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Designing anthropological reflection within an energy company

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The move towards a more liberalized energy market and the emergent smart grid technology has forced a Scandinavian energy company to begin rethinking the relation between themselves and private energy end users. Originally a unidirectional relationship, the present and future have potential for a more bidirectional relationship between the company and their customers. During this process the company has realized that they lack knowledge about private energy end users. The company has run a demonstration project simulating the face of the electricity smart grid in private households and has used ethnographic methods to investigate the system effect of private households' participation. Our paper questions why this kind of approach is reproducing the unidirectional relationship instead of creating a bidirectional relationship. We propose an extension of the ethnographic approach whereby anthropological reflection is generated in the company through a flexible tangible scenario model of the bidirectional connection between the energy company and the users.

THE PRIVATE ENERGY USER CHALLENGE

Governments and energy companies are currently developing alternative electricity smart grid solutions to address energy independencies, reliability and issues of sustainability (Massoud and Wollenberg 2005, Gellings 2009, Lin, Yang and Shyua 2013). These developments will lead to a disruption of the continuous evolution of energy use practices both in private households and in energy production companies (Farhangi 2010, Lin, Yang and Shyua 2013). The Danish government has determined that by 2050 Denmark will be independent of fossil fuels and the way to achieve this goal is to base the energy system on electricity from mainly wind turbines. This means that a smart grid system in this context will not only optimize the distribution of energy between the energy company and the user, but also the smart grid must integrate the unstable character of electricity produced by wind turbines. Energy users will have to cooperate with the system and use electricity when it is available - when the wind blows. A future electricity smart grid is based on an intelligent bidirectional communication between a range of different energy producing units and energy demand units – including our Danish energy company and the private energy end users

(Farhangi 2010, Verbong, Beemsterboer and Sengers 2013, Geelen, Reinders and Keyyson 2013, Lin, Yang and Shyua 2013). The energy company's role in the proposed infrastructure is dependent upon the private energy end users' willingness to cooperate with the system in a completely new way in order to make the intelligent energy system function effectively. This relationship towards the private energy users presents a challenge for the energy company and the company tradition, because so far the energy distribution company has only delivered energy in a unidirectional system. Therefore the company organizational structure has until now been dominated by an almost non-consideration of the private energy end users, simply because the private energy users have not been relevant to the company identity. The development of a sustainable electricity smart grid challenges the way the Danish energy company categorizes end users.

USERS AS LOADS WITH FLEXIBILITY POTENTIAL

Company knowledge about the private end users is still being collected through long-term multi-sited fieldwork (Marcus 1995, 2011) conducted by Løgstrup during her employment as an industrial PhD student inside the energy company (2010- ongoing). The company describes private energy users as a load or peak loads, which refers to the energy users as a load in the energy system. For example from 5 p.m. - 8 p.m. energy users are referred to as peak load because, in this period, energy users are using the highest amount of energy during the day. A project leader in the distribution department explains the different phrases that are being used to talk about the private energy users:

> "There are many names for clients in a household.
> Some call them clients, others call them users, and network people call them loads - there are not many other industries that call users a load."

The company also talks about the energy users as having a certain amount of flexibility. In terms of the companies understanding of flexibility, energy users could easily move their energy consumption from one period to another for example doing their laundry at night time during the off peak period instead of the day time, where demand for energy is high. People in the energy company use the formulation that the energy company wants "to borrow the energy users' flexibility". The users are in this way seen as either a flexibility problem or having flexibility potential in ensuring the technical setup of the electricity smart grid will work.

A COMPANY PROJECT OF MAKING USERS FLEXIBLE

When Løgstrup was employed in the company a number of people from the central innovation, sales and distribution departments presented her with the company's need "to change the energy users behaviour" in order to make the energy users contribute to the structural setup of the emergent electricity smart grid. Specifically, they wanted her to find out how they could make the private electricity end users willingly participate in the

electricity smart grid and by participation they meant, how they could get the private energy end users permission to shut down their electrical devices during specific periods of the day.

