

# Policy Brief: Systeminen muutos ja innovaatiot

## Promoting a local transition – the case of renewable energy use in a new district

**Name of the project:  
Accelerating Transition  
Towards Sustainable  
Energy System within  
System-level Innovation  
Framework (SUSER)**

The aim of this Policy Brief is to describe how the performance and the drivers and barriers of an innovation system can be explored in a workshop process with actors from both public and private sectors. Specifically, we describe a process where the participants discuss and plan the use of renewable energy in a new district. Based on the analysis of the workshop, the brief describes challenges in the adoption of renewable energy solutions in new districts. The study is a part of SUSER project, funded by TEKES Green Growth programme.

The workshop was arranged around a planning process of a new district called Isokuusi in Vuores area in Tampere in Finland. A full-day workshop for different city and energy related actors was arranged at 9<sup>th</sup> of April 2013 in Tampere. The workshop had two goals: to list preferable energy options for Isokuusi in general and a part of Isokuusi called Harjanne in particular and to identify carriers and barriers in implementing the identified energy options. The discussion in the workshop was organised around the questions:

- What are the energy solutions?
- How are the energy solutions implemented and by whom?
- What are the carriers and barriers of the energy solution?

The workshop produced suggestions for energy solutions for these two areas as well as insights on the implementation, actors, carriers and barriers. The workshop results highlighted the need for an energy solution for the whole area, the need for a clarification of roles, importance of collaboration and an iterative process. The workshop also highlighted the following challenges for policy:

- 1) Enhance sustainability education, especially professional training of city planners, architects and property operators in renewable energy applications.
- 2) Develop routines in public-private collaboration; e.g. workshops as described in this policy brief could be used as a transition arena where knowledge is shared.
- 3) Name the process owner of the renewable energy development process, who is responsible for the renewable energy development as a whole in the city.
- 4) Reduce the investment risk in renewable energy solutions for districts; e.g. the city would guarantee the loan or other substitution models.
- 5) Develop renewable energy service business and its value network as well as new business models.

The brief describes the workshop process and how the system innovation functions can be used in identifying and analysing the main challenges of creating a system transition. The workshop formed a platform where relevant actors can discuss and create a shared vision. This jointly created vision speed of implementation. The main policy recommendation is to increase similar structured participatory interventions in issues where a systemic change is needed. Such an intervention, e.g. the described inclusive workshop will help in enhancing knowledge diffusion, supporting the creation of a value network and identifying the investor and process owner in a socio-technical transition process.

**Authors: Wessberg, Nina,  
Kohl, Johanna and Dufva,  
Mikko**

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## Introduction

**A landscape level pressure is to design climate wise cities. Existing construction industry regime makes this target challenging. New housing districts like Vuores in Tampere are niche examples of this ongoing systemic change process.**

Cities are facing political pressure to become more sustainable and create less carbon emissions by e.g. improving energy efficiency of buildings and increase the use of renewable energy (e.g. Hedman et al. 2013). These needs are also evident in the planning of new districts. In this brief we describe a process by which to explore and identify the carriers and barriers of change together with stakeholders from both public and private sector and analyse the results using an innovation system frame.

Our case is a new housing district in Vuores area in Tampere called Isokuusi. The district will provide homes to circa 4 000 inhabitants, and the city's aim is to make the whole district carbon neutral. There will be wooden apartment buildings close to the main road in a part called Puukaupunki and detached and row houses in a separate part called Harjanne (see the Figure 1). The building has started in 2013 and will end in 2017.

The study is a part of SUSER project (Accelerating Transition Towards Sustainable Energy System within a System-level Innovation Framework) funded by the TEKES Green Growth programme. A previous Policy Brief of this project introduced the barriers and drivers found in Helsinki's Eco-Viikki case (Wessberg et al. 2013).



