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**From Idea to Action: Engaging local authorities in energy transition**

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## **Abstract**

Energy transition reflecting the idea of a system change for a sustainable energy provision is on the Dutch innovation agenda for several years now. Energy transition has been launched as a new route towards a sustainable energy supply. Seven so-called transition paths have been distinguished as a next step on the transition agenda. To date, energy transition is basically a set of ideas and clusters of networks at distance of “business as usual” discussing future promises, expectations and routes. The big challenge is to widen the ideas and practices to get transition into every day practice of industry and governments. The paper suggests ways how to connect the transition arena of ideas with the local arena of action. The paper shows that the core idea of energy transition – coherence – can be translated to the area-based jurisdiction of local authorities and connected to municipal their tasks and responsibilities in energy.

## **1 Introduction**

Energy transition, reflecting the idea of a system change for a sustainable energy provision, is on the Dutch innovation agenda for several years now. Energy transition has been launched as a new approach and route towards a sustainable energy supply. To date, energy transition is basically a set of ideas, experiments and a cluster of networks at distance of “business as usual” discussing and exploring future promises and expectations and routes to get there. The big challenge is to widen the ideas and practices to get transition into every day practice. Due to their “front line position” in energy, local authorities can be considered as rather “obvious” addressees of energy transition in this respect. But to date, municipalities, or local authorities in general, haven’t been included. The transition arena is focusing on the system level and not so much at the area level, the level of operation of municipalities. The incongruence between the system scale assumed by energy transition and the area based jurisdiction of local authorities, might be part of the explanation of neglectance of the local level in energy transition thus far.

The system perspective makes it hard to connect the word of ideas and plans of transition to the world of action in municipalities. The establishment of the action is needed to initiate and realize the changes and innovations needed for the transitional system change. However, to date bridging the ideas to the action hasn’t been done and the question is whether it will be done anyhow given the huge distance between the system perspective of transition and “business as usual” perspective in practice. We think bridging both words is feasible. This paper will make a start by presenting a framework bridging idea and action in energy transition. We will argue that in particular local government offers good entrance points in this respect. The paper argues that the core idea of energy transition – coherence – can be translated to the area-based jurisdiction of local authorities and connected to their administrative tasks and responsibilities. To establish this connection will not only strengthen the position of local authorities in the energy innovation chain, but will also relate energy transition to every day practice and current policies at the local level. The establishment of this relationship we consider badly needed to implement the innovations and change needed in energy transition.

The paper is structured as follows. Section 2 briefly explains the core idea of energy transition as suggested by Rotmans et al. (2000). Section 3 highlights the seven themes on the Dutch transition agenda. Section 4 briefly explains the Dutch municipal jurisdiction. Then section 5, the core section of the paper, connects the municipal jurisdiction with the thematic transition agenda in the Netherlands. The paper discusses five of the seven transition themes most open for municipal action. The paper ends with a concluding section 6.

## **2 The core idea of transition and transition management**

Energy transition is now the major case in Dutch transition management.<sup>1</sup> The idea of transition and transition management has first been suggested in Rotmans, Kemp et al. (2000) and introduced in Dutch policy for the first time in the National Environmental Policy Program IV in 2001. Rotmans et al have suggested transition management as new approach to interactively processing system wide changes for the benefit of sustainable development. Within this context, energy transition covers all initiatives (system-wide) innovation of Dutch energy supply.

According to Rotmans et al (2000) transition management in a nutshell covers the following ideas:

- Transition represents structural change of a complex societal subsystem
- The change includes mutually reinforcing large scale technological, economical, ecological, cultural and institutional transitions
- The transition takes at least one generation
- The transition implies interaction between developments on different scales and levels (p.35).

The idea of substantive change of significant parts of societies is of course not new and in fact is the essence of historical development of modern economies. Transition in this respect is very similar to the sociological concept of modernization. New is, however, the idea of transition as a prescriptive tool for initiating and managing transition or system change. In this way transition management is able to guide structural sociotechnical processes from certain standards or criteria such as sustainable development, or climate neutrality. Organizing and managing the societal support for these massive transformations is at the core of transition management.