A scenario could be for example that the users allowed the energy company to close down their heat pump during peak hour (typically the time from 5p.m-8 p.m. when the private end user demand for energy is the highest). The private end user's willingness to shut down electricity use during peak times of the day became the focus of a collaborative demonstration project in the innovation department and in the distribution department of the company. The demonstration project was concerned with getting private energy end users to collaborate with the energy company in a way whereby the energy company could use the energy users "flexibility" to balance the energy production with the energy demand side of the system and thereby turn the energy users into a flexible element instead of a load in the system. The project was a demonstration project of the electricity smart grid and the aim of the distribution department was to use the electricity smart grid to save money on distribution cable investments. The innovation department focusing on energy production, distribution and sales on the other hand was interested in the project because it could demonstrate if private energy users were willing to cooperate in the setup of an electricity smart grid. The distribution department described the way to reach their goal as obtaining "energy behaviour change in private households in the demand side of the system". Løgstrup entered the demonstration project with just this aim in the distribution part of the company. However she insisted on changing the word behaviour to a concept of practice.

Behaviour of private end users electricity use was presented by project managers as a linear task where A would lead to B as in a behavioural psychology stimuli/response setup, which is dominant in the energy sector (Mundaca and Neij 2010: 11, Shove 2010: 1277, Strengers 2012: 227). Instead she proposed a concept of practice (Bourdieu 1977 [1972], 1990 [1980], Shove 2010: 471, Strengers 2012: 228) arguing that families have many practices and where their energy use practices are defined as different habits, people in the household are most likely not aware of and may not be interested in changing. As an anthropologist focusing on the relational character of entities and the social while being engaged in an industrial PhD project focusing on the development of the electricity smart grid as a design process, she thought that the demonstration project design had several weaknesses. Løgstrup argued that participants should not be considered as a representative end user but instead be understood as families with roles as husbands, wives, fathers, mothers and children. This suggestion was made based on the argument that energy use is never an individual practice but practices that are produced within social structures such as a family (Strengers 2012: 228).

Her suggestion was not followed. Instead, project participants were selected based upon their interest in the demonstration project. The method used in the project to accomplish behavioural change was to ask participants to commit to different flexibility profiles, which would lead to a controllable demand side of the electricity smart grid. Project participants were not families but one person in the household who had found an interest in the project and volunteered. This person in the household was asked to choose how "flexible" s/he wanted to be, meaning how much control over the households electrical devices s/he wanted to hand over to the energy company to administer in order to avoid an overload of the system and distribution cables.

The project was a success in the sense that the energy company concluded that private energy end users were willing to let the company control their electrical devices to an extent where the company could move the end user's patterns of energy use thus saving money on the energy distribution cables. The energy company also concluded that the private energy users were willing to cooperate with the energy company in designing an electricity smart grid. In this way, it might seem as if the energy company has solved "the private energy user challenge" and changed the users' role in the energy system from being a load to becoming a flexible resource.

THE ENERGY USER CHALLENGE: COMPLEX USER PRACTICES INSTEAD OF FLEXIBILITY PROFILING

During the demonstration project Løgstrup visited five different families where she spent approximately three to five hours with each family learning about how the families related to energy, how they related to the interfaces of the electricity smart grid they had installed; what they thought about the electricity smart grid and how they related to each other according to their energy use. During this period of time she found out that although the families were participating in the project it was unlikely that these families would be interested in using the system in their everyday home environments on a long-term basis. Importantly, she discovered that reliable flexibility profiling would present a challenge for the design of the electricity smart grid and the energy company. This was mainly due to the lack of long-term sustainability of the smart grid design and the limited chances of success outside a project frame. Løgstrup's field visits highlighted that husbands and fathers in the families were the most likely family members to volunteer to be a part of the project and they were also the ones who were the most positive about the 'face' of the electricity smart grid. By the 'face' of the electricity smart grid we are referring to the part of the electricity smart grid that is visible to the users in the demonstration project in opposition to the whole electricity smart grid, which is partly invisible to end users. Also, the fathers were the most likely to be willing to change their everyday practices according to the system. The challenges to the smart grid system surviving in the household context originated mainly from the women/wives/mothers and the children in the families. In the next section we will describe some of these challenges as Løgstrup in the field experienced them.

