

# Towards a heat transition in the housing sector in the Netherlands

Roles and responsibilities of different actors

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## Roles and responsibilities of different actors

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### c. Introduction

While Denmark has spent the past 40 years developing a system that captures waste heat and puts it into a grid with heat from power plants (CHP<sup>1</sup>), the Netherlands has spent the past four decades developing its gas grid. (Groen, 2013) Now the Groningen reserves become exhausted, we are increasingly reliant of imported gas. Moreover, we are bottom of the class in Europe with regards to CO<sub>2</sub> reduction. So far that the Dutch energy transition is focused on the electricity market although heating accounts for 60% (Energieakkoord voor duurzame groei, 2013) of the energy we use. An urgent call for action is needed. Fortunately, more and more people are aware of this and the government seems to be willing to take the first steps to start a heat transition. In this essay we focus on the housing sector which represents 30% of the total heat demand. (Schepers & Aarnink, 2014)

What has been agreed so far? In the Energy Agreement (Energieakkoord voor duurzame groei, 2013) parties have committed themselves to reach climate neutrality in the built environment by 2050. As intermediate steps all buildings should possess on average energy label A by 2030 and in 2020 300.000 dwellings should be upgraded by two label steps. In 2020 housing associations should have renovated their housing stock to on average label B and businesses should have taken all measures with a payback time of less than five years. These goals can only be reached by a combination of energy savings and renewable, efficient, decentral energy generation. Since more than 90% of the current buildings will still exist in 2050 the greatest challenge concerns existing buildings. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014)

The (household) heat demand (for both heating and hot tap water) makes up more than 70-80% of the energy demand of the built environment. (Schepers & Aarnink, 2014) To reach energy neutrality in the built environment it is therefore essential to replace the current heating infrastructure based on natural gas by a CO<sub>2</sub>-poor one. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014) For new buildings policy measures are in place ('EPC'-norm<sup>2</sup>). This is not the case for existing buildings.

The greatest challenge in the existing-built environment is not technical by nature but socio-economic. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014) (Van Lidth de Jeude & Midden, Percepties eindgebruikers collectieve warmtelevering Rotterdam, 2014) Currently only measures that have a payback time of a few years and are compelling to residents and businesses are implemented. Without additional measures a substantial part of the existing buildings will only be transformed up to label B or C, not enough to reach climate neutrality. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014)

The renewable climate neutral heating options have to compete with a natural gas infrastructure that is already there, paid collectively, and with natural gas that is relatively cheap. Technically everything is possible but how do we achieve this? Who will take a step, when and why? What we need is an additional incentive or penalty on the current energy infrastructure that make alternatives to the existing infrastructure widely appealing. (Leguijt, Stadswarmte en alternatieven - Technische Sessie Stadswarmte Gemeenteraad Amsterdam, 2015)

### d. Description of aims

The essay has the following aims:

- To discuss what is needed for the heat transition in the housing sector to fly
- To discuss what technologies can be used where
- To discuss what the role is of different actors in the heat transition
- To discuss the changing environment for utilities and distribution companies

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<sup>1</sup> CHP = Combined Heat and Power, a power plant that generates heat and electricity at the same time

<sup>2</sup> EPC = Energy Performance Coefficient. In 2020 all new buildings meet the criterion 'near zero energy building' which has an EPC of zero. See e.g. <http://www.rvo.nl/onderwerpen/duurzaam-ondernemen/gebouwen/energieprestatie>

## e. Conceptual framework

### 1. Technological options to reach climate neutrality

To reach a climate neutral built environment by 2050 it is needed that all buildings are going to be renovated thoroughly. There are three knobs to turn: 1. Insulation of the building shell, 2. Efficiency of the building installation, and 3. Using a climate neutral energy carrier for the remaining heat demand (biogas, renewable electricity, residual heat or renewable heat). The technologies you choose are dependent on the building stock in an area. (Leguijt, Stadswarmte en alternatieven - Technische Sessie Stadswarmte Gemeenteraad Amsterdam, 2015) The optimization scale is dependent on building size and density. In metropolitan areas optimization at area/city level is possible (see figure 1.1). (Leguijt, Stadswarmte en alternatieven - Technische Sessie Stadswarmte Gemeenteraad Amsterdam, 2015)



#### Optimization level for heating solutions 1.1

In this essay we focus on the housing sector. Roughly speaking, the best technologies per building type are: (Leguijt, Stadswarmte en alternatieven - Technische Sessie Stadswarmte Gemeenteraad Amsterdam, 2015)

- *Stacked housing and low-rise buildings < 1945*: a heavy insulating shell is very expensive and often aesthetically not wanted, low-temperature heating is complicated and expensive to realize, and all-electric is not possible in most buildings. Therefore, biogas and district heating are the best options here;
- *Stacked housing > 1945*: serially built, project-based approach possible, possible to upgrade insulation, hard to realize all-electric heating since there is not much room for the installations and PV panels. District heating is the best option here;
- *Low-rise buildings > 1945*: heavy insulation is possible (via a new very well insulated outer facade), low-temperature heating is thus possible, and there is enough space for a heat pump and source plus solar PV panels. Therefore, all-electric options are possible (electrical heat pump). The 'Stroomversnelling'/'Energiesprong' programs<sup>3</sup> are aimed to lower costs for an energy neutral renovation of these dwellings and by that get to an attractive proposition for home-owners and housing associations;
- *Countryside*: biogas or electrical heat pumps depending on the local conditions.