For both transition and transition management politics and governmental policies are basic and significant. According to Rotmans et al government should be the initiator and manager of the transition process and supporter and facilitator at the same time. These latter tasks are conducted by public policy. Rotmans has made a classification of the role and support of government in the different stages of the transition.

- In the *preface* of the transition politics and policies are basically focused on facilitating diversity of options and initiating participative discourses and discussions.
- In the *take off* phase politics should initiate enthusiasm and critical mass by tempting future images.

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<sup>1</sup> For an extensive analysis of the core ideas of transition and transition management see Rotmans et al 2000 and Loorbach, 2007.

- In the *acceleration* phase the political challenge is streamlining and channeling developments
- Finally, in the *stabilization* phase the role of politics is consolidation of the new regime.<sup>2</sup>

Although transitions are complex processes, the management should not reduce complexity. The same holds for the uncertainty which accompanies the transition. Uncertainty is part of the transition almost by definition because the future transformed state of the art cannot be known, but should be explored and realized stepwise by means of learning. Policy instruments can support the transformation if they are able to support the very ambitious transformation goals, if they can intervene on a system and not only on the actor level, if they accelerate the problem solving capacity of society and if they will not act as short term barrier for longer term ambitions.

The idea of transition puts specific conditions to the role of politics, policy and government. Among these conditions are that transition policy is coherent in time and space, is able to account for the complexity of socio-technical change processes and is able to cope with future uncertainties. At the operational level, transition instruments should be able to support society and system wide ambitions. The instruments also should be able to intervene at the system level (additional to the actor level which is the dominant level of intervention of current energy policies). The instruments also initiate and support the problem solving and learning capacity of society and finally, instruments shouldn't act as barrier for longer term change.

Apart from this so-called content role, government also has a process role in transition. The process role is aimed at stimulating and organizing the transition process, mobilizing the social actors concerned, creating opportunities and challenges for participants in the transition and creating boundary conditions within which the transition process can operate. The next section briefly describes the state of the art of the content and process of energy transition in the Netherlands.

### **3 State of the art of energy transition in the Netherlands**

Soon after the launch of transition and transition management in Dutch politics, the approach of transition management became a guiding tool in Dutch energy and environmental policy. To date, the process has resulted in an energy transition agenda specified in seven so-called transition trajectories.<sup>3</sup> The agendas have been prepared and developed by groups of theme specific experts headed by an independent chair. Briefly stated the core idea of each trajectory is:

*Green resources* Assuming an increased share of organic resources in the overall resources for energy, chemistry and materials, this trajectory focuses on the production, processing and conversion of green resources into materials and products.

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<sup>2</sup> The suggested role of government in a way follows evolutionary based innovation policy (see Van den Bergh et al 2007).

<sup>3</sup> See [www.energietransitie.nl](http://www.energietransitie.nl)

*Sustainable mobility* This trajectory focuses on the acceleration of market introduction and diffusion of alternative fuels for transport and mobility (biofuels, biogas and hydrogen).

*Chain efficiency* Here the focus is on next steps in industrial energy efficiency improvement by smart production chain organisation and management. This means connecting industrial and other processes for the benefit of efficient energy conversion and usage.

*New gases* This trajectory explores alternatives for the extensive application of natural gas in the Netherlands in order to continue benefits of the very well developed gas infrastructure in the Netherlands. The focus is on synthetic gas (in combination with CO<sub>2</sub> sequestration), biogas and hydrogen.

*Sustainable electricity* focuses on the development of new renewable resources for electricity production, basically offshore wind technology and biomass combustion. Wind and biomass are considered as the most relevant renewable energy options for the Netherlands.

*Energy and residential buildings* explores alternatives for the current fossil based heating and cooling of buildings. The trajectory focuses on advanced insulation technology in combination with PV and underground heat/cold storage.

*Horticulture as energy producer* Dutch horticulture is a large profitable economic sector, but also extremely energy intensive. This trajectory tries to change the horticulture sector from an energy consumer into an energy producer by introducing advanced innovative technology.

