

Understanding Local Energy Initiatives and Preconditions for Business Opportunities



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Summary

More and more local bottom-up energy initiatives are emerging. Those involved encounter many barriers during the realization of their ideas. As the generation of renewable energy is mostly included, these local initiatives contribute to the targets set at regional, national & EU level. At the same time, they are an indication that end-users themselves want to be part of the energy transition. What are the reasons for citizens to organize themselves and start an initiative? What kind of barriers do they encounter? What does this mean for roles and responsibilities of professionals? And to what kind of opportunities does this lead for products and services? Answers to these questions provide a solid starting point to develop methods and instruments to stimulate, facilitate and upscale local energy initiatives.

This paper bundles the outcomes of three workshops and three additional interviews in the Netherlands as part of the European E-hub project. Conclusions can be drawn on needs and drivers, barriers, risks and solutions (lessons learned), possible roles for professionals and opportunities for new products and services.

Keywords: local energy initiatives, drivers, needs, roles, opportunities



Methodology

The above mentioned workshops and interviews were held in order to gain insight in barriers, drivers, roles and opportunities of various parties on demand and supply side. In the interviews, three cases were addressed located in The Hague (Couperus), Hoogkerk close to Groningen (PowerMatching City) and Culemborg (EVA-Lanxmeer). The workshops were held from the perspective of parties representing the demand-side and local bottom-up initiatives, parties involved in the production, distribution, transport and supply of energy, and a workshop dedicated to a local authority.

Results and Conclusions

An increasing amount of local energy initiatives is emerging. Drivers to set up a local energy initiative vary from a concern about energy prices, a desire to have control over their own energy supply, a wish to jointly save energy, a concern about the environment, a wish to realize more efficient energy generation and to improve quality of life for their community and to increase social cohesion. Another driver is dissatisfaction with the energy services of large companies. At the same time municipalities are setting their own sustainability goals in which the local energy initiatives seem to fit.

The transition towards a new energy system will cause all kind of changes. At the moment the following can be observed; roles of new and existing involved parties will have to be (re)defined. Small businesses are emerging that operate on a local level as an interface between local initiatives and conventional energy companies. They can for example take over the exploitation of a small electricity grid line. Roles of the municipalities and housing associations will be mostly facilitating.

Many risks are present. In smart technology projects insufficient support from residents can occur due to technology push, for example. The lack of understandable information on the applied system can form a big hurdle in the acceptance. Another risk that undermines support is if participants feel unheard when it is not clear to what extent they can influence the process. Teething troubles with new technology should be avoided since it causes participants to pull out. A supporting infrastructure should be ensured through for example local SMEs that are dedicated to service residents. It will be difficult to measure progress in a project without knowing the status quo at the point of departure. Further, legislation does not follow the innovative solutions development as quickly. The consequence is that sometimes, breaking the law cannot be avoided as a manner to expose the shortcomings in the legislation and achieve that authorities start considering the necessary amendments.

There are also risks for local initiatives. To give some examples: the competence of citizens who fulfil a role in the initiative is not always up to standards and there is a danger of hostile take-overs of companies founded by the initiative. An important success factor is often the influence of enthusiast individuals. Sharing responsibilities with more people can lower the risk that the initiative collapses when the individual stops or moves.

As for barriers, legislation and regulations can be mentioned, and the granting of permits, split incentives, missing knowledge of procedures or technical issues. Another barrier is access to finance. There is a need for new financial constructions. It is very difficult to get banks involved in the financing of local initiatives. One of the reasons is that the investments necessary are relatively small and the way banks are currently organized does not allow for the management of a portfolio of small loans. One of the solutions would be to somehow bundle small loans of several local initiatives. Housing associations see the legal requirement that 70% of residents has to agree with a proposed measure as a big barrier. A lot of unexpected barriers will rise when starting an energy initiative anyway. A local energy initiative representative therefore recommends:

“Just start, do not let them blow you away!”

On the other hand, this transition period brings about unknown opportunities for the end-users who become prosumers, SMEs and not to forget, the established large energy suppliers and distributors. New products and services like charge-my-car or ESCO-services are emerging. A minimum energy package for everyone with agreements on flexibility of supply could become a possibility soon. It means that end-users agree that energy is not available on certain moments. A commercial party could offer additional energy services against additional fees. Shares in the energy production can be bought instead of paying the bill based on the amount of energy used. As a result, the investor reduces his energy bill and new capital will become available for investments in renewables.

Other products and services will appear, too. Case managers, either independent people or people coming from consultancy, who would support a local initiative by providing the right expertise and by helping with procedures, would be welcome.

When implementing smart grids, the users should get the possibility to access the market. Now, the risks (profit and loss) are covered by the energy supplier who, for example, does not pass on the price fluctuations. At the moment price incentives for accepting smart solutions like timing the wash machine with automatic control are too low. This can change in case energy prices increase dramatically.

