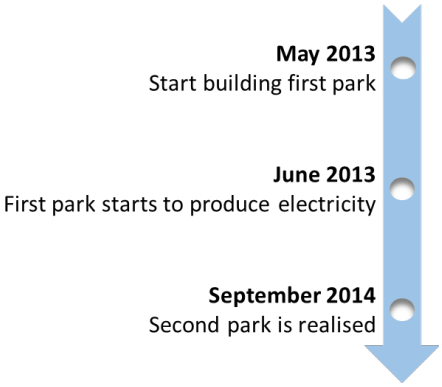

Figure 10: timeline of the collective solar panel parks.

Project participants who were unable to secure a place in the first park, ended up at a waiting list. This became the basis for the second solar panel park. This one was realised one year later than the first, in September 2014, and had 130 panels (LochemEnergie, 2014c).

Experiences

Neither the project managers nor the participants spoke much about the domestic solar panels. One of the participants did not know that having solar panels was compulsory. The domestic solar panels were thus not considered among the most important events of the project Smart Grid Lochem.

As can be seen in figure 12, the solar panel parks evoked positive associations among the participants. The project manager saw the solar panel parks as an advantage, especially in relation to the heavy investments required for domestic solar panels, as at that time there were no subsidies that could lower costs. The project manager stated that at the end of the project, there were even some people who wanted to join the project so that they were able to participate in the solar panel parks.

Figure 12: participants' feelings regarding the solar parks.

A major benefit, as is depicted in figure 12, was the opportunity to invest in solar panels for people whose own roof is unfit for solar panels. One of the participants stated in the interview:

> *"I really want to produce solar energy by myself, but I don't have the space for it on my own roof. I thought: 'That is a niche opportunity to create some awareness because you produce energy sustainably, locally and with each other.' So that it is really a collective effort. (…) Together with the cooperative."*

Lastly, one of the participants explicitly stated that he found it awesome to be a precursor of the postal code regulation for energy cooperatives. This is a Dutch regulation that enables tax regulations for energy cooperatives in order to facilitate collective production of energy.

2.5 The pressuretest

Technical partners of LochemEnergie wanted to conduct research on the effects on the grid when energy usage was high. On October 9 in 2014 the project consortium conducted a test they called the 'black-out' test. This consisted of electrical vehicle charging and the use of as much electricity as possible in one street in Lochem.

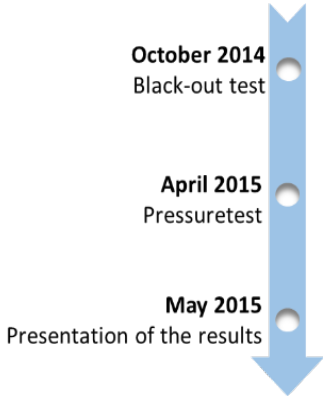

Figure 13: timeline pressuretest.

Figure 14: Facebook campaign pressuretest.

The black-out test is a precursor of the pressuretest, which takes place on April 2 in 2015. The pressuretest is set up in the same way. In the preparation phase LochemEnergie used Facebook for a campaign where users were able to bet on either LochemEnergie or on Alliander. As can be seen in figure 14, this post got 9 participants (responses).

Residents of the Koedijk, where the test took place, were notified via a letter and asked whether they are willing to provide an extension cord to charge electric vehicles (with an energy demand of approximately 1 Euro) and to turn on all their devices at 8pm. Also in this test pizza's were provided for residents to bake in the oven.

Figure 15: information letter pressuretest.

The pressuretest on April 2 succeeded in LochemEnergie's mission: to bust the grid. Alliander tried to focus on charging the electric vehicles in a smart way, but the households used so much energy that the safety fuse in the transformer house burned through. This caused one of the phases in the street to be busted. After the test the participants and Alliander had some drinks on the street.

Experiences

Interestingly, the participants' statements cover only the second test, the so-called pressuretest. The black-out test was remembered only vaguely by some residents, and not even by the project managers.

With regards to the second test, the pressuretest, it is important to note that not all participants were present.