These seven themes have been translated into ideas, plans and experiments (see also next section). Each of these themes bears relevance from the perspective of urgency. All have been elaborated in a transition agenda with visions, plans and experiments. If this “planned approach” of innovation and transition is going to produce results is unclear yet, because the process only just started. Transition, conceived as system wide change, is expected to cover time frames of generations. So the success of the approach can only be evaluated when the R&D chain enters the diffusion phase.

But apart from structuring agenda building and experiments, the transition themes could also serve as guidance for the implementation of matured innovations ready to enter the market. For this implementation purpose I would suggest “arenas of action” additional to the current “arenas of ideas” of the energy transition process. I would suggest the municipality as one of such “arenas of action” because the seven themes all appear in one way or another in their jurisdiction. This would offer unique opportunities for the local level to implement innovations in line with the transition agenda. But the municipality also offers a unique jurisdiction to establish coherence between the short and the longer term perspective of energy transition and to establish integration among the themes of the transition agenda within the restricted area of the municipality. Almost all transition themes come together in the municipal jurisdiction and this offers good ground for implementation and diffusion of energy innovations.

Using the local arenas of action for implementation of innovation in the perspective of the thematic transition agenda has three advantages.

- It will improve the short term energy performance (environmental gain), without blocking future perspective.

- It will accelerate technological learning curves which could, in combination with adequate feedback to transition agendas, add to sharpening future perspectives. So implementation speeds up learning.
- Municipal implementation helps relieving non-technical barriers of innovation and this also adds to learning curves.

In other words, the arenas of action serve to implement innovations in line with the thematic visions and plans developed in the transitional arenas of ideas. This fits in the logic of technological change and innovation. So developing ideas and implementing innovations should be seen as additional activities and not as mutually exclusive activities by energy transition management. The next section starts elaborating this idea.

#### **4 The local “arena of action”**

This section briefly explains the jurisdiction of a Dutch municipality. From there we can analyse the local contribution to energy innovation (section 5). In the Dutch constitutional setting municipalities have implementing responsibilities and this makes them rather suitable actors for implementation and diffusion of innovation. This section shows that the topics discussed and debated in the transition “arena of ideas”, have a connection with municipal tasks and/or responsibilities. The municipal jurisdiction therefore offers good opportunities to connect ideas and action in energy transition. But how does the municipal jurisdiction position in Dutch constitution?

Constitutionally the Netherlands is a monarchy with the king/queen heading the national government. Administratively, the country is of the centralized unity type, with hierarchy and shared responsibilities between central, regional (provinces) and local (municipalities) layers of government. Municipalities share certain activities with central and regional authorities but they also have independent powers in their jurisdiction. The first activity restricts to municipal implementation of policies decided higher in the administrative hierarchy and the second activity is independent municipal policy design and implementation. Both municipal responsibilities bear relevance for our analysis. Figure 1 below summarizes the municipal governance span of control.

Starting clockwise, the top-block in the figure lists the economic sectors covered by municipal politics and policies. It covers industry, agriculture and services but also housing, teaching (first grade level), tourism and (public) transport (in the bigger municipalities). The right block summarizes the type of ambitions or goals of municipalities. Many of the about 400 Dutch municipalities have adopted ambition in the field of sustainable development and/or climate protection. The bottom block of the figure lists the type of areas covered by municipal jurisdictions. Dutch municipalities are basically divided in urban and rural ones, each of them covering different types of areas and facing different types of problems. Urban and rural municipalities also differ in scale of the different area types within their jurisdiction. The largest urban metropolitan municipalities in the western part of the country are

divided in sub-units of governance sharing certain responsibilities with the central municipal board.

The final left block lists the set of municipal instruments. Urban planning and concessions offer quite some room for independent municipal politics and policies. In construction and environmental licensing the municipal degrees of freedom are more restricted but still present for energy innovation.