The number of participants involved in the workshops and interviews held is for obvious reasons rather limited. And, of course, the parties involved represented only the Dutch situation. The expectation is, however, that this is enough to formulate the first preliminary conclusions. On this, a first draft of a framework can be build that is fit for the development of new products and services.

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1. Introduction

1.1 Context

In the past, there have been initiatives in communities to generate their own renewable energy. These were merely regarded as pilots or of no real importance to the rest of society since they were initiated by people with an 'alternative' lifestyle. In the recent years, the number of local renewable energy initiatives is increasing dramatically. To illustrate this: in the Netherlands there were about 50 of them in 2011, halfway 2012 there were 300 and end 2012 there are 1500 existing and starting initiatives knownⁱ (www.hieropgewekt.nl/initiatieven) and their number is still growing rapidly. More initiatives in other EU member states can be found on the website of the European Rescoop project (www.rescoop.eu) [1].

This development is triggered by changes in the market, ICT opportunities and new technologies, legislation regarding distributed energy generation, incentives and not to forget the crisis and rising energy prices. Furthermore, our energy system is changing towards a smart grid system. Smart energy systems require a new framework in which technological, societal and institutional innovation interplay. The current framework of institutions, organizations and technologies is built to facilitate the incumbent structure. Energy generation and distribution centrally managed by several large companies is the current practice.

At the moment new approaches are emerging that will determine the set-up of our future energy system. How will the intelligent energy grid look like from the perspective of bottom-up initiatives? What kind of products, services and support do we need from companies and public institutions to make this a success? What needs to be changed in order to make this happen?

Energy service companies, distribution system operators (DSO's) en transmission system operator (TSO), energy production and supply companies contemplate on their role and their opportunities. They are looking for ways to deal with the increasing imbalance in the grid due to the increase of renewables. Companies are investing in new products and experimenting with ESCo's. Do these fit in with the needs of prosumers and the new emerging local energy initiatives?

1.2 Research is part of the E-hub project

This research was executed as part of the E-hub project. The E-hub project (EU FP7; www.e-hub.org) is developing a new type of district energy infrastructure consisting of advanced systems for matching supply and demand of energy including advanced heat storage technologies such as TCMs (Thermo Chemical Materials). The E-hub concept will be demonstrated at full scale in the district of Tweewaters, Belgium. To achieve low energy or even energy neutral districts, the share of renewable energy must increase drastically. As still more renewable energy will be produced locally, both smart energy management systems and energy storage are necessary.

The objective of the E-hub project is to maximize the amount of renewable energy in a district while using the above mentioned technologies. For acceptance of such an innovative system, it is crucial to develop new business models and service concepts that are attractive to all stakeholders. An important element is the acceptance of such an advanced energy system by the end-users. The interviews and workshops used in this paper were part of the activities conducted to study the possibilities (and limits) of how that can be achieved.

2. Theoretical framework

The emerging bottom-up initiatives matter to both research and policy making [2,3]. They are seen as an important first step in active citizenship that is promoted as a solution to diminishing of public budgets [4,5]. They are seen as well, as a sign that society is changing under the influence of individualisation and digitalisation [6,7]. Parallel to processes of government, governance processes are appearing [8]. In governance processes all sorts of parties form partnerships, which can include government to realize public goals. The direct involvement of a government party is no longer a necessity. In the government model, the role of citizens was limited to test policy and co produce policy at special determined moments during procedures. With governance room in policy has increased considerably and citizens are able to get involved in the processes as an equal party. This leads to a network society in which organisation processes are increasingly of a bottom-up nature.

An outlook on how our energy future could look like has been described by Rifkin. Rifkin [9] argues that conjoining Internet communication technology and renewable energy technologies is giving rise to a Third Industrial Revolution. The entire system will be interactive, integrated and seamless. This interconnectedness is creating whole new opportunities for cross-industry relationships. And, Rifkin argues, the Third Industrial Revolution brings about a new era of "distributed capitalism" in which millions of existing and new businesses and homeowners become energy players.

3. Methodology

In the Netherlands, three workshops and three interviews were held by ECN and TNO in order to gain insight in barriers, drivers, roles and opportunities of various parties from both the demand side and the supply side. In the interviews, three cases were addressed located in The Hague (Couperus), Hoogkerk (PowerMatching City) and Culemborg (EVA-Lanxmeer). The workshops were held from the perspective of parties representing the demand-side and local bottom-up initiatives, parties involved in the production, distribution, transport and supply of energy, and a workshop dedicated to a local authority. To summarize:

1. Couperus interview
2. Hoogkerk interview
3. EVA-Lanxmeer interview
4. Supply-side workshop
5. Demand side workshop
6. Municipality workshop

3.1 Couperus interview (i1)

Interview with a technical consultant involved in the lay-out of a smart thermal network.