BALANCING THE ENERGY SYSTEM WHILE UNBALANCING THE FAMILY

While the energy company considers the demonstration project a success according to balancing the energy system what is not taken into consideration by the energy company is the 'unbalance' in the participating families that the demonstration project has created. In the participating families there was one recurring issue between the fathers and the children and occasionally wives about using less electricity. Fathers involved in the project were struggling in daily life to persuade their families to cut down electricity use and act responsibly without wasting energy (not necessarily due to environmental concerns, rather to act responsibly without wasting too much energy). Irresponsible use was a daily annoyance to the fathers

especially if they were not able to influence the other family members with their electricity practices and attitudes about electricity use. In this way the new system was described by other family members as an extension of the fathers' voice reminding them to turn off the light, turn off the television and their computers. One of the wives described how she, on the first night, after the face of the electricity smart grid was installed she had to get up during the night because their baby was crying. When she got to the room she was not able to turn on the light. It turned out that her husband had turned off most of the electricity in the house at the mains before he went to bed, and had forgotten to mention this to his wife. His wife described this as being extremely annoying. Also she became increasingly uncomfortable with the fact that he was able to monitor her use of electricity devices when he was not at home. She said that she liked to have all the lights in the house turned on in the house because it gave a sense of life to the house that she valued. Her husband thought this was a waste of energy both according to the household economy and wider environmental concerns. The demonstration project did more than just absorb time from the family – it also influenced how family members planned and prioritised their activities. In this way, the face of the electricity smart grid was actually instigating family conflicts, which led to the wives vetoing the system.

Some of the wives and children of the participating family units felt surveyed by their husband. As one of the children mentioned his father could now see when he was playing with his computer during the night, when he, according to his father, was supposed to sleeping. The child thought his fathers continued surveillance of his daily activities was an infringement on his personal freedom.

These examples of willingness (or lack of) of household flexibility shows that it is not everybody in the family who wants to be flexible. Moreover it shows that it might be easier to act flexible if you are the one in control of the face of the electricity smart grid. Also you could argue that the wives and children have become accustomed to being 'uncontrolled loads' in the energy system that they see this as their right, which they are not willing to give up unless it is made meaningful to them.

A CASE OF KNOWLEDGE REPRODUCTION

As mentioned previously because of the unidirectional tradition of thinking about the private end users in the energy company, the company has not traditionally been concerned with the role of the energy users according to the company's aim of producing, selling and distributing energy. Now that the relation is changing towards bi-directionality, you could say that the company is blinded by the unidirectional tradition of relating to users. This results in the users not being seen as the core concern of the business. Instead users are seen as playing a small part in the energy distribution value chain and set up of the electricity smart grid system whereby the system informs and dictates user practices instead of the other way around. This became evident in the demonstration project when it became clear that the focus of making "flexibility profiles" was based upon the energy company's aim to maintain control of the energy. The energy company was not interested in getting to know their customers and relate to them in a bidirectional way. Instead they were interested in controlling the energy users' electricity use in order to maintain the control over the