Figure 1. Plan for the Isokuusi area. (Source: City of Tampere)

### Approach

**The workshop was designed to facilitate the joint exploration of three key factors in a systemic change: the drivers, barriers and actors of change.**

The workshop was designed to facilitate the joint exploration of three key factors in a systemic change: the drivers, barriers and actors of change. The theoretical background for our approach, the system-level innovation framework, is the multi-level perspective. We also drew on previous foresight process experiences at VTT (see e.g. Kivisaari et al. 2013a, 2013b, 2013c; Kohl et al. 2013). The results of the workshop were analysed by using the seven innovation system functions (Hekkert et al. 2007): 1) entrepreneurial activities, 2) knowledge development, 3) knowledge diffusion, 4) guidance of search, 5) market formation, 6) resource mobilization and 7) legitimacy creation. When analysing the results professor Hekkert suggested that we should add an eighth function 8) coordination to the list, because empirical observations required it. The functions provided a structure for the analysis and helped us to figure out the barriers and the carriers of the innovation system; the points of policy challenges.

**We held a full-day workshop with different key stakeholders aimed at discussing preferable energy options and drivers and barriers for their implementation.**

## The workshop

A full-day workshop was arranged on 9<sup>th</sup> of April 2013 in Tampere. The workshop had two goals: to list preferable energy options for Isokuusi in general and Harjanne in particular and to identify drivers and barriers in implementing the identified energy options. The starting point was a general vision of “Renewable Isokuusi/Harjanne in 2020”.

The participants of the workshop were selected to represent different key stakeholders (Figure 2): entrepreneurs and companies, governmental representatives, NGO’s and researchers. Invited companies and organisations represented different renewable energy options. Officials from the city of Tampere, environmental organisations (NGOs), representatives of the inhabitants and an eco-city consultant represented the planning process of the area. There were altogether 26 persons invited to the workshop, of which 17 could participate.

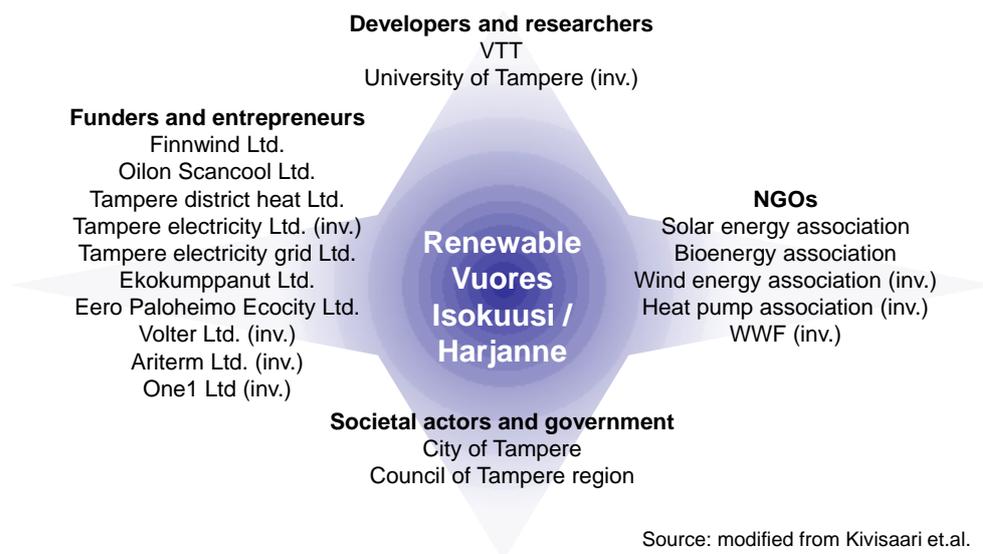


Figure 2. Workshop participants. “Inv.” means that the stakeholder was invited, but could not participate

The workshop started with orienting presentation by the facilitators, the city representative and an eco-city consultant.

After the presentations the participants were divided into three groups for structured brainstorming. The topic for the first two groups was renewable energy options of the Harjanne area, while the third group discussed Isokuusi as a whole with an emphasis on Puukaupunki. The brainstorming was guided by a general, undefined vision of a “renewable Harjanne/Isokuusi in 2020” and the following questions:

- What are the energy solutions?
- How are the energy solutions implemented and by whom?
- What are the drivers and barriers of the energy solution?

The participants were asked to first discuss how they understood the vision and then to answer the questions. Every participant was encouraged to document the discussion on post-it notes, which were then attached to A0 template on the wall (see Figure 3).

