



PowerMatching City: power to the people?

Showcasing the PowerMatching City project on user engagement

IEA DSM TASK 24 Subtask 2 report - The Netherlands

Author: R.M. Mourik, 2014

Contents

1. Introduction to this study.....	3
2. A short introduction to PowerMatching City.....	3
3. Context, methodology and limitations of findings	5
4. And so it started	6
5. Key lessons learnt	6
6. A quick summary	7
7. How to start and how to keep on going.....	9
8. Scalability and replication starts with making it about more than me and my machine	10
9. Trust is key, make it a non-issue	12
10. Residents are humans too.....	14
11. Engage and share control: what you want is partnering, not engagement: partner not consumer	18
12. The Right Team and Methods	22
13. To conclude	25
IEA Demand Side Management Energy Technology Initiative	26

1. Introduction to this study

This document presents the general observations and lessons learnt based on the empirical analysis of the Dutch case study PowerMatching City Hoogkerk. This case study is part of Subtask 2 (Case Studies) of Task 24: Closing the loop- Behaviour change in DSM: From Theory to Practice. For Subtask 2, a stakeholder inventory was performed under 30 Dutch experts in policy, research and practice. For this stakeholder inventory we asked these experts what would be valuable outputs and outcomes of Task 24 for them and why, what the three most important context factors that affect successful implementation of Energy DSM in the Netherlands were and if they had suggestions for interesting pilots for further analysis¹. Several key questions identified for further analysis. One of these addressed the impact or influence of different approaches to end-user engagement on the potential behavioural change of these end-users, and then in particular those approaches that use smart grid and smart metering technologies.

To investigate this issue further we chose the Dutch best practice case PowerMatching City Hoogkerk. The findings are listed below. First a short description of the pilot and a story on the project is provided. Next, in random order, key lessons are presented on how to achieve and keep end-user engagement.

2. A short introduction to PowerMatching City

The Dutch PowerMatching City (PMC) project is a living lab in Hoogkerk and Groningen (Netherlands) to test an integral smart grid with innovative technology and appliances in real life circumstances. PMC was set-up by a consortium of complementary stakeholders: an energy retailer, a Distribution System Operator (DSO), a technology company, an ICT company and knowledge organizations and institutes. The first participants were recruited by the participating partners, and as such very motivated early movers, eager to learn about the technological issues. The first (technical feasibility) phase of the project ran between 2007 and 2011. PowerMatching City offered a real life experiment, using technology such as solar panels, micro CHP, smart appliances to test the feasibility of this future scenario on a small scale. PowerMatching City works with variable energy prices, coupled to decentralised generation. The dynamic tariffs used consisted of updated energy prices on an hourly basis, based on a fictive modelled spot price. Although this project does describe the end user as a 'Homo economicus'², see excerpt of PowerPoint presentation below, the consortium partners understood that households potentially need more than merely financial rewards as an incentive to shift demand. Many meetings were organised with the participants in this first phase, to inform them about the project and its progress.

¹ For further information on this stakeholder inventory see Breukers, S. B.; Mourik, R.M. (2012). IEA DSM TASK XXIV Closing the Loop Behaviour Change in DSM: From Theory to Practice. Inventory among Dutch stakeholders.

² DNV KEMA Energy & Sustainability, PowerMatching City, October 4th 2012, PowerPoint presentation



General assumption: The end-user is a 'homo economic'

Its incentives:

- reducing energy costs
- without profit no investments in:
 - Solarcells
 - μ -chp
 - Load management
- free energy market with peer to peer trade
- transparency in tariffs in time and load for energy and transport



An important aspect of the PowerMatching City project was that the consortium of PMC decided that comfort was a very important value of a home and should be at least maintained and preferably even increased, such that the new energy installations would then become an addition compared to the old situation. PowerMatching City had therefore one important criterion: to maintain or preferably increase comfort levels of the home for end users. This led to a situation where providing immediate service to residents when technology failed was a priority to the consortium, to ensure their comfort levels would not be influenced negatively by the project.

The second phase of the project focused on developing propositions and evaluating the behavioural issues and runs from 2012 to mid 2014. To test the DSO related issues of integrating large amounts of renewables in a local grid, matching demand and supply on a local level, measuring smart grid technology acceptance, an additional set of participants was added to the pilot, consisting of many homes and residents in one particular street, the Thomsonstraat in Groningen. Residents in this street had already started a collaborative process of becoming an energy neutral street. In this second phase the feedback devices and propositions were developed in co-creation with all end-users, both the participants from the first phase in Hoogkerk, as well as the new Thomsonstraat in Groningen.

This co-creation process lasted until June 2013, then the propositions were built and starting September the propositions (discussed in more detail below) were tested and went live in October 2013.

The process in this second phase became much more participatory and aimed to understand which products and services were of interest to residents, and which drivers drove their interest in and commitment/participation to the project and its technologies. Different methods were used, compared to the first phase which mainly used a few information evenings. Workshops and informative meetings were held, but also test groups and sessions with a selection of residents who assisted in designing and provided feedback on the first designs of the feedback display. Also a game was developed to elicit the residents' worries and priorities and future perspectives on energy and energy use in a changing energy system. The participatory process focused on eliciting motivations yielded two end-user groups; one mainly driven by cost reductions and one driven by motivations of sustainability or even self-sufficiency, both from an individual and community perspective. The two propositions involved energy services focused on either aiding

residents to use at cheapest times, or aid residents to use energy when it was locally produced through the CHP or PV.

1. 'Together more sustainable' aimed at optimising the usage of locally produced energy within the community of participating residents
2. 'Smart cost reduction' aimed at (fictively) lowering end-users energy bills by shifting their demand to the cheapest price moments.

The residents were randomly distributed over the two propositions by the project-team, not necessarily matching the proposition to the corresponding residents' drivers. Rather, from a research perspective it was decided that a mix irrespective of actual drivers or needs was needed to optimize learning about which propositions might work best for which end-user groups. These propositions and the resident acceptance were planned to be tested until mid 2014; results for this phase are thus not yet present:

The propositions were accompanied with end-user feedback given through an In House Display referred to as the Energy Monitor. The Energy Monitor shows how much energy is used and produced at any time. Also, it shows what that implies in terms of cost or the share of locally produced energy. For example, it shows whether laundry was done at a relatively cheap or expensive time period, and whether a heat pump started on the moment PV panels were producing electricity (Essent, 2013). The residents of both Hoogkerk and the Thomsonstraat were randomly assigned to one of the two propositions, irrespective of their motivation or attitude. This random assignment was the result of the research questions of the consortium in this second phase, which was to learn about the reaction of a diversity of residents to both propositions.

3. Context, methodology and limitations of findings

The case study analysis is based on an analysis of project documentation³ and 8 semi-structured interviews with five residents/participants of the pilot, and three project team members. The residents were selected by the project team to represent a diverse group of participants from both the Thomsonstraat and the Hoogkerk pilot and both active and less active residents. As such the groups of interviewed residents is a mix of residents, representing the diversity of residents participating in the project. However, of course, the sample is small, only 5 of in total 40 residents, and probably all 40 residents would have presented different views and perspectives. The findings presented in this report are based on these interviews and as such thus are not necessarily representative of all 40 households participating in PowerMatching City. The findings on end-user engagement, and from the perspective of these end-users will be contrasted to findings from other case studies and findings from many other researchers recently conducted, e.g. for IEA DSM Task 24 in a later deliverable of Task 24.

In addition, the findings need to be understood in the specific context of a pilot being conducted with the aim to learn about a technical system not yet mature and potential end-user issues of a system not yet available in the market. As such, the findings would most likely differ in some aspects when dealing with a technologically mature system or in a mass-rollout phase. Where this is the case this is discussed in the report.

³ Essent (2013). "The smart way. De klant als schakel in de energietransitie." Presentation at the kick-off workshop for the testing and evaluation stage of PMC phase 2, October 2013; <http://www.powermatchingcity.nl/>; and Maïke van Grootel, Jorgen van der Velde, Joost Laarakkers, Joost van der Linde (2014) Final Report Working Group Propositions, Version 1.0, Den Bosch, 18/11/2013 – 07/01/2014

4. And so it started⁴

Once upon a time... a country called The Netherlands used centralized energy supply, such as coal fired power plants and natural gas.