This is consistent with (Van Melle, Menkveld, Oude Lohuis, De Smidt, & Terlouw, 2015). They have shown that replacing boilers with heat pumps entails the highest costs for society due to the high investments needed in distribution and transport grids. Heat pumps should only be applied in cases with optimal to maximal insulation and district heating is very attractive when a high level of insulation is not possible (or too expensive). The strong interaction between insulation value and infrastructure costs for electric heat pumps makes it important for

<sup>3</sup> See: <http://www.stroomversnelling.nl/> and <http://energiesprong.nl/>

society to make the right choices and implement measures in the correct order. What the best technology is in a certain area also depends on the availability of resources e.g. biogas and waste heat or geothermal heat.

The lowest costs for society can be attained if: (Rooijers & Hers, Energiemarkt in beweging - Denktank vernieuwing energiemarkt - Fase 2: Warmtemarkt, 2015)

- a. Energy saving measures (insulation) are rolled out on a large scale and used optimally rather than maximally. This can lead to a decrease in CO<sub>2</sub> emissions of the heat demand by ~30-50% (relative to 2010)<sup>4</sup>;
- b. Gas supply changes substantially from natural gas to biogas and takes more the role of peak delivery in winter instead of volume supplier;
- c. Heat supply is being applied in compact urban areas. Preferably using waste heat and geothermal or other renewable heat sources for base load supply and natural gas as supplier of peak capacity.

Currently, the dominant technology for heating homes in the Netherlands is an (individual) natural gas boiler (>90%). District heating only accounts for 5-8% of the market and heat pumps are just arising (1-2%). (Rooijers & Hers, Energiemarkt in beweging - Denktank vernieuwing energiemarkt - Fase 2: Warmtemarkt, 2015) According to the same authors biogas could account for 25% of the total market after the transformation, electrical heat pumps for 25%, and heat supply for 50% (Rooijers & Hers, Energiemarkt in beweging - Denktank vernieuwing energiemarkt - Fase 2: Warmtemarkt, 2015) Our Minister states a percentage of 30% for district heating in his recent Heat Vision. (Kamp H. , 2015) In practice, the outcome will depend on technology development and the adaptation rate. In the end users will determine the outcome.

## 2. Role of consumers

More and more citizens are concerned about climate change. However, most people still do not put their money where their mouth is. Energy saving measures are mostly being taken to cut costs and to improve comfort, not to save the planet. And people are only willing to take these measures when they are moving or expecting an addition to the family. Therefore, at present there is hardly any demand for overall sustainability options for the built environment. Part of the problem is that the current gas price does not represent the cost of a CO<sub>2</sub>-free facility. It is cheaper and easier for residents and building owners to just keep burning gas and discharge CO<sub>2</sub>. (Den Ouden, Hoeksema, & Graafland, 2015) The big challenge is how to get people to save energy and to be open for a new way of heating their homes and investing in the connected measures.

A way to start is to make more accessible information available for residents (both home-owners and tenants). When their boiler breaks down or needs to be replaced the only thing residents think of is a new boiler. Installers don't offer other options by themselves. And when you start searching on the internet for a new boiler no other heating solutions are offered to you.<sup>5</sup> What is desperately needed is (independent) easy-to-understand information on new ways to save energy and heat your home. A simple tool can be really helpful. On the basis of some simple characteristics of your house and your postal code you should get a selection of options to save energy and heat your home. It should be really clear where you should start and where to find the best information or advice. If wanted you should be able to contact an independent adviser like Hoom<sup>6</sup>, a daughter company of Alliander, is doing right now. They inspect your home, give you advice and provide you with multiple quotes. People just don't know where to start themselves and they don't have the technical knowledge to select the best solution for their specific situation. Moreover, they don't know where a district heating network is located or planned. So they just keep doing what they did, nothing is changing and gas boilers remain the norm.

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<sup>4</sup> According to the scenario's 'Beperkt' and 'Breed' in (Van den Wijngaart, Folkert, & Van Middelkoop, 2014)). This amounts to ~16-29% reduction of the heat demand.

<sup>5</sup> Queries - 'nieuwe CV-ketel', 'nieuwe ketel', 'CV-ketel', 'HR-ketel' - on Google 27-12-2015

<sup>6</sup> Hoom, <http://www.maakjehuishoom.nl/> So far their focus is mostly on energy savings and solar panels plus gas boilers.

Talking about district heating the current perceptions aren't very positive either. It is unknown to many people. It is seen as old-fashioned, perceived as too expensive, not reliable, you're stuck with one supplier etc. (Van Lidth de Jeude & Midden, *Percepties eindgebruikers collectieve warmtelevering Rotterdam*, 2014) (Remmers, 2015) When you start searching the internet this perception is confirmed. Remarkably it is very hard to find positive stories and references on district heating. And there is not an easy-to-understand website where you can find (objective) information on the technology, the way it works, it's costs, or where the current network is located. So far, utilities and municipalities pay too little attention to the consumers. If their wish is to implement this form of collective heating on a large scale, it is essential to start informing the public as soon as possible. Treat them as full discussion partners and involve them from the beginning in this heating (r)evolution.