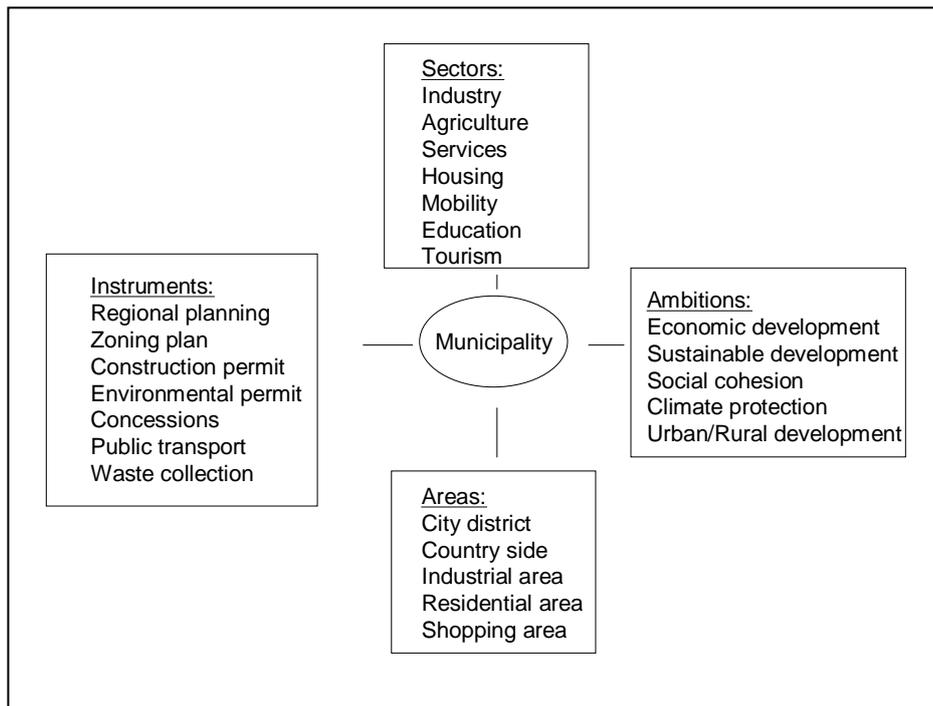


Figure 1 The Dutch municipal jurisdiction

Having briefly explained the municipal role and position in the Dutch politics, we now turn to bridging idea and action in energy transition. Figure 2 below visualized the core idea of connecting ideas of energy transition to implementation in municipalities.