Every day... energy would flow from just a few places in the country to the homes of the citizens. Coal and gas was abundant, so nothing to worry about.

But, one day... scientists realized that these fossil fuels were exhausting and damaging the environment. People were searching for other solutions and started experimenting with intermittent renewable energy sources such as wind and solar. In order to match supply and demand, demand response and demand side management gained increasingly attention. The Dutch government issued a subsidy scheme to start experimenting with smart grids.

Because of that... A pilot called 'PowerMatching City' was set up to test real life conditions of smart appliances, innovative CHP installations, solar power, energy monitors and smart meters to match sustainable energy production and demand. 40 residents of the North of the Netherlands were engaged on a voluntary basis. Demand was to be shifted to a period in which supply was highest and/or cheapest; variable tariffs were used to trigger people to shift their demand. In a very interactive process, set up in the second phase of the project, residents were asked and invited to co create the energy monitor and help co-design the propositions.

However... Like with all pilots, sometimes things went differently than expected, and some technological challenges presented themselves, after all, the system was not technologically mature yet. And of course, budget constraints and time constraints also impacted the choices available both in terms of technology and process. And some residents were not as engaged as hoped for, others were much more engaged than ever anticipated.

And, ever since then...the project team did all it could to learn, adapt and meet the needs of residents. In addition the project team tried to capture the lessons learnt and share these with other relevant stakeholders to make sure the next pilots would be able to build on PowerMatching City. But then the next questions arise: what is the value of such a system for Dutch consumers. And which services should we develop for them? In the second phase of the pilot, these questions are central.*To be continued...*

5. Key lessons learnt

In the sections below we will present the key findings on end-user engagement extracted from the interviews. The key findings are ordered around several themes, ranging from how to start and keep going, to trust, effective methods and team roles. Under each heading the subthemes are first visualised with a picture and then discussed by means of citations and an analysis. Below is a short summary of key lessons learnt from this case study:

⁴ For a description of the use of storytelling as a methodology see Mourik, R.M. et al (2013.) Most of the time what we do is what we do most of the time. And sometimes we do something new. Analysis of case studies IEA DSM Task 24 Closing the Loop -Behaviour Change in DSM: From Theory to Practice. Deliverable 2 for IEA Implementing Agreement DSM Task 24

6. A quick summary

How to start and keep going: Communities matter

- *When you start with an existing community, make sure your proposition fits their goals and ambitions*
- *Make sure your technology can keep up with needs of the community members*
- *When people already meet in the street they need an online community that provides what the street encounters do not*

Scalability starts with making it more than me and my machine

- *Green minded community minded people need physical interaction, me and my system is not enough*
- *Belonging to a community creates more connection to the technology everyone is using*
- *communities offer scalability*

Trust is key, make it a non-issue

- *Knowing the team creates trust: make it personal*
- *Commercial interests and trust do not get along well*
- *Participants in a pilot have more patience towards the technology, as long as they are not blamed for failures*
- *Be transparent about the assumptions designed into the system: make participants as knowledgeable as they want to be*
- *Building up trust is also about demonstrating you understand the WIFM of participants*

Residents are humans too...

- *People usually do not use energy just to be able to waste it*
- *Propositions need to match what motivates to get people to behave accordingly*
- *To change behaviour technology needs to fit real life*
- *Do not ask people to accept a higher energy bill for the sake of the project*
- *Even the most willing participant has a family...*
- *Comfort is not only non negotiable, the need for comfort can even grow...*
- *Even greens place home or ' me' first, society second*

Engage and share control: wwhat you want is partnering, not engagement: partner not consumer

- *People want to be a partner, not a passive consumer*
- *Shared decision making also creates a bigger potential to create a system that actually fits in the daily life and existing home installations*
- *Partnering entails accepting that participants are experts on their own homes and behaviour*

- *Investigate the potential of creating a sense of partnering during mass-rollout using open innovation*
- *Engagement is time consuming and can hurt (spouses): acknowledge this investment*
- *beware you make as efficient use of participants' time as possible*
- *Don't push too hard for engagement: it might pollute your results*
- *Lasting engagement is key to changing behavioural routines*

The Right Team and Methods

- *Build-up a personal relationship: know your participants*
- *Create a one-stop shop contact person*
- *Different phases, different project team competencies*
- *Different phases require different methods*
- *Engage the silent voices, spouses or children. These are the next best thing to mass-market representatives.*
- *Being technical about it is OK*
- *Monitor, or your participants will and be frustrated about it*
- *Allowing feedback creates engagement*
- *Direct response to concerns strengthens the feeling of being in a partnership*

7. How to start and how to keep on going...

One key finding is that the use of an existing or creation of a new community can be essential in the process of engaging residents on a mass-scale, at least the green minded people. Several interviewed residents stated that their engagement was already formed around a community that was broader than the Thomsonstraat. This very active cooperation of house owners took initiative for the solar panels and heat pumps. Within the Thomsonstraat several house owners were linked to this Grunneger Power energy community cooperative which was organised towards creating an energy neutral street. The house owners of the Thomsonstraat were thus part of a larger community already aimed at cooperating and achieving community self-sufficiency in energy use, and the PowerMatching City project only needed to step in:



Figure 1: Thomsonstraat



"The Thomson Street is a different kind of street. Residents were already very energy minded before the pilot started."(Project member)

It was as if PowerMatching City was allowed to participate in this already started movement because it fitted with the various ambitions of the residents:

"From this energy cooperative the thought emerged to think bigger, and also start cooperating with the swimming pool nearby, and to put solar panels on the school's roof. So when PowerMatching City contacted Grunneger Power and asked us to participate it fitted our plans well. And even with the different individual interests, e.g. for one collective buy-in was important, for another social cohesion or standing stronger as a collective to lobby against hindering law and regulations, it was apparent that we wanted to share and exchange energy as a cooperative and this project offered that possibility when we were not yet able to do it. In a way we were selected on the basis of our enthusiasm." (Resident Thomsonstraat)

And the residents from Hoogkerk, where no such community had existed prior or had formed during the project mentioned that a sense of belonging to a community might have changed their engagement:

"It would have been different if I had participated with my street. Then I would have known the people, now the participants were strangers. If they had been people I knew I would have felt more sense of connection. That is the result of having more contact moments with your neighbours, and those moments are different as well, you would talk much more often about the project." (Resident Hoogkerk)

"One day I spoke to my neighbour and he apparently also just applied to participate. That was a nice feeling to be in this 'conspiracy' together." (Resident Hoogkerk)

Working with an already existing community that knows and already experienced the advantages of a community, including the efficiency of sharing information can also create a sense of dissatisfaction when a project is unable to meet the needs for communicating efficiently with the community. This occurred specifically with respect to lessons learnt:

"A digital community should have been available from the beginning, with frequently asked questions and stories about experiences with the technologies and problems. That would have saved Han (responsible for maintenance) a lot of time; he would have had to answer the same questions a lot less often.... A community needs to be part of the process from the start, that would also have contributed to the engagement and better interaction between participants from Hoogkerk and the Thomsonstraat and would have contributed to acceptance and in particular the patience of residents in the Thomsonstraat because you would have been able to see the history and someone that participates for a longer period of time could help out." (Resident Thomsonstraat)

One way to tackle the above dissatisfaction could have been to appoint an ambassador from the Hoogkerk pilot that could have answered questions from newcomers. A potential disadvantage of working with an already existing community is that technology can fall short compared to the social network of neighbours. When people often meet each other in the street and talk, they are potentially less likely to make the full use of technological systems such as online communities:

"That chat programme that was developed, I do not use it, I meet the people daily on the street, and I need to reset my password first." (Resident Thomsonstraat)

The above citation demonstrates that performing a pre-survey to take stock of the strength of the existing community and their potential interest in a chat system might have saved time and money or at least could have resulted in a more tailored communication system. Another challenge any pilot faces when dealing with already existing communities of energy minded residents is that these residents might want to go further, also technologically, than the project is able to provide, which can lead to frustration:

"When I would have received the display as a ready to use device I would probably still use it, but just not for management but as a monitoring device. If I would be able to also manage other devices, then I would use it more extensively. That is really a missed opportunity of the tablet now; you cannot use it to set any settings, not even your thermostat. You need to do that by means of the PC that is very frustrating. It is a real lack of added value." (Resident Hoogkerk)

We will discuss this in more detail later in the document. It suffices here to say that in this project a tension was felt by several of the interviewees between the research objectives aimed at finding out how residents would react to the propositions and methodologies used being that residents were assigned randomly to the propositions, even if they did not feel comfortable being in either the cost or sustainable group, and their need to actively start engaging with behavioural change and exchange of power at times that fitted them or their wallet. Two major challenges they experienced was that on the one hand the system had a delay of 5 minutes in delivering real time data and feedback, and that in addition the residents were assigned to either a cost or sustainable group and got feedback about when to use energy that did not necessarily fitted with their motivations, and therefore was unable to really engage them.