In general the energy transition can be stimulated by making better use of knowledge about human behavior and behavioral factors that play a role in individual behavior. (Meijdam, et al., *Doen en laten - effectiever milieubeleid door mensenkennis*, 2014). It are ultimately people who have to accept and use the technologies. When they don't accept it it won't fly. People are willing to change but they don't want to be changed.

### 3. Importance of and challenges for housing associations

44% of all homes in the Netherlands are rental houses and 56% are owned by its residents. (Kenmerken woningvoorraad 2014, 2014). In total 30% of all dwellings are owned by housing associations (De corporatiesector in cijfers, 2013) and in urban areas this percentage is even higher.

Since housing associations have committed themselves to improving their houses to an average energy label B by 2020 (Covenant Energiebesparing Huursector, 2012)<sup>7</sup>, improving the sustainability of the existing housing stock is part of their policy making. However, the pace of improvements should go up to meet this goal.

Currently, housing associations are still replacing their collective heating systems in apartment buildings mostly by individual gas boilers. This is easy to realize, in the short term cheaper, and they can do this independently from others (like heating companies). (Van Lieshout, *Warmtenetten bieden grote kansen voor verduurzaming*, 2015) However, this is not sustainable and will put these high-rise buildings and it's residents at a disadvantage. Moreover, the whole heat transition will be slowed down since the rollout of a new district heating network or extension depends on the number of homes that will be connected.

Many associations choose an approach in width: as many accommodations to label B as possible. This way they have to spend less money per house. It requires technically much less than the next step towards label A or better. An improvement to label B is also easier to sell to the residents who immediately feel the benefits of double glazing or an energy efficient gas boiler. A (more extensive) renovation requires a lot of residents and their perception is that the yield is small. Especially if there is also a rise in rents attached. (Braanker, 2015)

In (Van den Wijngaart, Folkert, & Van Middelkoop, 2014) it is demonstrated that more stringent measures are not cost-neutral but cost money in particular for stacked houses in large(r) cities. Consequence is that a significant portion of the housing stock in urban areas will not be renovated further than label B (or C for houses owned by private landlords). In most cases, gas boilers remain the technology that provide the remaining heat demand of these buildings. (Leguijt & Schepers, *De rol van warmtelevering in de klimaatneutrale stad*, 2014). Thus in order to make a heat transition a reality additional measures need to be taken. However, so far housing associations are not willing to commit themselves to additional or more far-reaching goals. There are several underlying reasons for this:

- a. They do not have the money for more extensive renovations due to the 'landlord levy' ('Verhuurderheffing')<sup>8</sup> that has seen the light of day in 2014;

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<sup>7</sup> By now the energy index methodology is used and not the energy label system since this has changed into an indicative label. However, for convenience we still refer to the energy label system. More info on the energy index can be found via <https://www.rijksoverheid.nl/onderwerpen/energielabel-woningen-en-gebouwen/vraag-en-antwoord/energie-index>

- b. Housing associations want to decide independently on their housing stock. They conduct a strategic housing-stock policy: part of their possessions they want to keep and part they want to sell. In the latter part there is no priority for sustainability measures;
- c. It is not easy for housing associations to sell energy efficiency renovations to their residents. 70% of the tenants need to agree while an increase of rent is mostly part of the deal.<sup>9</sup> Tenants are often more interested in a new bathroom or kitchen.
- d. When the rent increases to a level above the social rent limit ('sociale huurgrens') housing associations can only borrow money against market conditions. (Braanker, 2015) The question is whether banks are sufficiently forthcoming to lend money because it can be unclear what the investment will yield (in terms of energy savings).

Nonetheless, housing associations must take responsibility. As a first step they should work together with municipalities and the heating sector to map cities to identify what the most promising and cheapest sustainable heating options are per area. Moreover, they need to be open about the expected replacement time of boilers and foreseen renovation moments of complexes. Associations have a decisive role in the realization of a district heating network in promising areas. By committing that they will connect their housing stock in these areas (market) parties can invest in such a network and make a district heating network a reality. Moreover, private home-owners and home-owner associations will then more easily take the step to connect to this network as well. This way a heat transition can be planned.

#### **4. High-rise buildings: the increasing role of home-owner associations**

Since housing associations are selling more and more of their housing stock the role of home-owner associations is increasing especially in cities. With this a new problem arises: these (new) home-owner associations hardly have any reserves and no investment is made in making these homes more sustainable before they were sold.<sup>10</sup> So there is no money available to invest in (additional) insulation measures or other ways of heating. On top of that decision making in home-owner associations is often quite complicated especially when both home-owners and a housing association are involved. This may complicate the roll-out of a district heating network in urban areas and thus delay the heat transition.