In the Couperus project in The Hague about 300 dwellings are involved. Heat pumps are used for heating in combination with ground source collectors. The heating demand of the whole system can be controlled by postponing the demand for a short period of time without the inhabitants noticing change in the comfort levels. This allows the balance responsible party to steer electricity demand of the heat pumps. It is possible to deliver heat to the coldest dwellings first. Agreements were made on preconditions and timeframe in which the demand can be altered. [10]

3.2 Hoogkerk interview (i2)

Interview with a consultant involved in the lay-out of a smart grid.

The PowerMatching City consists of 25 interconnected households equipped with micro cogeneration units, hybrid heat pumps, solar panels, smart grid appliances and electric vehicles. Additional power is produced by a wind farm and a gas turbine. The underlying coordination mechanism is based on the PowerMatcher, a software tool used to balance energy demand and supply. The aim is to extend this coordination mechanism in such a way that it can support simultaneous optimization of the goals of different stakeholders: home optimization for the prosumer, reduction of network load for the distribution system operator and reduction of imbalance for program responsible utilities. [11]

3.3 EVA-Lanxmeer interview (i3)

Interview with a Managing Director involved in the buying and extension of the thermal network of Thermo Bello

Residents that initiated the founding and construction of the sustainable neighbourhood EVA-Lanxmeer bought the thermal network from their water company. This thermal network provided their houses (170 dwellings), some companies and public organizations (5 additional buildings) with heat. The water company put the thermal network on sale since it did no longer fit in their corporate strategy. The residents worried that the new owner might increase the rates considerably. They decided to buy it in order to secure energy at affordable prices. It was decided that residents are free to financially participate in their new energy company. The network has already been extended to another neighbourhood. [12]

3.4 Supply-side workshop (w1)

This workshop was organized by TNO with representatives from energy companies (production & supply), energy service providers, a TSO company and DSO companies to reflect on possible scenarios for the network enabling bottom-up renewable energy initiatives.

Point of departure for this workshop was to think of a new set-up for the electricity system in the Netherlands in order to facilitate local bottom-up renewable energy initiatives. Goal of the setting was to explore the possibilities for steering while facilitating the development of regional and local networks and realizing the societal benefits of smart grids. Basic assumptions were that on a regional level, people should be free to make their own choices and that economic principles can be used to steer people to preferable outcomes. [13]

3.5 Demand-side workshop (w2)

A workshop organized by ECN and TNO with participants from different perspectives on the demand side. The participants represented housing associations, local energy companies, initiatives of citizens, lawyers, residents, research institutes and universities.

The workshop started with two presentations on the experiences of local energy initiatives in Hoonhorst (www.duurzaamhoonhorst.nl) and Texel (www.texelenergie.nl). Texel Energy is involved

in solar power, wind turbines, manure fermentation, district heating on pruning and a smart grid pilot. Hoonhorst has initiated 17 projects which include solar power, district heating, fibreglass to facilitate e.g. care-to-the-home, bio fuels, biogas from manure, reduction & harvesting of waste, grey water system, village garden etc. Two parallel brainstorm sessions were held; one with people from the perspective of people in local initiatives and one session from the perspective of parties supporting or facilitating local initiatives. Objectives were to explore desirable scenarios and to make an inventory of needs, opportunities and possibilities for products and services in a future intelligent energy system. [14,15]

3.6 Municipality workshop (w3)

The workshop was organized by TNO with representatives from different departments in a local municipality.

At this workshop, departments for climate policy, environment, construction & housing, and e-mobility were present. The given municipality has formulated ambitious environmental goals for 2025 and is looking for ways to realize those. Workshop objectives were the further clarification of interests, role of the municipality and identification of new opportunities. [16]

4. Results from the interviews and workshops

The conclusions of the workshops and the interviews are clustered under the following headlines: needs and drivers, roles and responsibilities, risks, barriers and solutions (lessons learned) and opportunities for new products and services.

4.1 NEEDS & DRIVERS

Needs and drivers for parties in the supply chain are addressed in the report Business Models for Smart Energy [17] produced for the E-hub project. These drivers are not repeated here, only those of consumers or end-users, bottom-up initiatives, municipalities and housing associations.

4.1.1 Changing consumer needs

There is an emerging tendency among consumers to invest in private energy generation. (i3, w1, w2). Around 10% of end-users are interested to own energy generation equipment (w1).