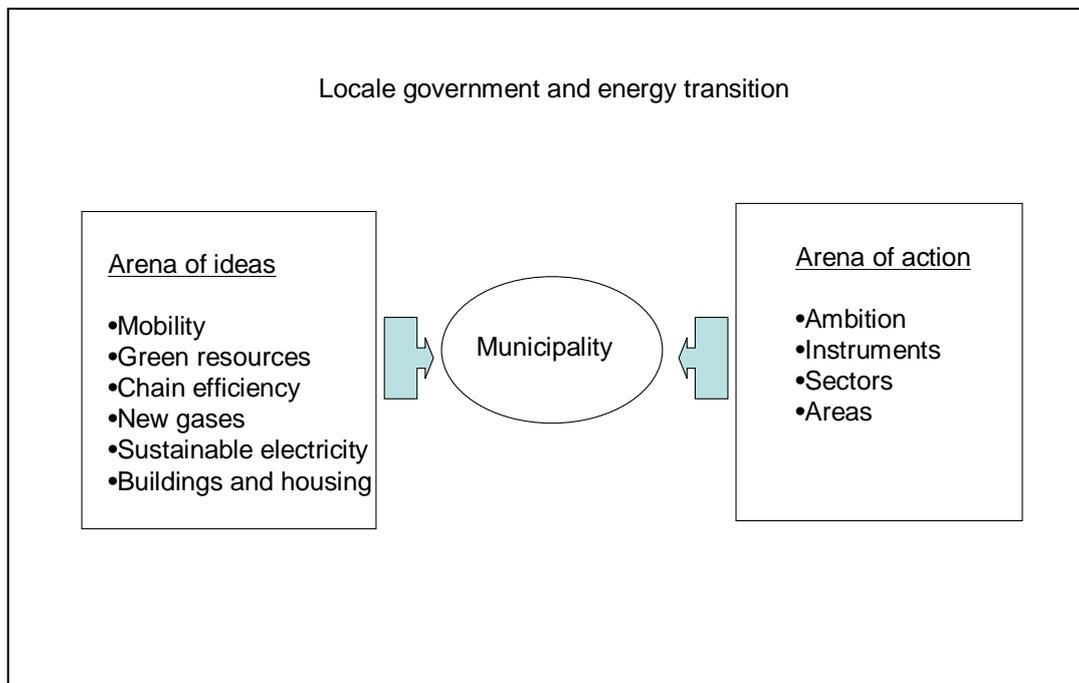


Figure 2 Idea and municipal action in energy transition

The left block in the figure contains the seven tracks of energy transition with the right block summarizing the scope of municipal policy implementation. The next section analyses the connection between both blocks in more detail for five of the seven transition themes.

## **5 Local actions for energy transition**

This section makes specific suggestions how municipalities can contribute to energy transition as suggested by the seven transition tracks introduced in section 3 above. The logic of our argument is illustrated in figure 2 above. We will analyse how municipalities can line up in their daily practice with the transition agenda of the seven tracks. A first step in this respect is to take the local environment of the municipality as point of departure. Drawing on local conditions and opportunities instead of simply imitating or copying what others do or have done. Our suggestions in this section therefore should be read as a general menu which should be processed and finalized into local flavor and taste. The options are discussed for five of the seven transition tracks separately.

### **5.1 Mobility**

In mobility the energy transition challenge is to reduce the emission impact of transport and mobility, preferably to zero. The transition trajectory focuses on hybrid means of transportation, biofuels, hydrogen and intelligent transportation systems. Given the degrees of freedom, municipalities can make significant contributions in this track by just implementing the currently best technologies available. Municipal procurement, urban planning and concession policy provides “windows of opportunity” in this respect.

Dutch municipalities own and use many different means of transportation, varying from luxury cars to special lorries and trucks, next to municipal machinery based tools and equipment. Municipalities can instantly decide to go only for the most advanced technologies in purchasing the means of transportation and machinery. Hybrid engined luxury cars are widely available and could be the standard procurement technology of municipalities. The same holds for lorries and trucks. Here hybridization means engines able to use biodiesel, natural or biogases. Hydrogen fueled cars can also be considered although the hydrogen fueled car concept is still rather experimental. However, the municipal car fleet provides a good ground for experimentation since most cars are used for short distance trips, which would match the radius of the current hydrogen car. The hydrogen refilling station could be part of a municipal depot. A municipal hydrogen car fleet with a centralized municipal refilling station can be considered as a promising next step in the real life experimentation with hydrogen fueled car based mobility.

Municipalities can also change the fuel base of the semi-stationary motorized municipal machinery. Here too the fuel alternatives for the current fossils are basically biofuels and hydrogen. So in the mobility parts of the municipal procurement next generation technologies are available today and can be instantly used in the municipal tasks and services. The technology is still more expensive but

this shouldn't be perceived as a barrier by municipalities. They bear public responsibility and for that reason can act as "launching customer" of the alternative technology on account of additional costs. Adding to the learning curves of technology is the major legitimization of the municipal decision to go for the alternative technology and connects the municipal decision with the longer term ambition of energy transition. Here municipal procurement acts as tempting example for the private sector. Municipalities as "launching costumers" of the most advanced technology from a climate protection perspective. The overall Dutch public procurement is an economic factor that counts and can really make a difference in changing technology for mobility. Municipalities could consider developing procurement strategies with other municipalities and use this common strength to negotiate better conditions from dealers, importers and even manufacturers of the alternative fueled mobility means.

Municipalities can also use their concession policy to change technology for energy transition. Here the options are comparable to the ones discussed previously under public procurement, but the implementation trajectory is different. Municipalities could add transition focused criteria to the concession conditions. For instance a certain share of hydrogen fueled buses in public transport, or biodiesel/biogas based waste collection. City trams can be geared by renewable electricity. And water located municipalities could also consider the purchase of hybrid engined boats, or even PV engined water transport.