About the pressuretest, one participant stated that he learned a great deal, for instance that the grid consists of various phases of electricity flows. Moreover, one of the project managers stated:

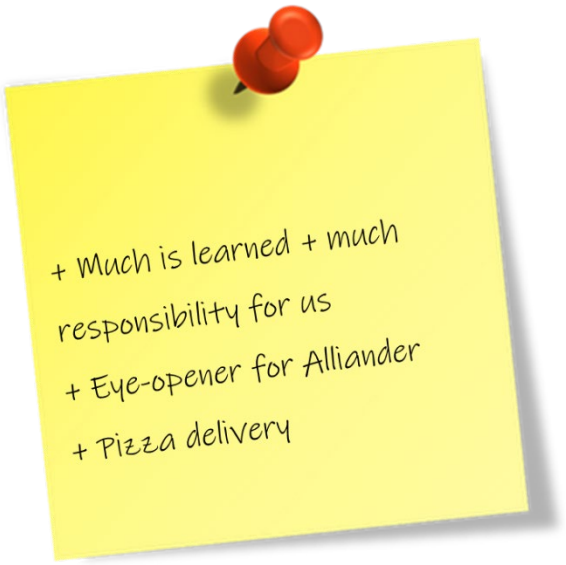

Figure 16: participants' feelings pressuretest.

> *"What I have learned of this test are two things. One, how simple it is to cause to induce a black-out, so very simple. I did not expect that. The second thing is how important this responsibility of LochemEnergie is to facilitate this energy transition, by not charging our cars all at the same time and to not all bake pizza's at the same time. Because that's just not possible right. So as residents we have a very large responsibility in this energy transition. And I could not have imagined upfront that that would be an outcome. We have to support, otherwise it will turn into chaos."*

Other participants stated that they have learned a lot from the test as well, for instance about the three phases that the grid consists of. The employee from Alliander elaborated how *"spastic"* the DSO was about this test. According to her Alliander regarded keeping the grid in good condition and ensuring no black-outs occur as the main reason for its existence. Consequently, some in the DSO were appalled that this test would take place. After the test, also Alliander realised much was learned from this test. The employee stated how valuable she found it that the DSO became more openminded about such tests.

2.6 Other events

In this section three events are covered that were important to the project managers, but were not defined as key events by the workshop participants.

2.6.1 Acquisition activities

The first event that LochemEnergie organized, in order to attract people and future clients, was held in the Sint-Gudula Church on the Day of Sustainability 2010. At this meeting, retired astronaut Wubbo Ockels spoke about sustainability and the future and the founders of LochemEnergie spoke about their plans for LochemEnergie. Several weeks after this event LochemEnergie had the e-mail address of 650 aspiring members (interview Paul Stolte).

In 2012, the IPIN-subsidy was officially attributed to the project 'Smart Grid Lochem', after which the energy cooperative started an active promotion campaign to recruit participants. The campaign consisted of information spread by e-mails, newsletters, going door to door and living room meetings. On June 6 and June 9, two information meetings were held, at which the project Smart Grid Lochem was explained in more detail. It was explained that participants were going to get smart meters, would be transferred to another energy supplier, were supposed to purchase solar panels either domestically or collectively and which tests were to be conducted in the project (LochemEnergie, 2012a).

From people who wanted to enrol, the project consortium required (next to basic information such as name, contact details and address) the following information:

- Under which energy supplier the participant currently had his energy contract
- Whether participants have solar panels
  - Or whether they want to buy them via LochemEnergie
  - Or whether they want to rent solar panels in the collective solar panel park
- Whether participants have an electric car.

Experiences

The experiences between project managers and participants were different during this event because they had different roles. Yet they all felt frustration that not more people joined in the project.

One of the project managers referred to the frustration that both he and his colleague project manager felt that the confirmation of the subsidy took a long time: "*We could not offer anything to people and nothing new could be told. So to keep people motivated and to switch to 'I will join the project' took a lot of effort. That was really dragging*." One of the project managers also stated that participants needed to be hauled in *"one at a time"*. According to him this was partly because there were strict conditions that needed to be fulfilled before being able to participate (being the purchase of solar panels, acceptance of smart meter and the switch of energy supplier).

During the very first meeting in 2010 LochemEnergie elaborated upon their ambition to participate as one of the IPIN projects. However, the actual confirmation of this participation and the corresponding subsidy did not arrive until June 2012. In the meantime, optical fibre was installed in the city of Lochem. As a result almost half of the households who wrote down their e-mail address got a new address. The project manager states that a large group has been missed due to this coincidence, which he calls *"a terrible pity"*.