electricity smart grid. It turned out that the change of private end user behaviour, which, Løgstrup had argued against in the demonstration project was an indicator of what the energy company hoped would happen in the future. The distribution department wanted precise numbers to be able to answer to what degree people would be able to or would want to shift existing behaviours of energy use (be flexible) in order to make exact measurements on how this would impact the system. This seems pretty logical from a unidirectional system perspective where the company already decides the structure and character of the electricity smart grid. After all, the distribution company is interested in developing an electricity smart grid that is operational and therefore they have to stabilize the unstable character of private electricity demand and make it more predictable and controllable. This is still the case despite the necessity for a bidirectional relationship to be established between the company and end user in the future design of the electricity smart grid and the distribution department's acknowledgement of the crucial issue of obtaining private end users participation according to the system's operations. The distribution company has become accustomed to thinking in the form of a unidirectional relation where the energy users are loads to the system that a bidirectional way of thinking calls for a knowledge tradition change (Barth 2002). It is therefore not accidental that behaviour is the term that wins influence in the in between paradigms that the energy company is currently facing. Behaviour is the term that is used to account for human actions when you consider this as something that can be controlled or that you aim to control and this is exactly what gives meaning in the unidirectional paradigm - controlling energy users use of electricity. This unidirectional paradigm is present in many energy companies. Traditionally energy companies see energy users as a demand number in a model (Mundaca and Neij 2010: 2, Strengers 2012: 227). Mundaca and Neij (2010) have argued how the energy sector is based on an engineering and economic modeling approach that is lacking important information about private energy use because it focuses primarily upon the quantitative and economic factors related to energy use (Ibid 2010: 5, see also Gunn and Clausen 2013). Instead, they argue that the energy companies' understanding of private energy use should include both qualitative and quantitative approaches (Ibid 2010:12).

The ethnographic contribution in the demonstration project has been limited by the conditions of the unidirectional paradigm with no real concern about understanding private end user practices. This means that ethnographic methods have been used to find out about user requirements for the electricity smart grid and interactions with the face of it in homes. In so doing the company has been hoping to create user willingness to participate in the project. Anthropological reports and subsequent discussions that were produced throughout the project by Løgstrup and external consultants (2010-present), and which introduced a different form of relation between the company and their customers were deliberately overlooked by the company. Their argument being, "that this kind of information is not interesting, and this was not what we asked for when we wanted to involve ethnographic methods in the project". The non-uptake of anthropological knowledge demonstrated that dominant paradigms of unidirectional thinking could not just take in just any kind of knowledge. Instead they could only uptake the kind of knowledge that matched their unidirectional thinking of the users. As such they were reproducing existing ways of conceptualizing innovation and practice in an attempt to do innovation in the company (see

Gunn and Clausen 2013). In this way participation of the users in the demonstration project is limited to end user requirements and technical development needs of the system and the company and is thereby only innovative along existing paths of development (Ibid).

Ethnographic methods are in this way perceived by the company as a tool to persuade and create willingness in private end user behaviour. Demonstration projects thus are more concerned with gaining insights about how to control the users' behaviour than understandings of electricity users everyday use practices. The ethnographic and anthropological contribution in the demonstration project is therefore limited and based on the premises of a predetermined design rather than the premises of the users, ethnographic methods and anthropological methodology (Donovan and Gunn: 2012: 8).

ENTERING INTO THE ANTHROPOLOGICAL DESIGN STUDIO

In parallel with conducting research for the energy company on private end user use of electricity Løgstrup became interested in the way the energy company took up or did not take up end user knowledge and how the demonstration project in the company located end user knowledge in a predetermined system based upon a unidirectional paradigm. Løgstrup entered into another field site (Marcus 1995, 2011) to explore the energy company responses to the private energy user challenge. This parallel collaboration was with researchers from SPIRE - a research centre in participatory innovation at the University of Southern Denmark. The collaboration consisted of: Nelson-Burk, Mosleh and Gunn and a group of twelve interaction design students engaged in a first year course in ethnography within a faculty of engineering. On this background our focus and aim evolved around creating awareness among multiple stakeholders in the energy company that the customers (the private energy end users) are not detached from the company. Rather, they are customers in a specific way based on the character of the relation that the company has to them.

Based on collaborative design activities within the context of The Ting (SPIRE's collaborative designing place) and the first year interactive design student studio, we began to identify ways of addressing the private energy user challenge that consisted of an aim to engage the company in an anthropological reflection toward reframing the relation between the company and the private end user.