Home-owner associations see themselves as private persons rather than business customers. (Remmers, 2015) Energy companies, installers and municipalities should be aware of this. The board of a home-owner association is very reluctant to push one solution: they are afraid of being looked at on the final decision. Therefore, they want (independent) easy-to-understand information on the technology and price. And quotes should be easy to compare with other technologies. They have the same negative associations with district heating as consumers (see page 5). (Remmers, 2015) (Van Lidth de Jeude & Dervis, Quicksan Percepties Bewoners Collectieve Warmtelevering Rotterdam, 2012)

To seduce home-owners in an apartment building with individual gas boilers to connect to a collective heating solution (e.g. district heating) might be quite difficult. For a district heating connection to be profitable the majority (if not all) of the apartments should be connected. However, these residents don't want to give up their freedom of choice and replacement moments are not equal. The home-owner association could play a role here.

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<sup>8</sup> Landlords who rent more than 10 social houses need to pay a levy on the value of their rental houses. See <https://www.rijksoverheid.nl/onderwerpen/huurwoning/inhoud/verhuurderheffing>  
For more information on the consequences for housing associations see:  
<http://www.aedes.nl/content/dossiers/verhuurdersheffing.xml>

<sup>9</sup> More information on energy savings measures, rental increase and the rights of tenants can be found in (Weevers & Beltman, 2012)

<sup>10</sup> In (Convenant splitsen en verkoop sociale huurwoningen 2008 t/m 2016, 2008) that is applicable in Amsterdam the quality requirements set for social housing that will be sold refer only to the Building Act. No additional sustainability requirements are set.

## 5. Role of municipalities, metropolitan areas and provinces

In order to be able to reach the goal of a climate neutral built environment in 2050, it is needed that all larger cities start making plans for their heat transition in the existing built environment. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014)<sup>11</sup> Cities should map which heating solution fits best where against the lowest societal costs. As concluded in the Dutch ‘Energieakkoord’ in 2013 several regions in the Netherlands should also look into the possibilities for a regional heating infrastructure. (Energieakkoord voor duurzame groei, 2013) In the province of Zuid-Holland and the Amsterdam Metropolitan Area such initiatives have started.<sup>12</sup> To be successful municipalities, provinces, the energy sector and housing associations should combine forces to start the needed heat transition.

It’s very important that municipalities make yearly arrangements with the social housing sector about sustainable renovations (as agreed in (Energieakkoord voor duurzame groei, 2013)) and – where applicable – connection of their housing stock to a district heating network.

Right now municipalities may designate areas in their community where a connection obligation applies to a collective heating system. For this, a so-called heat plan (‘Warmteplan’) must be developed. However, this is only applicable to new buildings. Existing buildings are excluded from this obligation even when a major renovation is planned. (Israëls, 2013) To stimulate a heat transition and to reach the full potential of district heating it is needed that municipalities are allowed to let existing buildings fall within the scope of this connection obligation. When the heating system of a building needs to be replaced the building or home-owner should be obliged to connect to the district heating network (against reasonable costs) unless it can demonstrate that it will have an environmentally equal or better heating system. In these areas the distribution companies should be allowed to remove the gas infrastructure after a certain time (say 15 years). (Rooijers & Hers, Energiemarkt in beweging - Denktank vernieuwing energiemarkt - Fase 2: Warmtemarkt, 2015) For this the national government should expand the legal framework.

Municipalities (and provinces) must be aware that they have a very important role in informing their inhabitants about the purpose and necessity of the heat transition and the connected measures in an easy understandable way. It is advisable that they offer support to home-owners, home-owner associations and tenants about sustainable measures to take. They could for example contract or advise an independent consultant that can help home-owner(s) (associations) to select the best and most cost-efficient measures. And they could offer financing solutions for sustainable renovation measures such as insulation and sustainable heating as more and more provinces and cities are doing.<sup>13</sup>

To help realize district heating networks and making these (financially) more attractive for citizens to connect to municipalities and provinces could (co-)invest in the infrastructure<sup>14</sup> (Nillesen & Hensgens, 2015) or guarantee

<sup>11</sup> For a list of Dutch cities see p.29 of (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014)

<sup>12</sup> In Zuid-Holland a ‘Programmabureau Warmte Koude Zuid-Holland’ is active since 2012 to realize a regional heating infrastructure (‘Warmterotonde’). See: <http://warmopweg.nl/>  
In the Amsterdam Metropolitan Area a similar initiative has started in 2015. See <http://www.warmteiscool.nl/>

<sup>13</sup> In the Netherlands the ‘Stimuleringsfonds Volkshuisvesting’ is offering a sustainability loan to provinces and municipalities. They can then offer this to their inhabitants. See <https://www.svn.nl/FinancieleRegelingen/Paginas/Duurzaamheidslening.aspx>

<sup>14</sup> Examples are ‘Warmtebedrijf Rotterdam’ <http://www.warmtebedrijfrotterdam.nl/warmtebedrijfrotterdam/> and ‘Stadsverwarming Purmerend’ - <http://www.stadsverwarmingpurmerend.nl/210/over-svp/over-stadsverwarming-purmerend>

the needed loans. This way market players can make a more attractive offer because the risks and interest rates go down.

When municipalities or distribution companies own the transport heating network, they could work with heat concessions for distribution and supply per area. This way competition between heating companies is promoted. This can give citizens more confidence in (the price of) district heating.