4.1.2 Reasons to start local bottom-up initiatives:

- concern about energy prices or exploitation costs for dwellings in the future (w2)
- to improve the quality of life for the community (w2)
- to improve social cohesion (especially in areas with declining population) (w2)
- the urge to do something together (is considered great fun!) (i3, w2)
- as a means to jointly save energy (i3)
- control over own energy supply (i3)
- concern about the environment (w2)
- People are not satisfied about how large energy suppliers work. One pointed out that during the liberalization of energy market, a lot went wrong. Companies were not used to clients changing over to other suppliers. (w2) Now that these companies have become anonymous entities driven to maximize profit, some people feel the need for an alternative which allows people to get involved (i3).
- A group has more power than an individual and energy supply for a group can be more efficient. (w2)

Formulating mainsprings is important. In the Hoogkerk project, the mainspring is "Green". A partner from Germany, MVV Energie, has "Innovative" as a mainspring. In Mannheim, where the headquarters of the company is located, the mainspring is: "MVV is our company", because employees have shares in MVV Energie. "Sustainable" could be a mainspring, too. In Hoonhorst, the mainspring could be "Proud of Hoonhorst". (w2)

4.1.3 Municipalities

Many municipalities are setting additional goals regarding sustainability and climate. The municipality used to formulate environmental goals as a separate policy line. The experience was that this made it very difficult to involve other departments of the municipality and other stakeholders. It is not possible to realize the set of environmental goals on your own as a municipality. These environmental goals are now an integral part of other policy plans. Environmental goals are reframed to sustainable liveability, sustainable health and sustainable safety. Support within the municipality has grown considerable as a result. (w3)

Question remains how to mobilize companies and citizens to increase sustainability goals in their own organization or household. (w3)

4.1.4 Housing associations

Housing associations often wish to distinguish themselves from their competitors and to address the most important driver for tenants: affordable living expenses. In the future, energy bills are expected to rise, therefore solutions are sought to control these costs. (w2) It needs to be explored how tenants can be actively involved in the realization of energy goals. (w2)

4.2 ROLES & RESPONSIBILITIES

Decentralised energy generation requires a much more active role of different parties who have remained passive up to now. New parties are also joining in. (w1) Each stakeholder needs to redefine its own role. (w1)

4.2.1 New parties

Local bottom-up energy initiatives are emerging. Local energy production brings about advantages for conventional energy companies (DSO's, TSO's and energy retailers) like possibilities to support consumers in energy saving, decentral balancing and reduction of transport costs due to the fact that generation and consumption of energy will take place at the same location. (w1) It turns out that successful initiatives are often from close small communities. At the heart of these initiatives are often one or two enthusiast leaders who can mobilize the community to realize local ideas. These close communities stick to their own surroundings and people usually are prepared for more sacrifices for their village, quarter or ward than people who do not have a bond with the locality where they live. This leads to a kind of urge to do things themselves as much as possible, with little external interference. People prefer not to be patronized by organisations or the government and be dependent. Instead they want to decide themselves on matters that affect their surroundings and they like to decide on ways to take action. People wish to be involved in the decision process already in the early stages. Furthermore, an important element is increasing community spirit. (w2)

Parties supporting local initiatives and new businesses will emerge e.g.:

- Usually new players are small businesses that operate locally (decentralised) and on a small scale. They sell solar modules, for example. These new players often find a position between the end user and the energy supplier/grid operator (w1). Texel Energie, for example, has contracted out the grid balancing. (w1)
- Decentralised generation can lead to congestion on the grid. If this is not solved by the grid operator, the consumer may even end up paying more than before. The grid operator can also contract this out to new parties. (w1)

4.2.2 Existing parties in the supply chain

Current developments lead to changes in roles and responsibilities of existing parties that use, create maintain, operate and manage the current electricity system. Ideas and thoughts that emerged from the workshops and interviews are mentioned below.

Network management and production are divided in the Netherlands, this makes optimization difficult. Splitting up of these two activities was imposed by law some years ago (with a corresponding resistance of the energy companies), but apparently these parties still prefer the old situation since the question was posed: Can we think of providers able to combine both functions?

(w1) There is infrastructure available, but balancing should be organized regionally with the responsibility and alignment with the national grid. (w1)
National distribution grid should remain under the responsibility of the Dutch TSO, TenneT. Regional networks should ideally be under the responsibility of a regional public party. Underneath the regional party, several commercial parties can reside. (w1)

The grid operators need to change the way they are monitoring and react to new developments (such as to the mentioned congestion on the grid which can be solved by placing batteries for storage to prevent congestion). The grid operator needs to identify a suitable business case, but cannot pass the risks to the end users. The grid operator is allowed to hire another party to take care of the grid management. For example, another player could start exploiting a small line. This does require different business models. Frictions may also arise between current cooperating companies since roles will change and current ways of collaboration will have to be redefined. (w1)

There is a difference between social ties in a village and social cohesion in a town or a city, which usually is not as tight. In a town or a city, the local lower authorities or housing associations could or should get involved. (w2) The roles they can or should take on are not clear yet. On the lowest administrative level (e.g. city council) support for local initiative could or even should be organized. The city council could or should create financial instruments in order to support local energy initiatives. Furthermore, provincial institutions dedicated to environmental goals could support the initiatives through their web sites. Using the community spirit is also important. (w2)