Of course the energy infrastructure should be supportive if municipalities take advanced positions in procurement and concession. Here comes in the idea of coherence between idea and action in energy transition. In mobility this would mean that municipalities use their urban planning instrument for achieving the necessary infrastructure for hybrid engined cars and trucks (refilling stations for biofuels, natural and biogases and hydrogen). The extra costs can be financed by identifying a specific transition part in municipal taxes and by a transition surcharge in the ticket price of public transport. Making the costs of energy transition visible in this way gives the public a stake in energy innovation. Energy transition also requires engagement of the general public. Visibility of transition costs could act as a means of engagement. This could even release new tax or surcharge labels like "learning curve taxation or surcharge" or "technological experimentation surcharge". In this way, the idea of energy transition can also diffuses among the general public which is currently almost completely absent in energy transition. As shown, municipalities can play an important role in this respect.

Rural based municipalities could consider initiating and facilitating production of biofuels in their jurisdiction. In the Dutch context the production of biogases offers good prospects in the rural northern, eastern and southern part of the country. Facilitating these activities could be part of rural innovation programs currently running in the areas. The Dutch country-side needs revitalization and connecting agriculture to energy supply could contribute. However, here national agricultural politics and energy transition aren't coherent which hinders local initiatives. These local initiatives are highly desirable from a perspective of energy transition but quite often frustrated by national (environmental) regulation.

## **5.2 Green bio-resources**

This transition trajectory focuses on a 30% share of green resources in the overall feedstock by 2030. It is not only the feedstock for energy but also for chemical industry and chemical products. For this purpose the trajectory formulated several themes and topics to focus on. Two of them bear relevance for municipalities: the production of high quality biomass and bio refinery. In general municipalities can use their licensing responsibilities to facilitate both the production and refinery of biomass. But there is more municipalities could do. For instance, all biomass from public terrains and public areas could be considered as a potential green energy resource. As indicated above rural municipalities could facilitate the production of high quality bio mass within their jurisdiction. This could be done in the context of the rural revitalization programs mentioned above.

But municipalities could also use their international municipal networks to improve the quality of biomass. Most Dutch municipalities have bilateral relationships with other municipalities in Europe and in other parts of the world. These relationships could be used much more intensively for the benefit of improving the quality of biomass. In Europe countries like Sweden and Austria have advanced positions in biomass production and utilization for energy purposes and this provides ground for learning for Dutch municipalities. Relationships with rural based municipalities in for instance Eastern Europe could be used to develop new biomass production chains, connecting production facilities in Eastern Europe with biomass usage in the Netherlands. More generally, Dutch municipalities could focus their international connections much stronger on the theme of energy. This perfectly fits in the idea of one common EU energy market. Municipalities, in particular the rural ones, could develop advanced positions in biomass facilitation: production, refinery and utilization and the biomass production chain.

Of course we are not suggesting that the municipality should do all this on its own. The idea is of course that the municipality should act as facilitator of the local public/private cluster to work on this topic. Dutch municipalities could use their already existing international connections for this purpose.

## **5.3 Chain efficiency**

The transition ambition in this trajectory is to significantly increase the energy efficiency of industrial production by means of smart production chain management. This topic bears special relevance for the municipality, in particular urban planning and licensing responsibility. Municipalities can use both instruments to facilitate innovations in the local organisation and management of production chains.

The focus in the trajectory is on industrial chains with the challenge of a thermodynamically smart connection of production processes. This means that the energy resources will have maximum output and efficiency if they are applied according to the first law of thermodynamics. This law says that it is wise to use the energy resources to produce heat at the highest temperature possible and subsequently use the heat accordingly with the stepwise decrease of its temperature till temperature equals that of the environment. Simply stated, this means that it is wise to use any

energy recourse first for the high temperature steam necessary for producing electricity and then use the steam in accordance with the stepwise decrease of the temperature. So next to electricity production, the steam could be used for industrial processes and from there for heating purposes of activities (horticulture) or buildings and houses (heat distribution). Connecting physically these quite different activities is not only logistically challenging but also institutionally. Given that all activities take place in the municipal jurisdiction, the municipal authority can use its position to facilitate innovative chain connections for the benefit of energy efficiency improvement. This thermodynamic based chain management is relevant for urbanized and metropolitan municipal areas, because of the closeness of the different parts of the chain. The transportation of the heated water should be as short as possible and this can only be achieved in urbanized environments.