## 6. Role of the national government

The national government is a key player. They have to get the heat transition started. Since minister Kamp drafted his Heat Vision ('Warmtevisie') in April 2015 (Kamp H. , 2015) it is expected that the government will take a leading role. Everyone in the heating sector is now waiting for his Implementation Agenda ('Uitvoeringsagenda'). There are huge costs attached to a conversion to other heating technologies (e.g. for insulation measures, heat pumps, heat networks and reinforcement of electricity networks). (Van Melle, Menkveld, Oude Lohuis, De Smidt, & Terlouw, 2015) One of the things the government could and should do is to promote the societal most cost-efficient heating solution, e.g. area solutions in certain areas (such as collective heating) next to building-related solutions in other areas. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014)

For sure the government should stop waiting for the EU emissions trading system (ETS)<sup>15</sup> to work properly. Instead, to create a level-playing field for environmental friendly heating solutions the government can take many possible measures:

- i. *Start an information campaign*  
The government needs to explain to its citizens why a heat transition is needed and what comes along with this e.g. the need to save energy and to use other heating solutions. In our view focus should not only be on the need to take climate action, but also on the depleting Groningen gas field and the increasing dependence on gas from Russia. In order to be successful this campaign should stress the benefits for households such as an increase in comfort level or decreasing energy costs
- ii. *Make the national energy saving fund ('Nationaal Energiebespaarfonds') more attractive by:*
  - a. *Increasing the notoriety of the energy saving loan ('Energiebespaarlening')*<sup>16</sup>  
Since the start of this fund not many people have made use of it.<sup>17</sup> This option should be brought to the attention of citizens at relevant moments such as moving to a new house, family expansion, filing an application for a building permit, the breakdown of a boiler etc. Involve marketers to come to relevant campaigns.
  - b. *Expansion with a savings option*  
Dutch are good at saving money. The revolving fund could make use of this by providing a tax-friendly savings option next to the loan. (Meijdam, et al., Doen en laten - effectiever milieubeleid door mensenkennis, 2014)
- iii. *Make the Energy label more relevant*  
Unfortunately, this mandatory label does not reflect the actual energy costs for a household in a certain house. These costs are highly dependent on human behavior. The label tells you something about the energy efficiency of your home. To increase the use of these labels and the awareness of the energy efficiency of homes the government could think of other moments (besides selling your home) where a final label is mandatory such as when people file a building permit application.

<sup>15</sup> For more information on ETS see [http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm)

<sup>16</sup> See <https://ikinvesteerslim.nl/>

<sup>17</sup> See [https://www.renovatieprofs.nl/nieuws/honderden-miljoenen-voor-lening-duurzame-renovatie-van-huizen-blijven-liggen?utm\\_source=nieuwsbrief\\_Januari%20%2716%20editie%201&utm\\_medium=email&utm\\_campaign=edm\\_RenovatieProfs&utm\\_id=18545](https://www.renovatieprofs.nl/nieuws/honderden-miljoenen-voor-lening-duurzame-renovatie-van-huizen-blijven-liggen?utm_source=nieuwsbrief_Januari%20%2716%20editie%201&utm_medium=email&utm_campaign=edm_RenovatieProfs&utm_id=18545)

iv. *Expanding subsidies*

Another option is to expand certain (existing) schemes or the come up with new ones

a. *Social sector*

The government could think about expanding subsidies for housing associations to increase energy efficiency in the social sector. In the (Energieakkoord voor duurzame groei, 2013) 400 million euro is committed. However, that's a drop in the ocean considering the investment needed to get to climate neutral housing.

b. *Energy saving subsidy*

Insulating glazing is still very costly. To promote HR++ glazing or better in the existing housing stock the government could consider a household subsidy for this. Other insulation measures like cavity wall insulation, floor and roof insulation are mostly very cost effective. If not, a subsidy could be a good way to increase energy efficiency.

c. *ISDE ('investment subsidy renewable energy')*<sup>18</sup>

This new subsidy that has seen the light of day on January 1st is covering part of the investment costs for small equipment for the production of renewable energy such as solar boilers, wood pellet stoves and heat pumps. Households, businesses and housing associations can make use of this arrangement. In our opinion the government should consider expanding this to district heating. As we have seen before it depends on the area where people live what measures are most cost-effective and fit into the heating plan for that area among which district heating.

d. *SDE+ ('promotion of renewable energy production')*<sup>19</sup>

Since 2012 renewable heat production is part of the SDE+ subsidy scheme. To promote large scale usage of waste heat the government could consider subsidizing this. This measure can make a large contribution to the overall CO<sub>2</sub> reduction goal of the government.

v. *Elimination of tax distortions in the energy tax*

At this moment the energy tax for gas is much lower than for electricity. Adjustment of energy taxation creates a strong incentive for households to reduce their energy consumption through energy conservation. Moreover, a transition to solar water heaters or conversion of natural gas to heat pumps or heat supply become more attractive. You can see this as a form of CO<sub>2</sub>-pricing. (Rooijers & Schepers, *Verschuivingen Energiebelasting - verkenning effecten*, 2015) (Rooijers, Schepers, & Cherif, *Verschuivingen Energiebelasting - aanvullend op rapportage van juli 2015 is variant uitgerekend EBgas = EBelektriciteit*, 2015) (Den Ouden, Hoeksema, & Graafland, 2015) (*Groeiplan voor warmte*, 2015) A first step has been made with the adoption of the Tax Plan 2016 ('Belastingplan 2016')<sup>20</sup> just before Christmas. In order to be effective the energy tax on gas should increase step-wise the coming years until natural gas is more expensive than the environmental friendly alternatives.