8. Scalability and replication starts with making it about more than me and my machine

Many respondents from the Thomsonstraat mentioned that the existence of the community was the reason they had participated in the pilot in the first place and that they felt that making use of an existing community as a strategy for a mass roll-out would be smart and cost effective. The project team however stated that the community engagement process.

In the pilot would be much too time and resource intensive to repeat in a commercial mass-rollout. For the DSO the various face-to-face meetings and workshops are deemed incompatible with the strategy for a mass-rollout which requires a more standardized, commercialized and easy to use proposition that would take away the need for these face to face meetings. Co creation was in this pilot also used as a tool to achieve the highest learning as possible because co creation would result in engaged residents, participants, and as such in good sharing of knowledge, needs and requirements. However, Maïke van Grootel from Essent stated that in a pilot you need engaged users, participants, but in a mass rollout you need customers. The aim of a mass rollout is not to engage as many participants as possible, but to deliver products with added value for an acceptable price. Interaction and engagement is not an aim. Interaction with end-users - for example through end-user panels - would remain important, but according to Maïke van Grootel "you can't go about co-creating with 5000 people". However, a key question for future mass roll-out would be if the DSO or retailer would alone be responsible for this co creation and engagement strategy. Many other stakeholders, including self-organised stakeholders such as the Thomsonstraat community can take a role. Thus far there is little experience with co creation and other intensive engagement strategies used large scale during mass-roll out, and targeting others than the early adopters or early majority. Answering these questions would be an essential element of an up scaling strategy. Especially because it is exactly this interaction with people that does the trick in engaging people to work with a technology. Interacting with only the technology is not sufficient:

*"With a mass-rollout it will be difficult to keep this connection between the product and the mass. It is difficult to maintain the level of interaction. Now I am aware of the research but with a ready-made product my feeling would be different. Even if I would have the opportunity as a consumer to configure the thing; that would be only a moment between me and the system."
(Resident Hoogkerk)*

What this citation shows is that key to engagement for this respondent was that he felt a partner in the project. And that the product maturity itself was less important. In a mass rollout however, this person would more likely be engaged as a consumer and that would require another product because the product as it was now would not have been enough to start engaging with the system. The respondent further mentioned that perhaps for people feeling comfortable in the cost savings proposition this would be less of an issue, but for people feeling comfortable in the sustainable community proposition, this feeling of being able to know and interact with the community is imperative:

*"With a mass-rollout the biggest challenge could be to get a large number of people together physically in the same place, and this is certainly very important when you are dealing with people that feel most comfortable with the sustainable community proposition. For these people you will have to build a community that does things for and with them, just like for example my survival community does."
(Resident Hoogkerk)*

And for those for whom the presence of a community itself is not really important for the personal encounters it offers, the community is important because it offers scalability in terms of motivating more residents to opt for a proposition:

*"The existence of a community of users is not making a difference for me, not really. I am engaged to the project, not to the residents. It does not really matter that much who participates. The fact that a relatively high number of people do participate makes that I feel more interested because the testing is taking place on a larger scale."
(Resident Hoogkerk)*

9. Trust is key, make it a non-issue

In the PowerMatching City pilot lack of trust seems not to have played a role or be an issue, or it was simply present and thus not an issue. The presence of trust might be the result of the voluntary participation of the residents, and trust or lack thereof might become more of an issue with the early majority. The PMC researchers know almost everything about the residents, including, thanks to daily diaries when people do what, but in interviews not one resident mentioned privacy issues or lack of trust. At least, not lack of trust in the people from the project team. These people were known to them, at least sufficiently to be trusted. The importance of making it personal is discussed in a later paragraph.

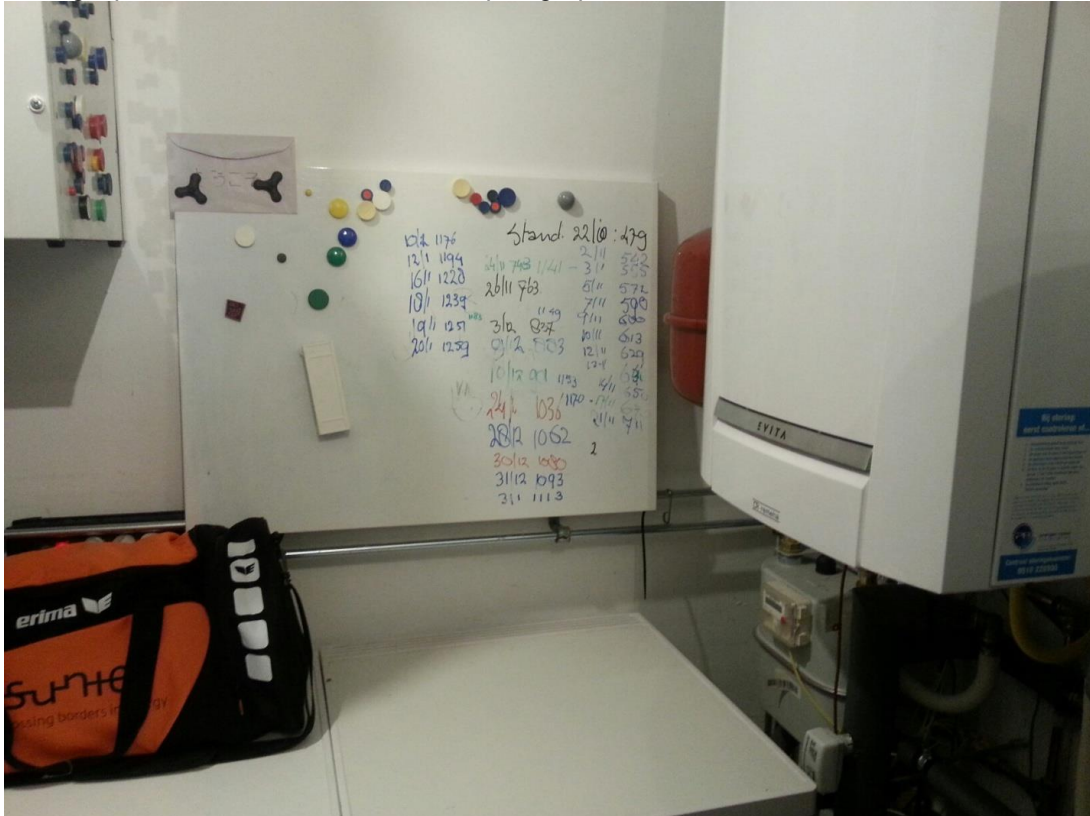


Figure 2 daily diaries of consumption data

In addition, the fact that the project was very clearly positioned as a research project may have created an aura of neutrality and objectivity or at least non-commerciality of the project. The importance of a non-commercial identity became very clear in talking to a resident that felt she had been targeted with a commercial marketing attempt following her participation in the project. The reaction below might stem from the fact that the residents were told beforehand that this was a research project and therefore did not expect a commercial angle:

"Communication runs through KEMA⁵ and that means that other parties should not start communicating with residents outside of this channel, choose the channel and stick to it. With Christmas we suddenly received a gadget from Essent, for being 'customer of Essent', but we are not so I got angry, felt like I was a part of a marketing stunt. But now I understand we got the gadget for being part of the PowerMatching City project, and I like the thing." (Resident Thomsonstraat)

Knowing that they are part of a research project also impacts the relationship the residents have with the technology, and the trust they have. They know that the technological system is experimental, so they are lenient and more patient with problems. And the remuneration they receive is allowing them to be ok with technical problems and potentially even higher energy bills because of these problems. However, it is essential that monitoring is performed and that problems are not blamed on the people.