Another relevant chain topic for municipal action is sustainable agro chains. This theme addresses chain management in agro food chains with the idea to improve the energy efficiency of the chains. Dutch agro chains connect the production of beef, fish, meat, dairy, vegetables and fruits to processing industries and from there to retail and consumption. Logistically these processes have become quite complex and rather energy intensive given the increasing fresh quality demands of consumers. Agro-logistics tends to become more energy intensive which puts high demands on the energy management of the agro food chains. This requires innovative approaches, in particular in urbanized regions of the country with many retail centers to be served. Municipalities can and should facilitate the innovative approaches suggested by others, but they could also initiate new logistic approaches themselves. For instance, the public transport system could be used more intensively for transport of goods in for instance cities. Amsterdam is already experimenting good transportation by city tram.

The old idea of the city or village farm could also be reconsidered. Although farming always has been a rural activity in the Netherlands, in former days in some parts of the country villages and cities held farms too. The city or village farm idea could be innovated to see if the idea fits in modern city life. One of the options that could be explored more intensively is the idea of locating the “city farm” as modern agro centre close to the railway station in order to supply it from outside by trains. From the agro centre the goods could be brought into the city with innovative means of transportation like city trams, bio-fueled or hydrogen fueled means of transportation. City waterways with modern shipping could be considered in this respect too. Municipalities could initiate the experimentation with these and other innovative logistical concepts for the benefit of energy reduction and local air quality improvement.

#### **5.4 New gases**

Due to own natural gas reserves, Dutch energy provision is strongly connected to and dependent on natural gas. In the prospect of reserve exhaustion by 2030, the Dutch are searching for alternatives. These alternatives all should build on the current gas infrastructure, which is very well developed. The transition trajectory focuses on several alternative gas options such as synthesis gas in combination with CO<sub>2</sub> sequestration, hydrogen and biogases. Municipalities, in particular those in rural

areas, can add to this transition trajectory by facilitating local biogas production, distribution and consumption. This implies initiating and facilitating new decentralized small scale energy concepts within the municipal jurisdiction where possible.

Dutch natural gas production and distribution always has been centralized and it will take some time for the incumbents to get used to the idea that gas production becomes diversified. Decentralized gas production requests access to the gas pipeline infrastructure and this is a serious barrier. The Dutch natural gas infrastructure has been designed and optimized for transport and distribution of natural gas of certain quality. Distribution companies, therefore, are still rather hesitant to open the pipelines for other types of gas. Although the impact of gas diversification in the pipelines is topic of technical research, companies are also hesitant for reason of management of gas distribution. Municipalities could use their position as shareholder to push the gas distribution companies more actively on the innovative path of gas pipeline flexibilisation. As shareholder, they could stress the public responsibility of the company to open up the gas infrastructure for decentralized produced biogas. Innovation of the distribution system clearly facilitates the new gas track in energy transition.

The same holds for facilitating the production of biogases. Here municipalities can also line up with energy transition. Bio gasification becomes a popular perspective on the Dutch country side, since it is strongly connected to manure management in industrial farming. Gasification can process the manure (in combination with other organic material) into biogases. The gas can be transformed locally into electricity and heat by means of CHP types of technology or the gas could be fed into the gas infrastructure. Local conversion of the biogas opens up opportunities for new types of locally based energy clusters. Dutch horticulture is considered as a tempting example in this respect. Locally grown green crops in combination with manure could be gasified and the gas could be used in CHP units producing electricity for the grid and heat for horticulture. Fueled by natural gas these clusters could also use the CO<sub>2</sub> emissions for crop growth. Experimenting this type of new energy clusters faces serious legal barriers and here central and local governments could join hands to facilitate local experimentation. Special experimental zoning for these activities could be considered. In the zones existing laws and other restrictions could be relieved for the benefit of learning for energy innovation. These facilities also would reward sometimes highly innovative local entrepreneurs instead of discouraging them in reference to restrictions caused by existing laws. By facilitating local experimentation municipalities clearly act as mediators between idea and action for energy transition.