vi. *Differentiation of notional rental value for owners-occupiers ('eigenwoningforfait')*<sup>21</sup> and property tax rates based on energy label / index

This will stimulate home-owners to invest in energy saving measures and climate friendly solutions. (Leguijt & Schepers, *De rol van warmtelevering in de klimaatneutrale stad*, 2014) And it gives municipalities the means to stimulate the local energy transition.

vii. *Make the 'landlord levy' ('Verhuurderheffing')*<sup>22</sup> for housing associations dependent on the energy performance of buildings

<sup>18</sup> See <http://www.rvo.nl/subsidies-regelingen/investeringsubsidie-duurzame-energie-isde>

<sup>19</sup> See <http://www.rvo.nl/subsidies-regelingen/stimulering-duurzame-energieproductie-sde>

<sup>20</sup> See <https://www.rijksoverheid.nl/onderwerpen/milieubelastingen/inhoud/energiebelasting>

<sup>21</sup> Home-owners have to add a percentage of the value of their home to their income. On this they pay taxes. <http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/prive/woning/eigenwoningforfait/>

<sup>22</sup> See note 8 on page 6

It is expected that this will stimulate the renovation of social houses. (Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014) Housing associations will probably allocate their resources differently with this measure in place.

- viii. *Equal appreciation of area measures like district heating in the 'housing valuation system' ('woningwaarderingssstelsel' (WWS)<sup>23</sup>) and 'energy performance fee' ('energieprestatievergoeding' (EPV)<sup>24</sup>)*
- Right now housing associations cannot increase the rent or ask an energy performance fee when they invest in area measures like district heating. The CO<sub>2</sub> contribution of district heating or other area measures is not valued.<sup>25</sup> They can do so when investing in insulation or heat pumps (in combination with solar PV). Equal appreciation of area measures will make these options more attractive. This will stimulate renovations and will lead to cost-efficient solutions.
- ix. *Make district heating more attractive by:*
- a. *allowing product differentiation for district heating* (e.g. concepts like 'green heat', 'no energy bill' ('notaloos') and 'zero-on-the(-energy)-meter' ('nul-op-de-meter')<sup>26</sup>) (Groeiplan voor warmte, 2015) This gives people a sense of choice. And there will be less resistance against the local monopoly of the heat supplier. This can be covered in the forthcoming revision of the Heat Act.
  - b. *abolishing the 'no more than otherwise' ('Niet meer dan anders', NMDA) terminology of the Heat Act*  
 Since gas boilers are the norm in the Netherlands, pricing of district heating is plotted against this norm. However, psychologically this term works adverse. When you tell someone to NOT think about a pink elephant, he or she DOES think about a pink elephant. Our brains cannot handle denials well. Instead who denies admits. (Gagestein, 2014) This contributes to the fact that many people are suspicious about the pricing of district heating and are convinced that they are paying too much whether that is true or not.
  - c. *making large transport infrastructure a public utility*  
 These pipelines are costly and should be built first while customer growth may take years. Market players cannot afford such a risk on their own. (Groeiplan voor warmte, 2015) The result is that the expansion of district heating is delayed or doesn't even get off the ground. By making these a public utility costs will be socialized and market players can invest in distribution networks and start connecting households.
- x. *Force home-owner associations to create a financial reserve for energy efficiency renovations and new heating solutions*  
 In a new Act home-owner associations will be forced to build a piggy bank for maintenance.<sup>27</sup> This will however not be enough for a more extensive renovation that is needed to improve energy efficiency or for a connection to district heating. It is therefore advisable to expand the obligation for home-owner associations.
- xi. *Let existing buildings fall within the scope of the connection obligation in Heat plans ('Warmteplannen')*

<sup>23</sup> See e.g. <https://www.rijksoverheid.nl/onderwerpen/huurwoning/inhoud/puntensysteem-huurwoning>

<sup>24</sup> See <https://www.rijksoverheid.nl/actueel/nieuws/2015/06/25/energieprestatievergoeding-voor-nul-op-de-meter-woning>

<sup>25</sup> Based on an interview with Daniël Awater, regulatory manager Nuon, on 19 January 2016

<sup>26</sup> See e.g. <http://www.rvo.nl/actueel/nieuws/energieneutrale-woningen-bouwen-lees-nul-op-de-meter>

<sup>27</sup> See [https://www.renovatieprofs.nl/nieuws/vereniging-van-eigenaren-moet-verplichte-spaarpot-voor-onderhoud?utm\\_source=nieuwsbrief\\_December%20editie%204&utm\\_medium=email&utm\\_campaign=edm\\_RenovatieProfs&utm\\_id=18545](https://www.renovatieprofs.nl/nieuws/vereniging-van-eigenaren-moet-verplichte-spaarpot-voor-onderhoud?utm_source=nieuwsbrief_December%20editie%204&utm_medium=email&utm_campaign=edm_RenovatieProfs&utm_id=18545)

This way municipalities can accelerate a heat transition and designate areas where district heating will become the norm (see page 7).