"After a year my consumption was much higher, suddenly, so you start to think it must be the system. But I could not prove this. But nothing had really changed at our home, except for that

⁵ (now called DNV GL)

system. We are talking about a few hundred Euros. What was annoying was that after we had mentioned it to KEMA they first did not really react, and after a while we got these charts that proved that the system did not experience any deviance. I did not feel like engaging in a fight, but I was pissed, but now that feeling went away a little. I also thought, well we do get a remuneration to deal with problems, but it is a waste of money, I would have preferred spending it on something else." (Resident Hoogkerk)

And next to monitoring, clear and transparent communication about the assumptions the developers transfer to the system needs to be discussed with the participants, they need to be engaged as partners and be made as knowledgeable as they want:

"The system is not transparent enough yet. I do not understand why the washing machine does not turn on when there is green electricity, my own electricity even. Apparently the choice of that smart appliance depends on multiple factors, amongst others the demand for energy and the decentralised generation of other participants, and the supply and costs. But I do not see the demand and supply of others, so I am not taken on board in terms of how the choice is being made, and then I do not get it. Then you need to put your trust in the software of KEMA, and then communication becomes really very important." (Resident Thomsonstraat)

Finally, building up trust is also very much related to the ability of the project team in demonstrating that they understand what the participants need, in terms of information or in terms of any other What is in it For Me (WIFM) issues, even up to what people want to get out of participating in meetings:

"a technical story like that is.... not sufficient, the fact that appliances have been tested or are going to be is not the information needed to provide answers to the question what this is going to mean for me as a resident." (Resident Hoogkerk)

"To make a meeting meaningful to me I need to be able to take something home or contribute something, otherwise it is a waste of time for me." (Resident Hoogkerk)

"The discussions are actually always taking place collectively, not on an individual basis. As a consequence the project follows the common thread, not my personal needs." (Resident Thomsonstraat)

10. Residents are humans too...

Sometimes, in pilots, it is forgotten that the participants, not matter how engaged and enthused they are, are still humans with daily lives, families and needs that might interfere with the project aims.

Energy is used to perform functions such as listening to music, cleaning clothes, getting warm, feeling safe, being comfortable or comforted. And being in a pilot does not necessarily mean that people are wasteful or not mindful of their energy use, as the daughter of one of the residents mentions when asked whether or not she uses the display device that stands on the sink:

"I am not really using it, or not at all actually. I do sometimes look what is on it, it is located in the kitchen and I walk past it anyway, but it has too much information, and then I need to take a real look to understand what it means. And I would not do anything about it anyways. Everything I do, I do it because I want to do it, and it's not like turn something on just for the sake of turning it on (daughter)." (Resident Thomsonstraat)

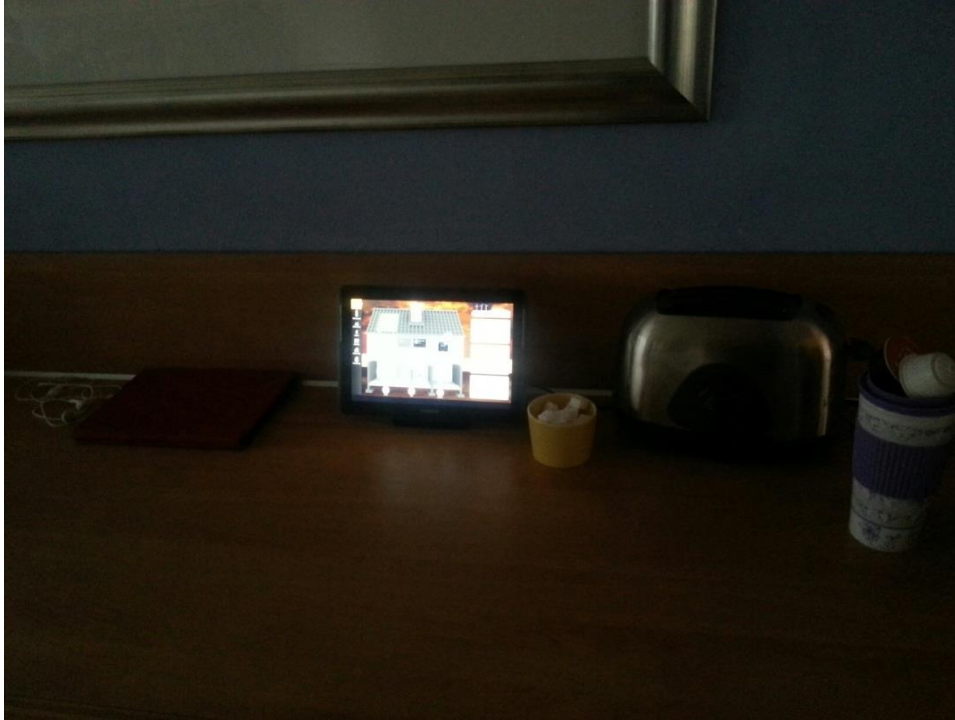


Figure 3: the monitor on the kitchen sink

Potentially the biggest challenge the PowerMatching City project faces is to get the best data possible on actual load shifting behaviour. The two propositions involved energy services focused on either aiding residents to use at cheapest times, or aid residents to use energy when it was locally produced through the CHP or PV. The residents were randomly distributed over the two propositions by the project-team, not necessarily matching the proposition to the corresponding residents' drivers. Rather, from a research perspective it was decided that a mix irrespective of actual drivers or needs was needed to optimize learning about which propositions might work best for which end-user groups.

"We did not let the residents choose themselves to which proposition group they would be assigned, we assigned them at random because otherwise you cannot monitor the effect of the proposition, and in the end we received feedback from approximately 10% stating they did not feel happy with the group they had been assigned to. In that sense there is a tension between the needs of the residents and the research." (Project member responsible for research on propositions)

This random assignment however created tension in some of the residents' lives. They all mention to understand that for scientific reasons this was necessary, or at least legitimate, but they also warned that for them it often meant that they did not behave as they would have normally and as such think the results might not be very representative. Therefore it's good to keep in mind that a balance needs to be struck between what it is you want to research and what it is that participants prefer. One solution to deal with this tension is to actually allow sufficient time to do both, first test the random situation, and then the tailored one:

"I am in the 'cost' group, but I feel more like someone that should be in the sustainable group. I regret that I could not choose. Our thinking is that you have a community and share energy and for that group it is really important to know each other. I find myself interacting more with those people, and some of them I know from the workplace." (Resident Hoogkerk)

"What I find less enjoyable is that I was put in one of the two proposition groups, the one I least identify myself with, the cost group, and I do notice that I tend to lean more towards the other group during meetings. But I do understand that assigning people at random in one of the two groups serves a research purpose and that this is important indeed." (Resident Hoogkerk)

"It is kind of a pity that one could not choose in which proposition group you would be placed, I really want to focus on the costs, that is why I stepped into this project, but now I am in the sustainable group. My behaviour is not really changing as a consequence, I want to vacuum clean when I see a mess and -in the game- when it is cheap to do so, not when it is sustainable, that is part of how I am, and it's in my genes." (Resident Thomsonstraat)

"If you want us to change our behaviour you need to engage us actively, and appreciate our real life. In a working week you do think when you need to, and pacing us in groups, at random for the sake of research might miss the point if you are assigned to the wrong group. My behaviour targets costs, not sustainability issues. I behave as if I was assigned to the other group and focus on what would be important to me." (Resident Thomsonstraat)