The troubles with subscription of people is reflected in the experience of participants, as they found it a great shame that it was accompanied by so much effort. One would have wanted that more people joined the project: *"I can remember the very first meeting of LochemEnergie. The interest was enormous, really. (…) but when we actually started, that enormous archive of people has been missed."* However, the participants in this workshop had no trouble with the conditions for participation.

2.6.2 Shared cars

In April 2013, a working group worked on exploring possibilities to set up a system to share electric vehicles. According to one of the founders of LochemEnergie, over the course of a year discussions and efforts were ongoing.

The electric vehicles were ultimately provided by Alliander. On April 24, 2014 they delivered 4 electric Smarts. The cars were placed on the Koedijk, were residents could pick them up when needed. Residents could reserve the car via a form on the website and had to pay 5 Euros for half a day, and 10 Euros for a whole day.

Figure 17: shared car project.

Experiences

During both the interviews and workshops, the project managers called the project with shared cars a big success and referred to the cheap options of hiring a car. The workshop participants mentioned drawbacks of the cars. Mainly the travel to the car and the short range of the car was seen as a hurdle to use the car.

> *"For short distances I enjoyed it. At the start I used it in the area and that was doable. But just like you said, first you have to go by bike and if it is raining you still pretty bummed because you get wet nonetheless. And then I thought, my daughter lives in Dordrecht, would that be possible? But then I heard a story from Tonnie that he went to Culemborg and the power went out."*

It is important to note that these perceived limitations were not written down on a post-it. This means that the shared car project has not evoked dominant experiences in the project.

2.6.3 Meetings throughout project course

Throughout the course of the Smart Grid Lochem project, various meetings were held with various goals. Such meetings were for instance official openings of the solar panel parks, discussions on the workshop results, presentations of the experiences with shared cars or a presentation of the findings of the pressuretest.

Figure 18: Workshop on project results.

Experiences

The meetings were considered very important by both project managers, but were not mentioned as a key event by the participants.

Project managers emphasised that for each meeting around 40 to 60 people were present. The final meeting was, as one project manager proudly told, completely facilitated by participants. During this meeting participants shared their experiences. In response to this one of the workshop participants said: "*And then you can see you are a cooperative."* As such, the meetings may not have been key moments, but they were the events that keep the cooperative together.

3 DISCUSSION AND CONCLUSION

After learning what the various events during the IPIN-project in Lochem means for the project members, we will further examine what their experiences mean for the development of smart grids.

3.1 Discussion

Feelings of frustration and disappointment, due to a loss of both time and money, were frequently mentioned by the active members of Smart Grid Lochem. These feelings were related to the pioneering work of the project, for instance with the early introduction of smart meters. Even though the bankruptcy of the energy supplier is not necessarily related to pioneering work, LochemEnergie would currently have more options of choosing a reliable green energy supplier than it had in 2012. The frustration and disappointment did not urge the active members to drop out of the project.
Gratitude and proud occurred mostly during individual experiences. For instance, a project manager expressed his gratitude for all the workshops, as they made him conduct energy saving measures in his own home. Another example is the solar panel park, even though this park is collectively owned, participants mostly spoke about their 'own panels' in the park, for instance when their own roof is unfit. Also, energy saving and cost saving led to a sense of proud.
Participants often expressed statements regarding learning as a positive experience. The app and the workshops were associated with positive experiences because participants explicitly learned much on energy use and energy saving. The same accounts for the pressuretest, where all positive experiences that were mentioned had to do with learning. Yet, learning seem to have occurred as well when not mentioned explicitly, such as about the workings of a smart meter or an electric car. As learning may also be frustrating in case of bottlenecks, the joy of learning of at least this group of participants may have offset the frustration that occurred during the project.
When examining the key experiences it can be concluded that the negative feelings mostly occurred in the early stage of the project, whereas the positive feelings mostly occurred later in the project. This is depicted in figure 19.