THE DESIGN STUDIO PROCESS OF REFRAMING THE COMPANY'S RELATION TO THE USERS

Marilyn Strathern (1995) describes how the relation has been a key concern in anthropology since the mid-20th century. Strathern (1995) explains how the concept of the relation in anthropology historically has developed to include both the person and an abstract idea of a connection (21). It is often with the focus on the relational character of entities that people with an anthropological training enter sites of fieldwork, which is also the case in our example. So when Løgstrup was employed as an anthropologist in the Scandinavian energy company the anthropological concept of the relation influenced her understanding of the worlds of energy production, distribution and sales. In reframing the relation between the company and the private end user, we also build on Gunn and Clausen

(2013), Kjærsgaard and Otto (2012), Kjærsgaard (2013) and Leach and Davis (2012) research. The quality of the concept of reframing is that it pinpoints one of the basic qualities in design anthropology: an ability to make explicit existing frames and definitions of categories in a specific context. In this way the concept of reframing is bound to a learning objective where the goal is to enable the company to learn about their own organization and how wider conditions influence their business models and conceptualizations of innovation.

Reframing is not new in anthropological theory (Bateson 1972: 188, Goffman 1986 [1974]) or in the EPIC community (Venkataramani and Avery 2012). However in our approach to reframing the relation between the company and the private electricity end user we propose differs itself in the way that it is based on a long-term fieldwork in combination with a design aim in a collaborative setup with the company. Here the design studio was an extension of the field site. Our methods include different ways of mapping and generating ethnographic materials. To be more precise, we build and make tangible the intangible potential of reframing the relation through mock-ups of the electricity smart grid and the bi-directional character of the smart grid including how the private energy end users were connected to the grid; and we experiment with different ideas of how private energy end users could become participants in the designing of the electricity smart grid; we map all the differing perspectives about users which are present in the company and have tried to engage this with the everyday experiences of the energy users. In parallel, we explored different ideas of what constitutes employee learning in the company concerning building customer relationships. Design experiments have been used to find different ways of how to make the bi-directional relationship character of the company's relation visible to the company in order to engage them in a reflection that would be meaningful and have effect within the company. At the same time, we discuss how different theoretical and methodological concepts from design and anthropology can inform the discussion and recast our own assumptions about the company's relation to the private energy end user.

DESIGNING FLEXIBLE CATEGORIES INSTEAD OF FLEXIBLE USERS

The energy company uses the word flexibility to describe how they wish private energy users to act in order to obtain the company goal of designing an operational electricity smart grid. When the company talks about borrowing the energy users flexibility they use a formulation as if the company wanted to borrow a cup of sugar, which would be something that the users could easily consider if they wanted to lend their flexibility to the company. At the same time energy users would also be aware of the consequences of lending sugar to the company.

This is not the case however while lending out your own and your family's flexibility (meaning allowing the company to take charge of electricity devices and electricity use in the home at specific times during the day). The borrowing concept implies that you will be given the flexibility back, when the company is no longer using it. But in fact, the company is not just borrowing the families ability to use electricity, they are changing the families' everyday life practices and relations to each other, which is the case when the mother discussed earlier is not able to turn on the light in her baby's room. What the energy company is calling

flexibility you could therefore also call a reformulation of the energy users' free will and choice. Why should the energy users compromise their freedom, change their everyday practices and create conflicts in the family? The amount of money the family would save is so small that it is not a motivation factor. Should the families then be motivated by the company's aim to save money on distribution cables? Although the company is predominantly owned by the Danish state and as such had a public responsibility, this was not something the users valued to the extent where they wanted to make a change in their electricity behaviour. Our argument would be that private energy users could only be motivated if the purpose for participating in the smart grid was meaningful to them in a way where they are considered as partners instead of 'loads' that need to be dealt with on the premises of the system and the company.

Changing habits is not as easy a task as our company seems to imagine. What we suggest therefore is bending the relation instead of bending the users in an anthropological co-analytical process of creating a flexible company scenario instead of creating flexible users. By creating a flexible company scenario we mean making the categorization of the users inside the company as a load tangible. These scenarios have to be recognisable for the company employees who they are intended for, while at the same time they should also contain a condensed meaning that is present in the company and bring to the fore the relational character of the company connection to energy users. From this background we have experimented with different ways of making company scenarios tangible in order to be more accessible to the company employees. We imagined the company scenario to be a part of a company-learning program. 'Balancing the Electricity Smart Grid without Unbalancing the Family', which has provided a theme for a range of company workshops.