- xii. *Emission cap for the built environment which is gradually adjusted downwards*  
(Leguijt & Schepers, De rol van warmtelevering in de klimaatneutrale stad, 2014) This already exists for new buildings since there is a clear policy standard ('EPC'-norm<sup>28</sup>). An emission cap is a quite drastic measure since renovation of houses by housing associations, landlords and home-owners is imposed. However, this is a very effective way to reach climate neutrality. Such a CO<sub>2</sub>-cap is elaborated in (Rooijers, Boon, Faber, & others, 2007). When such a measure is taken municipalities should help their citizens to implement the right measures against the lowest costs by mapping which heating solution fits best where.
- xiii. *Energy efficiency obligations / white certificate scheme*  
In order to achieve the energy savings targets for the Netherlands, the government could consider installing a white certificate scheme. Under such a system suppliers (or distributors) of electricity and gas are required to undertake energy efficiency measures for the final user that are consistent with a pre-defined percentage of their annual energy delivery. Several countries worldwide have done so already and these schemes have proven to be very effective. (Cowart, 2013) This will increase the costs for energy of end-consumers since energy companies have to finance the energy savings measures. In our opinion it is not very logical to force energy companies to save energy at the end-consumer since this will affect their business.

Measures i to vii are positive incentives, while measures x to xiii are obligations. There is a danger that the government will be doing too much power play and forces measures upon sectors and citizens instead of using already present forces in society. In general it can be very powerful to make use of the insights in the field of change management.<sup>29</sup>

We would like to urge the government to come up with a Delta Plan for the heat transition. It is important that the government - in order to reach broad acceptance - involves NGO's<sup>30</sup>, municipalities, provinces, housing associations, construction companies, installation companies, energy companies and distribution companies. The idea is to develop several scenario's per city area and rural area (e.g. most cost-effective, most sustainable) with as starting point a climate neutral built environment in 2050 and intermediate steps (Energieakkoord voor duurzame groei, 2013). The costs to develop these scenario's should be financed by the government. In order to realize such a transformation a clever combination of the above measures i to xiii needs to be implemented and all involved parties should commit to this Delta Plan. This way the heat transition can move ahead rapidly.

## 7. Changing roles of utilities and distribution companies

We expect that the role of energy companies will change drastically over the next decades. New players are entering the market, distribution companies are trying to extend their business and citizens take matters into their own hands.

We start to have a look at the changes distribution companies are confronted with. The heat transition has major implications for the energy infrastructure: (Rooijers & Hers, Energiemarkt in beweging - Denktank vernieuwing energiemarkt - Fase 2: Warmtemarkt, 2015)

- a. Strengthening of electricity networks in areas where heat pumps are preferred (Van Melle, Menkveld, Oude Lohuis, De Smidt, & Terlouw, 2015);
- b. Removing the low pressure gas network in areas where heat pumps and district heating will become the norm;

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<sup>28</sup> See note 2 on page 2

<sup>29</sup> See e.g. (De Caluwé & Vermaak, 2006)

<sup>30</sup> For example NGO's (non-governmental organisations) like Woonbond, Vereniging Eigen Huis, Natuur & Milieu, Greenpeace, Milieudefensie, Urgenda

- c. Preserving the medium pressure gas network;
- d. Adjustment of the charging and amortization of gas networks;

Thus, DSO's<sup>31</sup> like Alliander, Enexis and Stedin are confronted with huge changes and large investments. To cope with these changes, DSO's are looking into new areas of business such as district heating and advising households about environmental-friendly measures.<sup>32</sup> This way they want to steer the transition, optimize investments and tap into new sources of revenue. The above mentioned implications also mean that GasUnie's business will shrink considerably unless they decide to broaden their scope and start investing in e.g. district heating (transport) infrastructure. Question is whether these companies would also like to play a role in serving customers or that they will limit themselves or are limited by the government to a network role.

The three major energy companies, Essent (RWE), Eneco and Nuon (Vattenfall) play a role in production, trading and supply of electricity and gas. Both Eneco and Nuon also have district heating networks. Essent sold its district heating business in 2014 to pension insurer PGGM and Veolia and this way Ennatuurlijk was founded.<sup>33</sup> So far Eneco, Nuon and Ennatuurlijk are focusing their district heating activities mostly on the largest cities in their old monopoly areas or are divesting the smaller district heating networks. This means that there is room for players with a focus on medium- and smaller-sized cities. We also expect to see more competition between these companies and room for new players within the cities that already have a district heating network once district heating is (concession wise) rolled-out to existing built areas. You can already see this happening in Rotterdam where both Eneco and Nuon are active.