To sum up, for a successful mass rollout, propositions need to match the motivations people express for changing their behaviour and for high satisfaction with the proposition. On the other hand, the specific context of PowerMatching City required a focus on research, and finding out how to create a good match and as such in this specific case a balance between these two was crucial in the design of this pilot. If they do not match, the behaviour could likely not be what it potentially could have been. This behaviour might even go as far as not participating at all if people are not happy with the technical choices being made, as the technical and maintenance person found out:

"I do not experience a tension between the research element of the pilot and resident satisfaction, because when the technology works, the residents are satisfied, most of the times anyway, Some of the residents are not happy with the technical choices we make, for example the type of washing machine we chose, and sometimes we do receive the feedback that 'if it had been a Miele, and not an Indesit, then we would have done it'." (Project member responsible for technological issues)

In some instances, this mismatch between the technical system and the propositions, in combination with sometimes a lack of understanding of the system due to its lack of transparency (on assumptions being used for example) even leads to technology versus human feelings. In one interview the project team member responsible for the technology reflected on a situation where the PowerMatcher was developed to optimise between different goals, not always visible to the residents due to the complexity of this optimisation process:

"In phase 1 the purpose of the project mainly was to test the technical feasibility, it's only in phase 2 that we started with the propositions, and have started focusing on demand

management. That is tough material with complex issues. Now sometimes it's Power Matcher versus the residents, for example with respect to when the washing machine turns on." (Project member responsible for technological issues)

One way to ensure users keep motivated to engage with the technological system is to make sure the feedback is tailored to their personal circumstances, and sometimes a small app like a temperature monitor connected to a sensor outside is sufficient:

"In the second phase of the project, which was aimed at behaviour and changing it, big steps have been taken, a great growth of the collective. A very mature product is ready. I would use it, I think, even if I had not been involved in its development, but that stems mainly from the fact that the app that provides me with outside temperature information from outside of my home. That gives you more insight in your own environment; more than a general weather app, so that makes that I keep using the tablet."(Resident Hoogkerk)

All respondents mentioned that they did not change their behaviour regarding load shifting. Either because they did not feel connected to the group they were assigned to, or because mundane issues interfered. And they mentioned that if the system would have been more tailored to their real life it might have created more engagement and commitment towards load shifting. However, the aim of the project was not necessarily focused on achieving real load shifting as such, certainly not in the second phase of the project which was more aimed at finding out how to provide added value to the residents with the propositions. If the outcome of this value would be that a resident would not change his behaviour actively but would require automation to do so, that is considered to be a good output of this research project. However, in this search for added value, sometimes the residents, even though they were aware of this research aim felt some frustrations:

"Technological progress in combination with behavioural change that fits someone's rhythm in life provides more sense of (feasible) control and probably also take away some frustration." (Resident Thomsonstraat)

In addition, the tension between the system and real life becomes bigger when people are asked to respond to virtual prices whilst in real life this might lead to increased energy bills:

"When we come home I need warmth and the heat is just turned on, I am not going to wait. My behaviour responds to the here and now, and the information I receive on the best moment to consume energy simply is not relevant to me. There also is a big difference between the virtual price in the project and the real price I need to pay. I have Time of Use tariff, so the virtual dynamic pricing scheme does not fit my real life."(Resident Hoogkerk)

Many respondents mentioned that their behaviour did change in response to the information they got from the display, but their behaviour change was more related to reduction than load shifting:

"I am the one who initiate it all at home, I started it, but now my husband starts ironing even in the middle of the day. He also proudly tells the outside world how much fun it is to participate because you get direct results. It's not like our behaviour really changed, we have indeed become more aware of how we deal with warmth, all the doors upstairs need to be shut and you do remind each other. And we have become more conscious about the use of appliance such as the water kettle and we did buy a new refrigerator-deepfreeze combination, and we make these choices together now. But there are also people that start cooking during the day; we do not do that."(Resident Thomsonstraat)

For the monitoring and evaluation of the project impact, it is also important to realise people are humans, with lives that change, which can also impact the way they behave.

"I have not changed much because of the project, but I did learn a lot, for example that the freezer is more efficient than the fridge, that was a real eye-opener. Maybe I did change after all, because in the first phase of PMC I turned the washing machine and dishwasher when it was necessary, and now I tend to save more of the dishes, and we do not use the dryer anymore. That is partly because of the energy monitor, but also because the kids are bigger now and things have changed because of that."(Resident Hoogkerk)

Another problem respondent encountered when attempting to diminish their energy consumption, or shift had to do with the comfort level they started with. Some households started with a comfort level below their needs, and the project provided the required comfort level, but a higher energy bill accompanied this change. In addition it is also apparent from the next citation that comfort begets comfort, much to the despair of the Pater familias:

"We did have more discussions as a family, but not so much because of the project, but due to the comfort level that increased. And because we now have an inverted effect, the shower now provides a nice and hot water jet, so the kids shower longer now, and more often! We did get more arguments because of that. And now they want this new showerhead, a head that pours

water down. Yes, but they do not pay the bill, as mentioned before, the composition of our family makes you do not always have control over the situation..."(Resident Thomsonstraat)

What this example demonstrates is that not the new but the old comfort level should be assessed when identifying possible flexibility in load management. Project participants often are the only contact person for a project team, usually the family finds out how and what through that one family member. However, this person is depending on his or her social environment, e.g. family, to be able to perform the desired behaviour. And sometimes this simply does not work, in particular when there are children involved:

"The family constitution (3 teenagers) makes you do not really control the situation as much as you would like to. In addition we received questionnaires that were not really tailored to the family situation; as a result the final results are not really realistic."(Resident Thomsonstraat)

"when I was still alone at home I lived at 18 degrees, but since my wife has also retired we live at 20 degrees, and that temperature setting is non-negotiable to her"(Resident Thomsonstraat)

And establishing the impact of a project on behavioural change also needs to take into account potential changes in the family constitution:

"I now receive an overview of our energy consumption every two months. The consumption even decreased, but, Okay, starting November one kid moved out, and that makes a real difference." (Resident Thomsonstraat)

What PowerMatching City did really well is trying to get the whole family, or at least the spouses involved. This is a very strategic decision since these spouses often represent the potentially less involved, not early adopters. And as such these might be even more important to learn from than the willing and early-adopter type of stakeholders. Among the 5 key drivers elicited from the workshop sessions, self-sufficiency emerged as a particularly important one. Interestingly, self-sufficiency at the household level was given higher priority than self-sufficiency at the community level. So, first use energy in their own household, and if useful share remaining energy with the community. "Even if end-users care about the community, they tended to place themselves first".⁶What this entails for PowerMatching City or any other similar project is that future propositions should provide users the option to put their home and its energy use first in any market for local or decentralised energy and that as a second option people should be able to identify the people with whom they trade their energy, and chose if they want to trade with them or not. A project strategy can consist of identifying similar users in the neighbourhood, or allowing users to provide this input themselves.

⁶ Mentioned in the case study report PMC written up by Pieter Valkering for the S3C project.

11. Engage and share control: what you want is partnering, not engagement: partner not consumer

What became apparent in the discussions with the residents is that they cherish the feeling of being a partner in the project, and that when their role would be or become one of consuming a product; their engagement would diminish or even disappear.