Possible roles of the municipality:

- When commercial parties take initiative or are prepared to do so in order to achieve certain environmental goals, the role of the municipality is mainly one of a facilitator. (w3)
- The municipality chooses to take on the role of an initiator in order to realize strategic ambitions formulated by the city council. This municipality for example, sees opportunities related to electric mobility. (w3)
- Creating incentives to stimulate people to get involved in local bottom-up initiatives. Financial incentives should be created or facilitated by municipality. (w3)
- Setting an example. People dealing with sustainability see energy saving measures and renewable energy technologies in the municipalities' property portfolio as a way of setting example for other stakeholders. (w3)

Possible roles of housing associations:

- Facilitating. To help organize. For example to arrange excursions in order to learn from other local initiatives and promote knowledge exchange (w2)
- To provide choice for tenants (w2)

There are still a lot of questions concerning the role of housing associations in this respect.

4.3 RISKS, BARRIERS AND SOLUTIONS (LESSONS LEARNED)

4.3.1 Risks

The risks involved are related to very different aspects, as the overview below shows:

- Insufficient support from residents.
In the Power Matching City pilot 1 (PMC 1), so-called 'technology push' was conducted. Within 2-3 days all households were equipped with smart energy technology. The action was prepared through a number of meetings with participants. In retrospect, the technical team responsible for the implementation of the Power Matcher would no longer choose a technology push approach, but would prefer instead to find out first what participants want. They are convinced that a lot of attention should be given to inform people involved in the pilot. It should be taken into account that simple things may not be clear and are too complex to grasp for the residents. They also recommend launching a project only when there is social support. Information meetings are important. You can also start a blog where people can

exchange experiences and ideas. They should be free to say whatever they want. It is useful to look into this blog and to respond if necessary. (i2) End-users should also be allowed and encouraged to participate actively in the process. This was also done in the second pilot (PMC 2) project. (i2) to avoid resistance due to the technology push approach as occurred in the first phase of the project (PMC 1).

- The available social support structure can collapse.
In the first stage of the Power Matching City pilot project (PMC 1), the initiators had no idea about possible responses of the participants, the end users. The project team first contacted the local authorities to find a suitable location. Hoogkerk was soon identified as a suitable location, because a sustainability committee was already active with various projects in the district. Through the residents' association, the idea was brought about. Unfortunately, the sustainability committee has later been discontinued. (i2) In stage 2 (PMC 2), things were approached differently. Groene Power – a SME that sells solar modules – has been contacted. Groene Power is used to contact residents in the area. (i2) Another communication channel in stage 2 was the residents' association. There, they were able to convince people to install solar modules that feed-in into the existing grid. (i2)
- Difficulties to measure progress.
An incomplete overview of the situation at the start makes it difficult to indicate progress made in the project. Tip – start with the recording of important parameters at the start to set a reference. (i2)
- Teething troubles with new technology.
When experimenting with new technology equipment, the question emerges how to deal with the guarantee for appliances. Have they been tested? Are they functioning properly? In the PMC project, household appliances worked with the Energy Service Gateway (ESG) system for 'Automatic Meter Reading', i.e. measuring of gas and electricity use. The communication with ESG did not function well because the system was not equipped for this. As a result, people were pulling out. The producer was aware of the problem, but nevertheless, it was applied. This is a potential risk. (i2) At the time (2009) there were no smart meters that met the requirements of the project. (i2) Tip – pay enough attention to problems people may have with the appliances and ensure that the technology is functioning well, otherwise participants will pull out. (i2)
- Legal issues.
Legislation lags behind with the development of innovative solutions. Care should be taken that the innovative solutions tested do not break the law. In some cases it is unclear whether this would be the case. When conducting a pilot project that might raise legal issues, the consortium needs to take full responsibility for this risk and should not transfer it to the participating residents. (i2) Tip from local energy initiatives: when your plans not fit in the rules and laws, do it anyway. It will expose existing regulations that hinder the future intelligent energy supply. When exposed these rules and regulations can be criticized. Make sure you keep politicians posted of your actions when you do. (w2)
- Participants can feel unheard.
Participating end-users need to be convinced that they have influence on the process. It should be made clear to what extent and on what elements the participants can have influence. If this is not the case some people will become unsatisfied because they will develop the impression that the consortium did not have the intention to listen. (w2)
- Unclear benefits.
Participants are not aware of the advantages of new solutions and business models. For end-users it is not always obvious whether or not a technical solution and business model is advantageous to them. Especially for local district heating projects where projects are set up in which dwellers have no choice, this leads to questions and feelings of uneasiness. (i1) An example is a project of dwellings with a local district heating system on solar energy. Residents have a contract with the EScO company, which is responsible for production and

distribution. It remains also unclear what happens in case of bankruptcy of the ESCo. Will the residents still be able to heat their houses? (i1)