## **5.5 Housing**

A final energy transition theme we like to address in this paper is housing. This energy transition theme aims at a significant reduction of residential energy consumption and increasing the demand for green energies in the sector. The theme is highly relevant because of the strong involvement of municipalities. The municipal involvement is threefold: physical planning, energy provision and construction licensing.

Under the jurisdiction of provinces and in the context of national policies, municipalities plan and realize residential areas. Although public and private project developers are the ones actually realizing the houses, municipalities condition the activities with certain criteria and requirements. Housing types, way of construction, architecture and design of the new area, public transportation, road infrastructure and water management all can be part of the municipal conditions and criteria. Since 2001, Dutch municipalities have a legally based instrument to condition the energy provision of new residential areas. The instrument allows municipalities to strongly condition the technical infrastructure for the gas, heat and electricity provision in new residential areas. The idea was that municipalities would use the instrument to invite the grid companies to come up with the most sustainable energy solutions for new residential areas. However, it shows that the instrument is not functioning that way (Ministry of Economic Affairs, 2006). The core reason is that planning of energy infrastructure in new residential areas hardly allows for room to maneuver in the way assumed by the instrument. The greenness and efficiency of energy for residential areas is decided by the resources used for the electricity production and whether or not heat is produced (and distributed) area-based or house-based in the area.

The licensing responsibility in combination with legally conditioning the energy performance of constructions and areas, gives municipalities means to influence the energy performance of houses and areas. But municipalities could enhance ambition in this respect. Municipalities tend to compromise too much the energy performance with economic feasibility and market conditions for renting and buying a house. There is hardly any incentive of potential tenants and buyers to optimize housing constructions on energy criteria. Potential residents are more interested in inner and outer space of the dwellings they want to purchase.

The municipal responsibility in this respect could be to facilitate only construction of best performing houses and buildings in their jurisdiction. Zero emission houses are technically available and can be constructed today. They are more expensive, but the additional costs are played back in a restricted number of years. The pay back time is expected to decline due to increasing energy prices. Municipalities could be more decisive in this respect, “pressuring” project developers to pay more attention to the energy performance of the houses they are offering. Technology is available but the construction sector needs a push apply it. Increasing energy prices in combination with municipal “pressure” might act as incentive in this respect for project developers. Fortunately there are local initiatives for building only best performing energy houses, but there is room for much more.

## **6 Conclusions**

We started the paper by identifying the need of bridging the gap between idea and action in Dutch energy transition. Energy transition has been launched in 2000 and became part of Dutch policies in 2001. Since then energy transition has developed into a thematic idea generating cluster of organisations at distance of “business as usual”. Bringing the transition ideas into the every day practice of energy innovation can be considered as a logical and necessary next step in energy transition. The paper argued that the municipal jurisdiction offers a promising ground in this respect, despite the difference between the system perspective of energy transition and the

area perspective of the municipal jurisdiction. The municipality offers a good arena for implementation of innovations in congruence with the ideas of energy transition.

The paper has shown that the short term energy innovation is coherent with the ideas of energy transition. Moreover, municipal initiative and action does accelerate the problem solving and learning capacity of society. But short term local action has three advantages.

- It will improve the short term energy performance (environmental gain), without blocking future perspective.
- It will accelerate technological learning curves which could, in combination with adequate feedback to transition agendas, add to sharpening future perspectives. So implementation speeds up learning.
- Municipal implementation helps relieving non-technical barriers of innovation and this also adds to learning curves.

In other words, the arenas of action serve to implement innovations in line with the thematic visions and plans developed in the transitional arenas of ideas. This fits well in the logic of technological change and innovation. The paper argued for the facilitating role of local authorities in this respect to bridge the gap between idea and action in energy innovation.

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