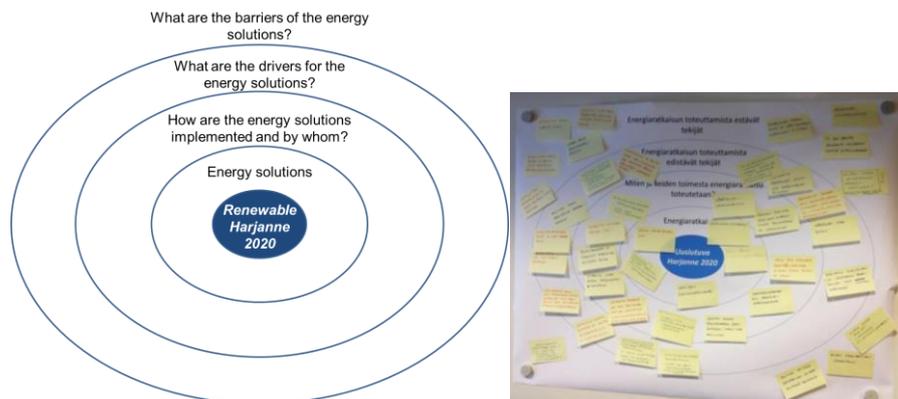


Figure 3. Template used in the group work and an example of the result

After the group work the results were presented and discussed. The workshop ended with a general discussion.

## Results

### Main challenges identified in the workshop:

**1. Process owner: who will be responsible for searching for, deciding on and guiding the solution?**

**2. Implementation: who will implement the solution? Who will be the investor of the solution? Who will take the financial risk?**

**3. Operation and maintenance: who will maintain and operate the actual solutions of complex technological renewable energy systems?**

### Workshop discussions

The workshop produced suggestions for energy solutions to Isokuusi area and specifically to Harjanne as well as insights on the implementation of the process, the actors and stakeholders to be involved, and the drivers and barriers to be addressed. The workshop identified a number of needs to be met in order to realize the new system: the need for an energy solution for the whole area, the need for a clarification of roles, the need for strengthening collaboration, and the need for an iterative process. The themes that were discussed in the workshop are summarised in the Figure 4.

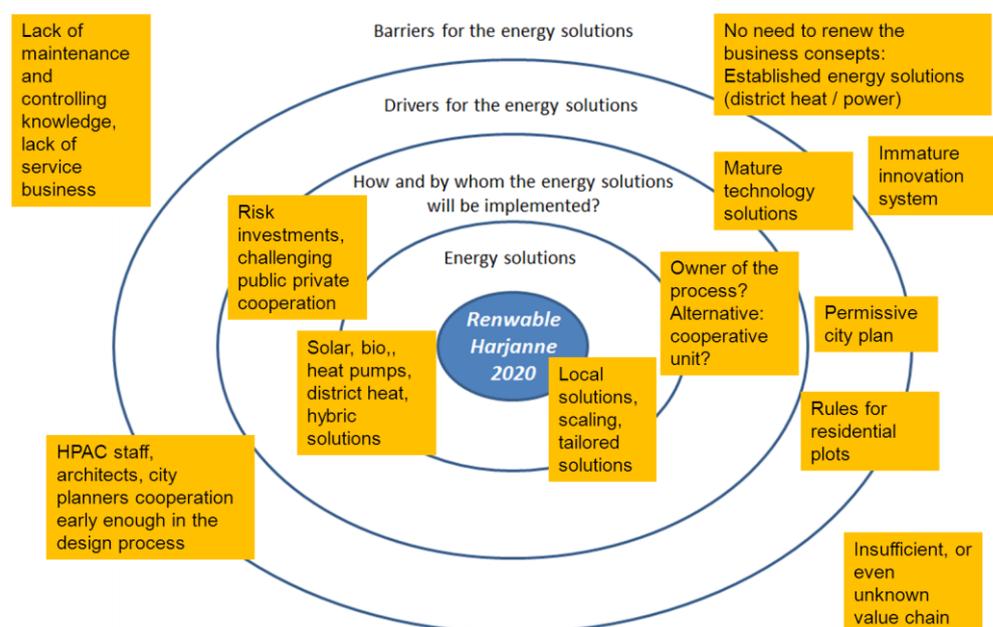


Figure 4. The themes discussed in the workshop.