"But you feel you are able to contribute to the project, that you really are a partner, a partner in the development, and you really want the trial to be successful. Had I not be so engaged, I would feel a consumer and then I would not be so motivated to go through all the trouble." (Resident Hoogkerk)

Creating a partnership already starts at the beginning, in sharing control over decisions, even technical ones. Perhaps even more importantly: allowing shared decision making also creates a bigger potential to create a system that actually fits in the daily life and existing home installations:

"I would have liked to have more power in deciding on the installations, and that goes particularly for the ventilation system, the bad ventilation of all our homes in this street.... I now prefer to open the door then letting the air flow through this dirty tube. We had the RIVM run tests, and the air quality was really not good, certainly not when we were all five in the room, and that is unacceptable, especially with someone with asthma." (Resident Thomsonstraat)

The project team made an effort at allowing the residents to have control over the meetings:

"We gave the residents control over the meetings, they could indicate what they would like and what their needs were concerning the content to be discussed." (Project member responsible for research on propositions)

Partnering also entails accepting that the participants are experts on their own homes and behaviour, when people do not feel taken seriously this could impact on their feeling of and commitment towards engaging with the project:

"The choices being made, also concerning the research that involves us and our motivations for example need to be communicated well. I want more information on the assumptions, the why behind certain actions and decisions. That is also a form of engagement they need to allow us, trust us, and our expertise, we are after all experts on our own home and behaviour. There must be a better communication flow on the total research concept. Now there were impossible and unrealistic options in the questionnaires, and because the framework was not clear for me, since I had not attended one evening when the game was being played, I felt not take seriously. I need to know why I have to answer questions about what I would choose 'mars or snickers'. I am not crazy, am I?" (Resident Thomsonstraat)

Participants in projects like PowerMatching City open up their homes, to strangers and strange technology. If they are not approached as partners, also during the installation of all the technology, they could feel less connection to the technology, which could impact their engagement:

"Part of the technology just happens to you. When the installations were performed by the installation guys a lot of people came into my home, all technical and knowledgeable people, and very friendly, but the world of residents sometimes was forgotten. I had to ask what was installed in my closet and side kitchen. A lot has been installed, but we received very limited explanation about what was what, why it was put on the wall, and why there. You want to know what is hanging on the walls in your home, don't you, because you hear a humming sound and you do not know what it is, and if it is something going wrong." (Resident Thomsonstraat)



Figure 4: a mystery closet with a lot of unknown devices...

The Hawthorne effect (when people behave differently because they know they are part of a trial) however could also play a role and create a bias regarding your results, as such it is wise to expect a less engaged resident when not dealing with this early adopter and partner-like participants when mass-rollout take place:

"Because you participate in a project you tend to turn off things quicker, turn down the thermostat and when you pass by something you think, I can turn this off, and that. But that is because I like participating in the project, you are part of a technological transitions and this is a vision of the future." (Resident Thomsonstraat)

One way to create a feeling of partnership with a product during mass-rollout is to work with open innovation or crowd-sourcing types of methodologies, where people can help design a product, make recommendations or even work on the software in an open source environment, especially around monitoring and evaluation and incremental innovation of a product.

When using the right methodologies: e.g. co creation tools such as the workshops and focus groups used in this project, engagement of people can grow, also increasing their patience towards problems:

"You get increasingly enthusiastic because of the meetings and the games and the simulation model." (Resident Thomsonstraat)

"Collectively working on the project motivates and the more the meetings where you can co create the more it motivates me, and in combination with good communication you tend to accept problems more easily. For example, it took a year and a half before it became clear that there was a problem with my installation, and the communication with the installer did not go very well, the technology was too new for him. But you have the feeling you are contributing to the project, that you are really participating, that you are a partner in a development, and you want the trial to succeed. When I would not have been so engaged I would have felt a consumer and I would not have been motivated to go through all that trouble." (Resident Hoogkerk)

And having participated in the creation of a device, e.g. the energy monitor also creates a connection that can result in increased engagement, although the device clearly needs to engage with the user:

"I increasingly check the monitor, so maybe I would use it if I had been given it ready to use. It becomes a game, it's interesting to know how we do, and when the thing is turned on and you see what you consume, you start wondering: what is turned on? There is a delay of a few minutes in the system, but still it creates awareness." (Resident Thomsonstraat)

In the project the importance of being careful about pushing for engagement became apparent. In PowerMatching City the research partners used to call participants that did not fill in their surveys. The response rate as a result was actually very high, but in the interviews with residents it was mentioned they often just fill it in, not really making sure the answers really applied to their situation, but would be sufficient just to be done with it. As such using response rates to say something about engagement is tricky. In this case the aim of the project was such

that phoning those people that had not yet filled in the questionnaire had multiple purposes, mostly related to gaining research data. For example the researchers wanted to find out why people did not fill in the questionnaire, if something was wrong with the site, if the questions were not formulated right, if there was a technical problem or anything else. From this point of view calling these people made sense.

Concerning engagement this action might be less effective. Those people that were now asked to fill in the questionnaire even though they had not done so in first instance did not necessarily do this out of a sense of engagement, but to be done with it. In this case however, the specific context of this pilot was to achieve good research results, and not necessarily maximise the level of engagement and commitment. If the aim of a project would be to maximise engagement and commitment, less attention would probably be put on filling in the questionnaire, and more on finding out why people did not engage. Engagement requires time from participants. But it also requires much more effort such as opening up your home, trusting project team members, providing feedback. This investment needs to be acknowledged and rewarded with small rewards such as flowers or a small gadget at Christmas time.

"We were the 'pilot' when the system was installed. I thought, I will just open up my home and we will see. The installation was not very easy because for two weeks a lot of people came in and out to make sure the system could be installed properly. We unexpectedly received a present and we thought that was very kind!" (Resident Thomsonstraat)

What worked really well in PowerMatching City is putting in at least as much time from the project team as the participants themselves. Many respondents mentioned that the passion emitted from the project team was engaging.

"I feel that the project team is appreciating the commitment and investment of the residents, e.g. in terms of time invested. The passion and enthusiasm of the project employees and the people that visit our home is fantastic." (Resident Hoogkerk)

However, if this investment of time and resources from the side of the project team does not happen in an efficient manner, and participants feel their time could have been used more efficiently this could potentially negatively impact their commitment:

"I take a management perspective and considering the time and investment the project is not always efficient. We do not complain, but we do sort of get turned off." (Resident Thomsonstraat)

What also needs to be acknowledged is that engagement can ask too much of participants, they can grow tired of it, and making sure not to ask more than bare necessity in terms of engagement could also give these participants a feeling of being appreciated. If this is not done, engagement can also diminish:

"You need to accept that some of the people do not have a lot of time or are less enthusiastic. Making a pre-selection of people and then tailoring it to their needs, e.g. shorter meetings, bigger steps, would suit me much better. ...I have not been to any meeting for a long time. I need to make choices and then I decide I can miss out on the meeting. Some of the meetings were just plain boring, when I had been sitting near the door I would have left, and that mainly has to do with their timing, they take place between eight and nine thirty in the evening. After a long days work, I tend to fall asleep unless it is interactive. The session concerning the portal was fun for example, it was not just listening but doing." (Resident Hoogkerk)

And the spouses sometimes need to be protected a little against the strong commitment of the early adopters; their engagement can hurt their family a little:

"Yesterday I received my energy bill. In the past that was an automatic thing, paid automatically and gone it was. Now we check to see if we improve. You become more attentive, changing light bulbs, oled, on, on, heat is non-negotiable." (Resident Thomsonstraat) "Now I get told off when I leave the door open." (Resident Thomsonstraat)

Making sure the engagement lasts for at least a couple of months is essential to get participants to develop new routines and stick to them:

"I think that what I am doing now, I will be doing for the rest of my life, and it has become a routine. And now it hurts also when I use the dryer because otherwise we get into trouble with the need for dry cloths, I feel guilty." (Resident Hoogkerk)

The biggest threat to engagement is to think that once technology is installed and functioning properly, the stakeholder engagement methods can be put to rest, however, especially when the behavioural aims of a project are as high as they are in PowerMatching City (e.g. load shifting, not reduction) and the propositions do not sufficiently fit the real life of participants, constant and perhaps even increasing engagement once the technology is in place is imperative:

"In this phase of the project there is actually no resident representation anymore. It is thought that we are done, it is installed. But then it actually starts. The phase in which you should get out what is potentially it, also in terms of behaviour, the use, should be optimised. A walk-in hour to engage residents might already be enough." (Resident Thomsonstraat)

"The virtual world insufficiently engages me to pull me out of the short term of today. I need basic incentives, preferably financial. And when you really want to reach people, do not target them primarily based on technology, the layer around that is important to residents." (Resident Hoogkerk)

Many respondents mentioned they did not feel the need for more control or decision-making power, at least as long as they felt sufficiently informed. A shared concern was that the residents felt the need to be kept informed, on the 'why', the 'when and what happens' next issues. Their engagement was diminishing in this last phase of the project because they felt out of the loop. They did not know what was coming next and this negatively impacted their commitment.