- Fragmentation in the supply chain.
The current fragmentation in the supply chain of the construction industry hampers innovation. Every next party in the supply chain can question the necessity of an innovative solution chosen in the project. Since innovation can influence the work of several parties involved, it can be difficult or almost impossible to introduce an innovative solution. (i1)

Some examples of risks for local initiatives:

- In local initiatives, the knowledge and / or competence of people that offer help can be insufficient. This can cause problems since it is difficult to tell your friendly neighbour that he or she is not suitable for a specific task. (w2)
- Some local initiatives feel it is very important to protect the companies founded by themselves from hostile take-overs. (w2)
- Local energy initiatives experience that the energy market is very complicated and it is not easy to earn money in this sector. (w2)
- The current economical and social system is not tailored for local initiatives. The process needs to be facilitated and people need guidance, but this cannot be enforced. Developments in solar modules, for example, are progressing so rapidly at the moment that it is difficult to facilitate the dissemination of information from a central system. These new developments require continuous updates of the available information. (i2)
- An important success factor in the development of local energy initiatives is the influence of enthusiast individuals. This is immediately a big risk too, since when this person stops or moves, the continuation of the initiative can be in danger. Sharing responsibilities with more people can lower the risk. (w2)
- Authorities have a different pace. They also have different interests to look after. A representative of a local energy initiative therefore recommends that authorities should not be involved directly. Another initiative advises to develop good relationships with local authorities instead. (w2)

4.3.2 Barriers

There are multiple reasons why one would like to start a bottom-up initiative, but there also are several barriers:

- Difficulties with legislation, regulations and the granting of permits

Most desired change is in the field of legislation and regulations. The current legislation is tailored to yesterday's situation in which the interests of households and small companies have to be protected against those of large energy companies. (i3) Legislation and regulations therefore do not correspond with the needs of local initiatives. (i3) As a result the government is more a barrier than a facilitating factor. There is a little overview of possibilities ("There is no one to answer questions" and "everybody says something else"). Further, due to circumstances and (subsidy) regulations changing frequently, many things are unnecessary unclear. Therefore there is an overall wish for a related policy that is continued for several cabinet periods. (w2) Granting of permits can be problematic because of insufficient knowledge of civil servants and officers. Especially in small municipalities the local energy initiative is usually the first to ask whether a biomass production unit can be installed or a wind mill. (w2) It is interesting that housing associations prefer residents to come with ideas rather than imposing the ideas top-down themselves. Housing associations see the legal requirement that 70% of residents has to agree with the proposed measurement as a big barrier. (w2)

- Lack of information, problems of getting the necessary information combined and lack of intermediary parties.

Another barrier is that often there is a lot of knowledge of procedures or technical issues necessary. This information is scattered around, not accessible by consulting one person and usually it is not clear where it can be found. (w2) A lack of intermediary parties is experienced. For example some tenants think that the lessors should take the initiative. (w2) Little research is available in the field of social innovation and there are only few instruments to help you with what you should do and how you should do it. (i2)

- Difficulties defining suitable business cases

During one of the workshops an example was given of a Science Park. Here it was difficult to construct a business case. Earning back the necessary financial investments proved difficult due to split incentives. (w2) Companies often cannot afford to set up renewable energy projects out of idealistic reasons. There must be a business case and a proper return on investments. A reasonable pay-back scheme and a suitable business models are important.

- Most residents do not take energy costs into account when assessing the rent

Another problem is that end-users often do not understand that due to energy efficiency measures, the rent rises while energy costs diminish. (w2) This is, however, not unavoidable, there are business models where the tenants do not notice any change in their energy bills and rent (like paying the energy efficiency measures by savings in energy, or higher rent only for the new tenants...)

- The obligation for gas and electricity connection for every address and the socialization of the associated costs.

The question is whether or not a gas and electricity connection should remain an obligation. The costs to connect everyone to the grid are socialized while the residents or companies involved might not be using them. This might hinder innovation. For example a greenhouse equipped with an energy generation plant still needs to connect to the gas network. In the past, 20% of the costs had to be paid by the entrepreneur, now all the costs are socialized while it is not sure whether the given end-user would use it. There are however some exceptions emerging, for example in the housing project Hoogdalem in Gorichem. (i1)

- A lack of suitable financial arrangements and no direct access to information on how to apply for finance.

Access to information on how to apply for financing should improve. And there is a need for new financial constructions. It is very difficult to get banks involved in the financing of local initiatives (i3, w2). These initiatives become more dependent on private equity (i3). The investments necessary are relatively small. This is a problem for most banks since they are not equipped to manage these small loans. How can we bundle these loans? (i3) Municipalities and housing associations do not have the expertise either (i3, w2).