### Energy solutions optimized for the area

The solutions emphasized local and self-sufficient heat energy production. A local centralised heat production and distribution system would be the most efficient and optimised solution, in particular because it would enable professional maintenance. Local centralised heat production and distribution system was also seen to increase the value of the area. The building of the electricity grid was taken as a given and the focus was on heat energy, i.e. “off-the-grid” solutions were not discussed.

The population density of Puukaupunki area would be suitable for a traditional district heat solution. In addition to municipal district heating also distributed solar energy system (both heat and electricity) was discussed for Puukaupunki area. The Harjanne area did not provide enough heat load according to initial calculations. However, optimising energy solutions for every building was considered important also in the Harjanne area. In the discussions it was emphasized that central solutions, such as local area specific district heat centre, heat storage or similar, would be good to be included in the city plan.

Energy solutions that were discussed for the Harjanne area in the workshop were:

- Solar heat combined with bioenergy
- Local district heating system based on solar heat and thermal energy storage
- Local district heat centre using solar heat, bioenergy and geothermal energy.

### Roles of the actors

**There seemed to be a lack of leadership; it is not clear who is responsible for the development of renewable energy in new district.**

A central theme that emerged from the discussions was the roles of different actors and stakeholders. The roles can be divided into three parts:

- Drivers and enablers: who will be responsible for searching for, deciding on and guiding the solution?
- Implementation: who will implement the solution? Who will finance or invest in the solution?
- Operation and maintenance: who will maintain and operate the solution?

In general there seemed to be a lack of leadership; it was stated that it was not clear who was responsible for the development of renewable energy in new district. Primarily the question is about responsibility: the energy development process needs an owner who is able to see the complex whole. The participants felt that the city should have a strong role in guiding the development of the energy solution for the area, e.g. in the Eco2-project, which is a pioneering project launched by the city of Tampere aiming to develop the climate policy and sustainability friendly Tampere region. This empirical result was the reason why we added Coordination function to the innovation system function list.

The second big question is the implementation of the solution. Possible actors mentioned included existing energy companies, new entrepreneurs, energy solution providers and building owners, either as an informal group or through a cooperative. The main barrier for new entrepreneurs in implementing a district heat centre is that the city plan does not state which energy solution should be implemented and whether the building owners have to support it or not. This produces a high risk for investment and most of the energy solution providers are unwilling to take that risk. Energy companies have their own central power stations and district heat systems. Implementing a district heat centre for a small area would be out of their business focus and might even harm their district heating business. However, there might also be new business opportunities with new business models, such as buildings generating heat for the district heating network. In the end a cooperative of the building owners was seen as the most probable actor for implementing the solution, but it would still need support from the city via city plan, conveyance conditions and possibly initial financing, e.g. city guaranteed loan.

The question of operation and maintenance is linked to who will implement the solution. Here it became evident that there is little service business around renewable energy solutions. This was seen also as an opportunity. In Vuores there is already a service company owned partly by the city. It is still defining its role in the area. Perhaps the maintenance of renewable energy solutions could be one part of its activities, and the service company could become an actor of the emerging renewable energy service ecosystem.

## Challenges for policy

### Key challenges:

**1) The whole transition process is dependent on the education system, namely the professional training.**

**2) Routines in public-private collaboration should be more developed.**

**3) The renewable energy development process needs a process owner.**

**4) Investment risk taking is critical.**

**5) Renewable energy service business and its value network require new business models.**

We analysed the performance of the emerging renewable energy innovation system in housing by structuring the workshop results using the functions of innovation system. We also identified the main challenges policy-makers face with regards to each of the functions. The results are summarised in the following table.