"It is important to put someone in between, between the world of technology and the world of the residents. That will also impact the willingness of residents, of us, to participate. You need to engage us and keep us engaged in the user phase and feedback phase. We do not blame the technicians; it is not their job or skill, which is why you need a communications expert.... In fact, communication only really took a flight when all the technology was already present."(Resident Thomsonstraat)

"I do not feel the need for more power to influence, I feel a real equal partner in the co creation process. I do feel the need for more information and in particular, more feedback. You feel really engaged to the sessions, they are really very open, you provide input and that you, in fact, hear nothing until suddenly there is a report." (Resident Hoogkerk)

This can imply that the frequency of certain information channels needs to be increased:

"The project ends in September 2014, so now everything is aimed at collecting results, the development phase is completed. But many residents, they do not understand the system and therefore we need to aim our communication efforts at providing explanations, e.g. in newsletters. We had not anticipated this need for communication, and we do sometimes receive signals that there is too little information about the focus and next steps in the project, and we react immediately with a newsletter. It was planned to work with these newsletters, just not with this frequency." (Project member responsible for technological issues)

12. The Right Team and Methods

A very strong feature of the work conducted by PowerMatching City is that the project focused on building a personal relationship with the residents. One way to accomplish this is by trying to tailor the project and its propositions as much as possible on the real motivations and needs of the residents. This was accomplished very nicely in the process leading to the creation of the two propositions, but less so in assigning the residents to one of the two proposition groups randomly.

Another way of creating a personal relationship is appointing one person as one-stop-shop contact person, not only to make life easier for participants, but even more so to avoid frustration that hampers engagement:

"Keeping the engagement high is essential. I stand for maintenance and monitoring of the pilot and my goal is to keep residents satisfied and engaged we do not want to let them stand outside in the cold, literally and figurative speaking. We also agreed to provide them with one face for maintenance and monitoring." (Project member responsible for technological issues)

"It's now also very friendly, I know the people well by now, they are close to me, you know who you are speaking to on the phone, and you know their face." (Resident Thomsonstraat)

"The coordinators of the project changed often, and that was difficult sometimes, because then you need to find out, again, who is who. Actually, there has never been an explanation of who is who and what they do. Everyone is friendly enough to respond, but a central point for all your questions is important. Also because the response then might be less fragmentary or discontinuous." (Resident Hoogkerk)

If contacts go well between residents and the installing company, in close cooperation with the technical project members this stakeholder could become this one stop shop contact person. Making it personal is also very important for mass-rollout. And although the budget of any project is clearly the limiting factor in making use of participatory methods during mass-rollout, the message is clear: the more you create a participatory, co-creation process the higher the chances of engagement, commitment and satisfaction of users.

In a pilot the system to be tested is of course elementary, if it does not function and the pilot fails, the participants also lose the meaningfulness of their engagement. After all, they engage in the testing and development of a working system and reliable data:

"This is a pilot so the system must work; otherwise you fail your residents and the project because the measurements are no longer accurate." (Project member responsible for technological issues)

Although different competencies are deemed necessary in the course of a project, one competency was deemed essential throughout the project duration: communicative competencies. This communicative competency should potentially be part of a project team in the form of a single person; also to avoid that technical people would have to become the relationship expert of the project:

"My competencies have changed as well in the course of the project. I used to be the technical guy, but now I make several calls a week on average with families that experience problems. I could not have anticipated that. I also need to reassure residents when they for example heard that the producer of one of our installations went broke, and see that many of the installations break down and that we do not have a lot of spares. They express their worries towards me. I now never know what my day will look like; sometimes I spend the whole day talking to residents on the phone. I have many more contact moments with the residents than I could ever have foreseen. In this phase of the project it is a combination of people with technical and communication competency." (Project member responsible for technological issues)

A big challenge when a group of residents sits together in the beginning is to create an environment in which they feel rather safe and comfortable to tell their true stories, feelings, needs and ideas and especially talk about their norms and values. Talking about norms and values is furthermore a good entrance point to talk about potential propositions yet to be developed to respond to a future that is not yet there, e.g. on smart grids and differentiated or dynamic prices and a local virtual marketplace.

The game developed by Essent to elicit norms and motivations provided a 'safe' environment in which participants felt free to speak honestly about their real drivers and motivations. It triggered discussions about norms and values, so it became clearer what people found *really* important in potential propositions. In addition it was really helpful to be able to work with tangible options in the card game (e.g. residents could make combinations with different forms of feedback, smart appliances, level of automation, dynamic tariff). The full set of options was developed by the project team, based on what were considered relevant future options, and based on the input (key drivers) from a previous workshop.

When trying to get participants to consider a future not yet 'out there' PowerMatching City used metaphors to discuss potential futures, and this was a very helpful tool to deal with future uncertainties and get participants engaged in a dialogue about the future. Everyone knows about for example the connection between early booking of holidays and cheaper prices, and such metaphors can help participants consider Time of Use or Real Time Pricing.

In the course of time the interactive methodologies can potentially diminish a little, or change towards more online channels, but interaction as a form of communication remains imperative to keep participants engaged, perhaps more at the start than later on:

"Maybe different competencies are required in different phases of a project. Communication is really potentially more important in the later stages than in the beginning. And to communicate you might also need different methods in different phases. In the beginning a lot of interactive meetings, in later stages a newsletter, with FAQ would suffice (misses F)." (Resident Thomsonstraat)

A concern shared by several of the interviewees was the mismatch between their feeling of being a partner of the project, and at the same time being targeted with not very personal methods such as surveys. The respondents felt the surveys did not allow them the level of detail and nuance the co-creation process did and asked of them. And perhaps even more troubling is that most of the respondents stated that they did not feed this back to the research partners:

"The many surveys do not appeal to me. The research on motivations that was partly issued online was not to my satisfaction. I could not make clear what I think with the questions used. We have to fill so many surveys online, our partners as well, whilst it is not clear why or why now again, and what the status of the survey is. And I do not like the way the questions are formulated either, but I do not provide feedback on that, I do not feel like noting down my comments, I am way to happy I finished the survey." (Resident Hoogkerk)

The citation above demonstrates that the lack of complaints not necessarily means that there are none. One lesson to be learnt in this project is that the silent participants need to be contacted personally. The person responsible for the citation above mentioned how much he valued the interview, it re-engaged him.

The project team did pre-test surveys, and worked with a small group in the development of the energy monitor. The selection of the participants for these pre-trials needs to be considered carefully. The importance of actively engaging the silent voices, as well as the spouses or children is clear. These are the next best thing to mass-market representatives.

The current project fits in a 'learning-by-doing' approach, which Essent believes is important to gain experience with possible new products and services for the future. And if you do not monitor the participants might anyway, but could get dis-engaged because of it. After all, if the project team is not interested in monitoring, why would you engage?

"The mal functioning and additional costs did not impact on my motivation, but I have become more alert and have started monitoring, my trust in the technology has decreased. I do not use the display we received, it stands in the room but we make no use of it. I watch a screen the whole day already and would have to do that at home again, I do not feel like doing that I was not involved in its design, it is beautifully designed monitor, but I do not feel at home in the group so the information is not meaningful to me." (Resident Hoogkerk)

"The phase in which measurements are taken is a phase that is really important to me and requires continuous feedback on what is being measured. In the first six months you heard nothing." (Resident Hoogkerk)

Learning entails that you also open yourself up for unwanted or unsolicited feedback, and not only regarding the technological system and it's functioning but also about the process:

"It would be nice if there would be good evaluations of the activities, just to check if residents were happy with them. We are customers and you need to know if your customer is satisfied, not just if the content is successful." (Resident Hoogkerk)

Opening the process up for potentially negative feedback might also be the gateways to useful engagement because it empowers participants to co create the process itself, not only the output. If participants bail out it could be as a result of lack of feeling of engagement and commitment and consequently your results become less meaningful. Allowing for feedback however also implies that you need to follow-up on what your participants have brought to the table in terms of concerns.