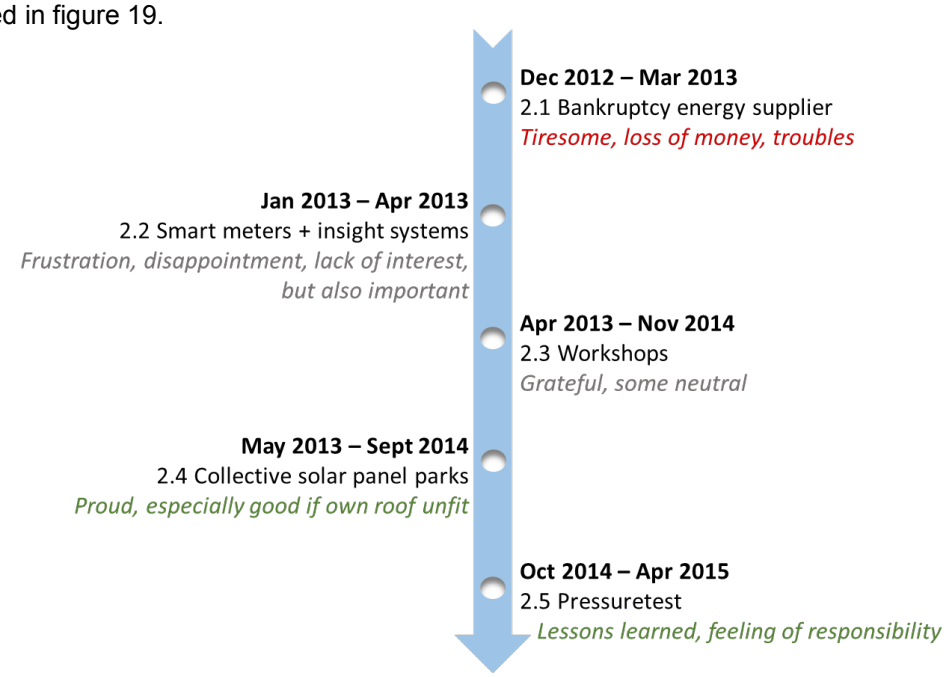

Figure 19: Timeline most important events and participants' responses.

The experiences of project managers and participants differed little in the key events (the bankruptcy, the intelligent home systems, the workshops, the solar parks, and the pressuretest). Regarding the acquisition activities, the shared cars and the meetings the project managers assumed that they were very important events for the members. Yet, the workshop participants did not attribute any post-its to these

events, meaning that they were of little importance for them. One of the project managers' worst experience, was not being allowed to co-develop the app. This was also not of importance for the active members.

3.2 Projected future (by participants)

At the end of the workshop meeting, the participants were asked the following question: *What would LochemEnergie have to do to in the future regarding communication and projects given the experiences in the project Smart Grid Lochem?*

Community projects were found to be valuable, including household gatherings and meetings. The participants formed ideas of building community projects with gas free houses, heat from industrial waste or hydrogen. Continuing with collective solar panels was desired. To engage neighbours further, some houses could be opened up to act as a demonstration site.
Participants indicated that a major concern was to include people who were less interested in sustainability issues. For these people, workshops on energy saving would not be attractive. To expand the member base of the cooperative, projects could focus on easily implementable solutions, such as a solar boiler, infrared heating or induction cooking. Participants believe that easy solutions help to engage people who are less interested in sustainability. Lastly, listening well to *"yes-but"* or *"no"* arguments was deemed to be important, so that people could be supported in their decision-making process instead of offering a direct solution that may frighten people.

3.3 Conclusion

With a workshop and interviews we aimed to give an answer to the question: *what do the experiences of cooperative members mean for future smart grid development?*

First of all, user experiences of this project are not always aroused by smart grid aspects of the project. For instance the bankruptcy and the solar panels are related to energy in general. The smart meters, the apps and the pressuretest could be regarded as parts of the smart energy project. This finding relates to the ambition of the project managers, namely using this IPIN-project to enlarge and strengthen Lochem-Energie as a local energy cooperative. Gratitude and proud and the joy of learning may have helped to achieve this goal.
Although the experiences do not relate much to smart grid aspects, several conclusions can be drawn with regard to future smart grid development. The members were willing to participate in collective events, for instance at projects meetings and workshops. However, collective facilities such as the cars and solar panel parks were assessed on their individual value by the members, whereas the project managers did assess these facilities on collective value.
The members of the cooperative had little to do with the technical smart grid aspects. Therefore, the acceptability of a smart grid cannot be judged with this project apart from one issue. The workshop participants strongly preferred the use of real-time data over platforms using data from the previous day. Among active project participants (those that were present in this workshop) the IPIN-project has led to a better articulated vision for the future. They see a certain responsibility for citizens and energy cooperatives to ensure that electrification and local energy production does not lead to chaos on the energy grid. Some participants also consider this project to be the precursor of the Dutch postal code regulation, an indication that they have ideas on 'what should be'. Still, the participants' lessons learned in this project do not lead to a fully integrated picture of the meaning of smart grids for residents.