In this scenario there is an element of provocation (Sitorus and Buur 2007, Boer 2012) because we as researchers are aware that the company and private end user perspectives are not easily matched, which has become apparent through co-analysis of materials generated through Løgstrup's fieldwork. We have also concluded that some form of provocation is required for the company to reflect critically upon their relation to the energy users because the unidirectional paradigm dominates and underpins the company's organisational structure.

We will, however, add an element of flexibility to the scenario to support the activity as a co-creation activity between researchers and company employees where our intent is not to showcase our analytic result but instead to encourage the employees to do the match or non-match between the user categorisations of the company, the user practices and the bidirectional future themselves.

The idea behind making the energy company scenario is to integrate Marcus's (2008) concept of incompleteness into the design of the reflective tool in order for the company to revise their own user categorisations and move towards ownership of their anthropological insight during the scenario process. Through this exercise our goal is to design an anthropological reflection based upon ethnographic imagining with the various stakeholders about their relation to the users. In this way we have designed a scenario for the company to interact with as part of their own reframing process (Bateson, G. 1972: 191-192). We do not question the overall idea of the sustainable electricity smart grid in itself because there is potential in designing more sustainable energy production and energy use. However, in this

process of designing there exists an innovative potential for a wider range of public agency, and a business potential for alternative energy solutions.

MATERIALS FOR ENGAGEMENT, REFLECTION AND REFRAMING

In the paper we have argued that design has occurred before ethnography during Løgstrup's long-term fieldwork in the energy company and in our collaborative research inquiry. However within design activities in the company and through our collaborative designing activities (including co-analysis) in the design studio anthropological theoretical concepts have played a central role in designing materials for engagement, reflection and reframing. For example Gatt and Ingold's (2013) concept of correspondence and their idea of dialogic products combined with Marcus's (2008) concept of incompleteness has enabled us, as researchers, to design materials for generating anthropological reflection within the company towards reframing the relation (after Strathern 1995) between the company and the private end user.

REFERENCES CITED

Barth, Fredrik.
2002 "An Anthropology of Knowledge." Current Anthropology 43 (1): 1-18.

Bateson, Gregory.
2000 [1972] "A Theory of Play and Fantasy." In *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution and Epistemology*. Pp. 177-193. Chicago: University of Chicago Press.

Boer, Laurens
2012 "How provotypes challenge stakeholder conceptions in innovation projects." PhD Diss., Mads Clausen Institute, University of Southern Denmark.

Bourdieu, Pierre
1977 [1972]. *Outline of a Theory of Practice*. Richard Nice, trans. Cambridge: Cambridge University Press.
1990 [1980] *The Logic of Practice*. Richard Nice, trans. Cambridge: Cambridge University Press.

Buur, Jacob and Larisa Sitorus
2007 "Ethnography as design provocation." In *Ethnographic Praxis in Industry Conference 2007 Proceedings*. Pp. 140-150. Keystone, CO, USA, October 2-6, 2007.

Donovan, Jared and Gunn, Wendy
2012 "Moving from objects to possibilities." In *Design and Anthropology*. W. Gunn and J. Donovan, eds. Pp. 121-134. Farnham: Ashgate.

Farhangi, Hassan
2010 "The path of the smart grid." *Power and Energy Magazine* 8 (1): 18-28.

Geelen, Daphne, Angele Reinders, and David Keyson
Forthcoming "Empowering the end-user in smart rids: Recommendations for the design of products and services." *Energy Policy* 61.

Gellings, Clark.W.
2009 *The Smart Grid: Enabling Energy Efficiency and Demand Response*. Lilburn, GA: Fairmont Press.