"An important lesson we learnt: keeping the residents informed, and providing a quick and frequent feedback is really important to keep them engaged. We now also developed an ICT track system to monitor issues, such that the aftercare takes place adequately. We did that in response to signals we received from residents last fall. The residents do not know about this, it's an internal thing. We do have a central mail address for the residents, and when a complaint is issued we make sure it is being dealt with within 24 hours." (Project member responsible for technological issues)

"September 2013 we performed a small telephone action in reaction to signals we received at one of the resident evenings. With some of the residents you have a lot of contact, with others less nothing. This was not part of the work plan, but you are depending on the residents, so you want to know what their position concerning the project is, and how they experience the project and the installations at home." (Project member responsible for technological issues)

This direct response to concerns strengthens the feeling of being in a partnership:

"The speed with which the project team reacts to questions and issues is really nice. And the installation guys are fantastic, quick, they communicate well. Good service is the basis. And what was really good is that the project team organised a meeting after several residents voiced their lack of satisfaction and need to ventilate their emotions." (Resident Thomsonstraat)

13. To conclude

Once upon a time... A pilot called PowerMatching City was conducted in the Netherlands.

Every day... this pilot tested real life conditions of smart appliances, solar panels, innovative CHP installations, an energy monitor, smart meters and dynamic pricing to match sustainable production and demand. Demand was to be shifted to a period in which supply was highest or cheapest. 40 residents engaged to a more or lesser extent.

But, one day... it was time to draw lessons learnt on user engagement for future pilots. Many new pilots would be designed in the near future, probably focusing on dynamic pricing, decentralised energy and virtual marketplaces for cooperatives. And the Dutch programme on smart grid pilots would want its future pilot projects to build on lessons learnt.

Because of that... a long list of lessons learnt was created. The lessons learnt revolved around issues such as trust that should be a non-issue and that building a personal relationship is key, and being transparent perhaps even more so; that in particular green minded people like to have a community engaged, whilst the cost motivated people are happy without a community; that creating a partnership with residents and not treating them like consumers works best to get them engaged, that a balance needs to be found between matching the technologies and products to their needs, and at the same time allowing for research to take its course; that willing participants often have a less willing family living with them; and that different phases in a pilot require different team competencies and also different engagement methods.

However... these lessons of course cannot be listed too unproblematically. The research conducted only used a small sample of the participating residents, and one methodology: in-depth interviews. In addition the participants in this trial are not necessarily representative for the mass market out there, and finally, the lessons learnt are also connected to the non-technological maturity of the technologies used in the pilot. **And, ever since then...** the lessons learnt are shared, with the clear comment that every pilot is unique and each pilot manager needs to reflect on the lessons learnt in PowerMatching City but also needs to tailor them to the specific technological, human context of the new pilot.

IEA Demand Side Management Energy Technology Initiative

The Demand-Side Management (DSM) Energy Technology Initiative is one of more than 40 Co-operative Energy Technology Initiatives within the framework of the International Energy Agency (IEA). The Demand-Side Management (DSM) Energy Technology Initiative, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. The following member countries and sponsors have been working to identify and promote opportunities for DSM:

Austria	Norway
Belgium	Spain
Finland	Sweden
India	Switzerland
Italy	United Kingdom
Republic of Korea	United States
Netherlands	ECI (sponsor)
New Zealand	RAP (sponsor)

Programme Vision: Demand side activities should be active elements and the first choice in all energy policy decisions designed to create more reliable and more sustainable energy systems

Programme Mission: Deliver to its stakeholders, materials that are readily applicable for them in crafting and implementing policies and measures. The Programme should also deliver technology and applications that either facilitate operations of energy systems or facilitate necessary market transformations

The DSM Energy Technology Initiative's work is organized into two clusters:
The load shape cluster, and
The load level cluster.

The 'load shape' cluster will include Tasks that seek to impact the shape of the load curve over very short (minutes-hours-day) to longer (days-week-season) time periods. Work within this cluster primarily increases the reliability of systems. The 'load level' will include Tasks that seek to shift the load curve to lower demand levels or shift between loads from one energy system to another. Work within this cluster primarily targets the reduction of emissions.

A total of 24 projects or "Tasks" have been initiated since the beginning of the DSM Programme. The overall program is monitored by an Executive Committee consisting of representatives from each contracting party to the DSM Energy Technology Initiative. The leadership and management of the individual Tasks are the responsibility of Operating Agents. These Tasks and their respective

Operating Agents are:

Task 1 International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto's GHG Targets – *Completed*
Harry Vreuls, NOVEM, the Netherlands

Task 2 Communications Technologies for Demand-Side Management – *Completed*
Richard Formby, EA Technology, United Kingdom

Task 3 Cooperative Procurement of Innovative Technologies for Demand-Side Management – *Completed*
Hans Westling, Promandat AB, Sweden

Task 4 Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – *Completed*
Grayson Heffner, EPRI, United States

Task 5 Techniques for Implementation of Demand-Side Management Technology in the Marketplace – *Completed*
Juan Comas, FECSA, Spain

Task 6 DSM and Energy Efficiency in Changing Electricity Business Environments – *Completed*

David Crossley, Energy Futures, Australia Pty. Ltd., Australia

Task 7 International Collaboration on Market Transformation – *Completed*

Verney Ryan, BRE, United Kingdom

Task 8 Demand-Side Bidding in a Competitive Electricity Market – *Completed*

Linda Hull, EA Technology Ltd, United Kingdom

Task 9 The Role of Municipalities in a Liberalised System – *Completed*

Martin Cahn, Energie Cites, France

Task 10 Performance Contracting – *Completed*

Hans Westling, Promandat AB, Sweden

Task 11 Time of Use Pricing and Energy Use for Demand Management Delivery- *Completed*

Richard Formby, EA Technology Ltd, United Kingdom

Task 12 Energy Standards

To be determined

Task 13 Demand Response Resources - *Completed*

Ross Malme, RETX, United States

Task 14 White Certificates – *Completed*

Antonio Capozza, CESI, Italy

Task 15 Network-Driven DSM - *Completed*

David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 16 Competitive Energy Services

Jan W. Bleyl, Graz Energy Agency, Austria / Seppo Silvonen/Pertti Koski, Motiva, Finland

Task 17 Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages

Seppo Kärkkäinen, Elektraflex Oy, Finland

Task 18 Demand Side Management and Climate Change - *Completed*

David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 19 Micro Demand Response and Energy Saving - *Completed*

Linda Hull, EA Technology Ltd, United Kingdom

Task 20 Branding of Energy Efficiency - *Completed*

Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 21 Standardisation of Energy Savings Calculations - *Completed*

Harry Vreuls, SenterNovem, Netherlands

Task 22 Energy Efficiency Portfolio Standards - *Completed*

Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 23 The Role of Customers in Delivering Effective Smart Grids - *Completed*

Linda Hull, EA Technology Ltd, United Kingdom

Task 24 Closing the loop - Behaviour Change in DSM: From theory to policies and practice

Sea Rotmann, SEA, New Zealand and Ruth Mourik DuneWorks, Netherlands

Task 25 Business Models for a more Effective Market Uptake of DSM Energy Services
Ruth Mourik, DuneWorks, The Netherlands

For additional Information contact the DSM Executive Secretary, Anne Bengtson,
Liljeholmstorget 18, 11761 Stockholm, Sweden. Phone: +46707818501. E-mail:
anne.bengtson@telia.com

Also, visit the IEA DSM website: <http://www.ieadsm.org>

DISCLAIMER: The IEA enables independent groups of experts - the Energy Technology Initiatives, or ETIs. Information or material of the ETI focusing on demand-side management (IEA-DSM) does not necessarily represent the views or policies of the IEA Secretariat or of the IEA's individual Member countries. The IEA does not make any representation or warranty (express or implied) in respect of such information (including as to its completeness, accuracy or non-infringement) and shall not be held liable for any use of, or reliance on, such information.