A lot of unexpected barriers will rise when starting an energy initiative. A local energy initiative representative therefore recommends: Just start, do not let them blow you away! (w2)

4.4 OPPORTUNITIES FOR NEW PRODUCTS AND SERVICES

The arrangements in the (future) energy market should be attractive for commercial initiatives. This means there should be enough room to explore different opportunities amidst all regulations to generate interesting business cases. On top of that, there should be a level playing field for different parties. What commercial parties take on and what not is not for the government to decide for. (w1) Ideas for products and services emerging from the workshops and interviews:

- New products and services based on value propositions.

We should not so much look at different types of energy production if we hope to find innovative products and services. An overview is needed where to the end-user requires energy: light, power, heat, mobility, cooling, and comfort. This opens opportunities to formulate value propositions. Also information has value. This leads to new products and services: charge-my-car, ESCo-services etc. (w1)

- Differentiation in packaging of energy services.

A minimum energy package for everyone with agreements on flexibility of supply could become a possibility soon. It means that the end-users agree that energy is not available on certain moments. A commercial party could offer additional energy services against additional fees. Now there is no choice. The commercial party can also divide the capacity between different users. (w1)

- Shares in renewables.

Shares in the energy production can be bought instead of paying the bill based on the amount of energy used. As a result, the investor reduces his energy bill and new capital will become available for investments in renewables. (w1)

- Case managers for local initiatives.

In some local initiatives there was a need for a case manager who would help to clarify how to deal with certain issues. He or she would advise and support the initiative, e.g. by searching for the right expertise and to help with procedures. An independent case manager is preferred, but it could also be someone coming from consultancy. (w2)

- Parties bundling different buildings into virtual balancing units

The TSO (transmission system operator) likes to have small units they can use to balance supply and demand. Especially in certain areas in the Netherlands where the net has more imbalances, like the Westland where greenhouses cause fluctuation in energy demand. This is the reason why there are several projects initiated to displace energy demand. Examples are the Couperus case (i1) and the FlexiQuest project, which investigates the possibilities to alter energy demand for warehouses and datacentres. (i1, w1)

- Financial services

Furthermore, there is a need for more flexible ways of financing of bottom-up energy initiatives and associated SMEs. There are many barriers in claiming finance, from banks as well as from the government. The financing should not be given too easily; the initiative should not get pampered. There should be, besides a profitable business case, some resilience and ability to manage itself. (w2) The desired support is therefore financial advice. Another opportunity would be to bundle small loans of several local initiatives for banks and other financial institutions as a way to make a new market available for them.

- Parties interested in delivering energy generation on peak hours and regulating local transport

The current rules are not written to realize the current district heating projects. (i1) The same holds true for electricity grids. (w1+3) Today's system is tailored to the large-scale energy market and not to decentralised generation. (i2) The current legislation is tailored to yesterday's situation in which the interests of households and small companies have to be protected against those of large energy companies. (i3) The current system leaves little room for local initiatives from locals to locals (i3, w1, w3). A mayor change can take place when the rules for grid management would be changed. The difference between transport and distribution will disappear. Rates will change as a result. How will the price for capacity be determined? For commercial parties it will become interesting to anticipate on scarcity. That is very different from now, at least at local level. Transport capacity will become available for everyone. Consumers might not be interested, which means commercial parties will have a role here. (w1)

Economic principles should be embedded into the energy system. Incentives to improve the system are lacking since costs are socialized. For thermal grids, as was claimed, the best performing party determines the standard. This sounds as a good thing, but in reality this means parties are taking each other hostage and do not dare to make step change. (i1) Basically, the electricity system is a physical and an economical system. First, it was mostly considered as a physical system. There was central planning, which was later discarded. Now the system is also seen as an economic system. Through liberalization the system started to change accordingly. Infrastructure and production were disentangled. It became possible for consumers to choose their own energy provider. Liberalization turns out to be a slow process. At the moment a lot of costs are socialized like: distribution, other network costs, pollution, etc. This means incentives are crooked. When looked at from an economic perspective, you want people to pay for the costs they inflict in the system. This would lead automatically to the best thinkable system. (w1)

When implementing smart grids, users should get the possibility to access the market. Now, the risks (profit and loss) are covered by the energy supplier who, for example, does not pass the price fluctuations on. (w2)

In case energy prices increase dramatically, the entire system will change. Only then options that are now pioneering will become interesting, like timing the wash machine with automatic means. Price incentives are too low at the moment. (w1)

5. Conclusions

Local energy initiatives are emerging in still larger amounts. There is an important enabler for this phenomenon; the impressive progress in development of information and communication technology (ICT) and renewable energy technologies. This creates possibilities for new mutual relationships on the energy market where end-users can become active players and start bottom-up initiatives. Local energy initiatives cannot be easily embedded in the current centralized large-scale energy generation and supply system, with the given legislation, regulations and traditional roles. This brings about a necessity to revise and adapt structures, systems and roles along the entire supply chain.