Gatt, Caroline and Tim Ingold
Forthcoming "From description to correspondence: Anthropology in real time." In *Design Anthropology: Theory and Practice*. W.Gunn, T. Otto and R.C. Smith, eds. Pp 139-158. London: Bloomsbury.

Goffman, Erving
1986 [1974] *Frame Analysis: An Essay on the Organization of Experience*. London: Harper and Row.

Gunn, Wendy and Christian Clausen
Forthcoming "Conceptions of Innovation and Practice: Designing Indoor Climate." In *Design Anthropology: Theory and Practice*. W.Gunn, T. Otto and R.C. Smith, eds. Pp 159-179. London: Bloomsbury.

2012 "Reframing what innovation could be: Observation, juxtaposition and challenging taken for granted assumptions," Abstract. In *Proceedings of International People Environment Studies Conference*. IAPS 2012, Glasgow, 24-29 June, University of Strathclyde, Scotland.

2012 "What does this mean to industry?" In *Making Indoor Climate: Enabling People's Comfort Practices*. J. Buur, ed. Pp 31-35. Mads Clausen Institute, University of Southern Denmark: Denmark.

Gunn, Wendy and Jared Donovan
2012 "Design anthropology: An introduction." In *Design and Anthropology*. W. Gunn and J. Donovan, eds. Pp 1-16. Farnham: Ashgate.

Kjærsgaard, Mette and Ton Otto
2012 "Anthropological Fieldwork and Designing Potentials" In *Design and Anthropology*. W. Gunn and J. Donovan, eds. Pp 177-191. Farnham, Surrey: Ashgate.

Kjærsgaard, Mette
Forthcoming "Transforming knowledge and design concepts in the design workshop." In *Design Anthropology: Theory and Practice* W. Gunn, T. Otto and R. C. Smith, eds. Pp51-67. London: Bloomsbury.

Leach, James and Richard Davis
2012 "Recognising and translating knowledge: Navigating the political, epistemological, legal and ontological." *Anthropological Forum* 22 (3): 209-223.

Lin, Chen-Chun, Chia-Han Yang, and Joseph Z Shyua
2013 "A comparison of innovation policy in the smart grid industry across the pacific: China and the USA." *Energy Policy* 57: 119-132.

Marcus, George
1995 "Ethnography in/off the world system. The emergence of multi-sited ethnography." In *Annual Review of Anthropology* 24: 95-117.

2008 "How short can fieldwork be?" *Social Anthropology* 15 (3): 353-357.

2011 "Multi-sited ethnography: Five or six things I know about it now." In *Multi-Sited Ethnography: Problems and Possibilities in the Translocation of Research Methods*. S. Coleman and P. von Hellerman, eds. Pp 16-34. London: Routledge.

Massoud, A.S. and B.F.Wollenberg
2005 "Toward a smart grid: power delivery for the 21th century." *Power and Energy Magazine* 3 (5): 34-41.

Mundaca, Luis and Lena Neij
2010 "A meta-analysis of bottom-up ex-ante energy efficiency policy evaluation studies." In *From the Selected Works of Luis Mundaca.* Accessed July 12, 2013. http://works.bepress.com/cgi/viewcontent.cgi?article=1021&context=luis_mundaca.

Shove, Elizabeth
2010 "Beyond the ABC: climate change policy and theories of social change." *Environment and Planning* 42: 1273-1285.

Strathern, Marilyn
1995 *The Relation: Issues in Complexity and Scale*. Cambridge: Prickly Pear Press.

Strengers, Yolande
2012 "Peak electricity demand and social practice theories: reframing the role of change agents in the energy sector." *Energy Policy* 44: 226-234.

Venkataramani, Arvind and Christopher Avery
2012 "Framed by Experience: From user experience to strategic incitement." In *Ethnographic Praxis in Industry Conference 2012 Proceedings*. Pp 278–295. October 14-17, 2012, Savannah College of Art and Design.

Verbong, Geert P.J., Sjouke Beemsterboerand Frans Sengers
2013 "Smart grids or smart users? Involving users in developing a low carbon electricity economy." *Energy Policy* 52: 117-125.