Function	Result from the workshop	Challenge of policy
1. Entrepreneurial activities	There are renewable energy solution providers, but not system integrators or service business	Support the creation of renewable energy value chain in the building sector by e.g. enhancing collaboration between public and private sector
2. Knowledge development	There is research and knowledge, but city planners (incl. architects) and property operators could be more aware of it	Improve the professional training in education system concerning renewable energy and energy efficiency, especially the education of architects and property operators
3. Knowledge diffusion	Lack of collaboration between the actors: knowledge and experiences are not exchanged, further developed and applied	Develop the public-private collaboration practices, rethink and benchmark new potential and new possibilities
4. Guidance of search	There is a shared vision of the renewable energy use and sustainable future, however the balance between an enabling and a guiding city plan is hard to achieve	Develop the public-private collaboration practices in order to develop clear instructions for sustainable building; encourage city planners to use rules promoting sustainable building
5. Market formation	The renewable energy markets are insufficient and there is a lack of renewable energy service business	Provide support for renewable energy solutions; use rules in city planning and in plot conveyance conditions to renewables and energy efficiency
6. Resource mobilization	There is money for piloting, but a lack of investment and operator for actual implementation	Develop models for risk taking after the R&D funding: city as one of the enablers of new business ecosystem models
7. Legitimacy creation	There is a shared understanding of the sustainable direction, but renewable energy solutions could have stronger legitimacy	The shared understanding and goal should be continuously re-assessed. Re-assessment is a process, which enables new solutions and practices to be used in the changing environment.
8. Coordination	There is a lack of process owner generating and implementing a shared vision	Develop the public-private collaboration practices: who is responsible for the continuous process (not project based)?

## Policy recommendations

**The workshop formed a platform where relevant actors can discuss and create a shared vision. This jointly created vision speed of implementation because a cross-section of decision makers and recipients of the decisions worked out the goals, strategies, objectives, and tactics together.**

**The workshop discussions are valuable in improving the performance of the innovation system and accelerating the societal transition process.**

**Functions of innovation system identify the policy challenges.**

The city officials found the workshop valuable and a step to the right direction in city planning. This was the first time such a diverse set of stakeholders in Tampere sat at the same table and tried to come up with solutions that each could commit to. This was something that the participants hoped would continue also in the planning of other areas. The inclusion of actors from the whole value network (e.g. machine providers, building companies, maintenance companies, inhabitants, city planners, research institutes, NGOs) was seen to be important for a holistic solution.

The key is to learn from previous planning processes, but at the same time be aware of the improvements in technology. Getting all the relevant stakeholders to discuss and explore renewable energy option enhances the understanding and knowledge diffusion about different alternatives and constraints and challenges concerning these alternatives. The workshop formed a platform where relevant actors can discuss and create a shared vision. This jointly created vision speed of implementation because a cross-section of decision makers and recipients of the decisions worked out the goals, strategies, objectives, and tactics together (Glenn).

On a more general level, it is important to look at the system as a whole: the performance of each of the functions should be good in order for the innovation system to function, and in order to achieve this, societal changes are needed e.g. with the help of education and innovation policies. Our approach helps to identify the areas where the innovation system performance is lacking and therefore aids in coming up with effective solutions. A participatory process may directly aid knowledge diffusion, guidance of search and legitimacy creation. Other functions of innovation systems are influenced indirectly through the process by identifying the main challenges and creating networks of actors who have the possibility to overcome the barriers.

As a general policy recommendation we encourage the use of structured, iterative, participatory interventions in issues where a systemic change is needed. Such an intervention, e.g. the described inclusive workshop will help in enhancing knowledge diffusion, supporting the creation of a value network and identifying the investor and process owner in a socio-technical system.

The policy recommendations from our specific case are:

- 1) Enhance education of sustainability in building industry. In the workshop the crucial education needs were seen to be in professional training of city planners and architects as well as property operators in renewable energy applications.
- 2) Develop routines in public-private collaboration; e.g. workshops as described in this policy brief could be used as a transition arena where knowledge is diffused.
- 3) Name the process owner of the renewable energy development process. The renewable energy development process needs a process owner, who is responsible for the continuous renewable energy development as a whole in the city.
- 4) Reduce the investment risk in renewable energy solutions for districts; e.g. the city would guarantee the loan or other substitution models.
- 5) Develop renewable energy service business and its value network as well as new business models.

## Further reading

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