Drivers to set up a local energy initiative vary from a concern about energy prices, a desire to have control over the energy supply, a wish to jointly save energy, a concern about the environment, a wish to realize more efficient energy generation and to improve quality of life for their community and to increase social cohesion. Another driver is dissatisfaction with the energy services of large companies. At the same time municipalities are setting their own sustainability goals in which the local energy initiatives seem to fit.

As a result of the transition to the new energy system, roles for new and existing parties need to be (re)defined. Current developments lead to changes in roles and responsibilities of existing parties that form the current electricity grid. For example, outsourcing of an exploitation of a small line and management of congestions on the grid to another party. Furthermore, it is expected that many small businesses operating on a local level will emerge.

The role of the municipalities will be mostly facilitating. Creating incentives and stimulate others to get involved and setting an example with their own property portfolio is a part of their responsibilities. They can also initiate local projects, like e.g. electric mobility to promote local business. Roles of housing associations are also mostly facilitating and creating choice for tenants.

Many risks are present. In smart technology projects insufficient support from residents due to technology push can occur for example. The lack of understandable information on the applied system can form a big hurdle. The available social infrastructure on which a local initiative is based can collapse. A broad support should be ensured e.g. through local SMEs that already have access to potential participants. It can be important to show results. But it will be difficult to measure the progress of projects without knowing the status quo at the point of departure. Teething troubles of a new technology should be avoided because it can cause participants to pull out. Further, legislation does not follow the innovative solutions development with the consequence that sometimes in practice, breaking the law cannot be avoided. This can, however, also be seen as a manner to expose the shortcomings in the legislation and achieve that the authorities start considering the necessary amendments. Participants can feel unheard if it is not clear to what extent and what they can or cannot have influence. Also, they are not always convinced about advantages of new solutions and selected business models. Furthermore, the current fragmentation in the supply chain of the construction industry hampers innovation.

Some examples of risks for local initiatives are the competence of citizens who fulfil a role in the initiative or a protection of the companies founded by the initiative from hostile take-overs. Further, the current economical and social system is not tailored for local initiatives. The success factor is often the influence of enthusiast individuals. When these individuals quit these initiatives risk to come to a standstill. Sharing responsibilities with more people can lower the risk that the initiative collapses when the individual stops or moves.

Many barriers are encountered too. For example legislation and regulations, granting of permits, split incentive, missing knowledge of procedures or technical issues. Housing associations see the legal requirement that 70% of residents have to agree with the proposed measurements as a big barrier. Another barrier is that there is little research carried out in the field of social innovation and there are only few instruments to help citizens with what they should do and how. The socializing of costs and current obligation for gas and electricity connection could be a barrier for innovation.

This obligation should be reconsidered as the connections to gas or electricity will no longer always be used.

As for barriers, legislation and regulations can be mentioned, and the granting of permits, split incentives, missing knowledge of procedures or technical issues. Another barrier is access to finance. There is a need for new financial constructions. It is very difficult to get banks involved in the financing of local initiatives. One of the reasons is that the investments necessary are relatively small and the way banks are currently organized does not allow for the management of a portfolio of small loans. One of the solutions would be to somehow bundle small loans of several local initiatives. Housing associations see the legal requirement that 70% of residents has to agree with a proposed measure as a big barrier. A lot of unexpected barriers will rise when starting an energy initiative anyway. A local energy initiative representative therefore recommends:

“Just start, do not let them blow you away!”

On the other hand, this transition period brings about unknown opportunities for the end-users who can become prosumers, business opportunities for SMEs and, not to forget, new opportunities for the established large energy suppliers and distributors. New products and services like charge-my-car or ESCo-services are emerging. Differentiation in energy supply packages becomes possible, e.g. a minimum energy package for everyone with agreements on flexibility of supply. It means that end-users are compensated when they agree that energy is not available on certain moments. A commercial party could offer additional energy services against additional fees. Shares in the energy production can be bought instead of paying the bill based on energy used. As a result, the investor reduces his or her energy bill and there will become new capital available for investments in renewables. Other products and services will appear, too. Case managers for example, independent people or people coming from consultancy, who would support a local initiative by searching for the right expertise and help with procedures was needed. New services will emerge when smart grids are implemented. The users will eventually get the possibility to access the market. Now, the risks (profit and loss) are covered by the energy supplier who, for example, does not pass the price fluctuations on. This will create opportunities for intermediary parties as well. At the moment price incentives are still too low to quickly raise interest for smart solutions like timing the wash machine with automatic controls. But this can change quickly when energy prices increase dramatically.

The number of participants involved in the workshops and interviews held is for obvious reasons rather limited. And, of course, the parties involved represented only the Dutch situation. The expectation is, however, that this is enough to formulate the first preliminary conclusions. On this, a first draft of a framework can be built that is fit for the development of new products and services. In the continuing transition period, new research questions will unavoidably emerge.

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