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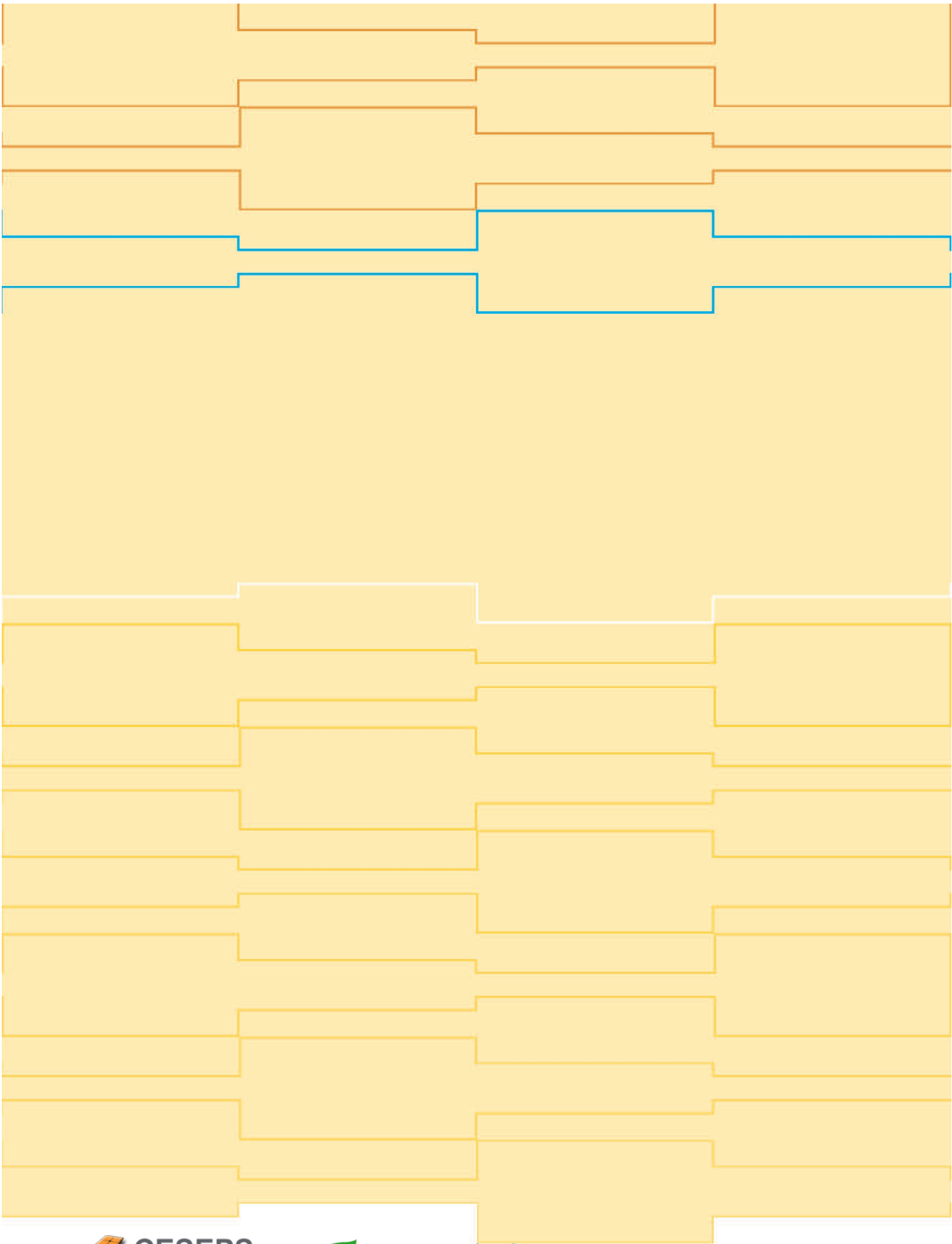

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