Next to this more and more district or collective heating cooperatives will emerge. Right now there are only a few active like Thermo Bello<sup>34</sup> in Culemborg. In Amsterdam a few neighborhoods are investigating the option of a local heat network that uses e.g. waste heat of ice skating rink Jaap Eden or the power plant of the academic medical center (AMC). Alliander DGO is very active in supporting these local initiatives.<sup>35</sup> We also see the emergence of other small companies who focus on small-scale (collective) renewable heating solutions such as BeGreen<sup>36</sup>. On the production side waste heat of power plants and waste incinerators will be supplemented and replaced by renewable sources in the future. Geothermal heat is one of the promising directions next to biomass. Horticulturalists are the first ones to drill geothermal heat wells. Therefore, they can become new players in the (low-temperature) heat market.<sup>37</sup>

With the growth of district heating and all-electric solutions the gas business for traditional energy companies will decline. Part of this business will be replaced by biogas. Farmers can become the main producers of this gas

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<sup>31</sup> DSO = Distribution System Operator

<sup>32</sup> Alliander has setup a whole new line of business called 'new markets' to do so – see: <https://www.alliander.com/nl/activiteiten/nieuwe-markten>

<sup>33</sup> See <http://www.energieactueel.nl/mijn-markt-ennatuurlijk-energie-geen-standaardproduct/>

<sup>34</sup> Thermo Bello is an energy cooperative active in Culemborg. It was founded in 2008 when it took over the district heating network and activities of water company Vitens. See <http://www.thermobello.nl/>

<sup>35</sup> See <https://www.allianderdgo.nl/>

<sup>36</sup> BeGreen owns and operates several heat station and networks. They also develop local heat projects that will be owned by companies or municipalities. The heat source uses wood chips (from pruning waste) as fuel. <http://www.begreenenergy.nl/zakelijk/index.php>

<sup>37</sup> E.g. in Zuid-Holland where a regional district heating network is being investigated - see <http://warmopweg.nl/>

together with the food and waste industry. However, there are still many hurdles to overcome.<sup>38</sup> Traditional energy companies will play a role in trading and supply although new initiatives like Vandebroon<sup>39</sup> can take a significant portion of this market as they connect local producers (like farmers) directly to customers.

Construction companies<sup>40</sup> want to become large players in the energy efficient renovation market with initiatives like ‘Stroomversnelling’. They focus on heavy insulation in combination with an all-electric solution (heat pump) that is powered by solar PV panels. Until January 2016 energy companies were not part of these initiatives. Recently Eneco joined them. All large utilities have an installation branch<sup>41</sup> but they are so far all focusing on the traditional gas boiler business and on post insulation of cavity walls, roofs and floors. We have not seen any all-in-one renovation packages yet to make your home energy efficient or even energy neutral.

Another threat for the traditional (integrated) energy companies is ‘third party access’ (TPA) for district heating. (Nillesen & Hensgens, 2015) (Den Ouden, Hoeksema, & Graafland, 2015) (Dervis & Nierop, 2015) A radical form would split production/supply and networks like in the gas and electricity markets. It looks like distribution companies like Alliander, Stedin and possibly Enexis are very interested to step into this market.

In order to stay a significant player on the heat market traditional energy companies should focus on the changing energy market and explore new business models. They need to put the customer first and start collaborating with small(er) (start-up) companies for innovation. The district heating business units of these energy companies need to change from an old-fashioned utility into a service-oriented marketing machine – from push to pull. They need to develop new competences like seducing consumers to switch from natural gas to district heating. A similar change like the electricity and gas markets have gone through. One of the things that can help is to change from one-product-fits-all to a portfolio of solutions. Moreover, companies need to be transparent about pricing and explain their product in a better way. Our recommendation is to abandon the ‘not-more-than-otherwise’ (NMDA) terminology as explained before (see page 10) and to give district heating a local twist. In our opinion district heating companies (and municipalities) should follow the example of fiberglass companies like Reggefiber<sup>42</sup> that have laid down fiber networks in districts using smart local campaigns. By the use of framing (Gagestein, 2014) companies can start setting up new views and associations connected to energy saving, heating homes and comfort standards.

## 8. Conclusions and recommendations

To realize a heat transition in the housing sector in the Netherlands natural gas boilers need to be replaced by several technologies in combination with insulation measures (instead of one-size-fits-all). The choice of technology depends on the building type and availability of resources. A combination of building and area measures is most cost-efficient. However, the implementation is grinding to a halt since:

- There is no level-playing field for environmental friendly heating solutions;

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<sup>38</sup> E.g. before biogas can be injected into the natural gas grid its quality needs to be upgraded. More info can be found in (Dumont) and via <http://www.rvo.nl/onderwerpen/duurzaam-ondernemen/duurzame-energie-opwekken/bio-energie/biogas>

<sup>39</sup> Vandebroon is an energy company that works like a broker and connects producers directly to customers - see <https://vandebroon.nl/#/>

<sup>40</sup> See <http://www.stroomversnelling.nl/leden/> for the construction companies that are participating in the ‘Stroomversnelling’ initiative.

<sup>41</sup> Nuon: Feenstra - <https://www.feenstra.com/>, Essent: <https://www.essent.nl/content/particulier/energie-besparen/verwarmingsinstallaties/onze-servicepartners.html?icmp=20150128TL001U>, Eneco: <https://www.eneco.nl/cv-en-onderhoud>

<sup>42</sup> See <https://www.eindelijkglasvezel.nl/>

- Citizens are being left to their own devices. They have no idea about alternatives for gas boilers or have negative associations connected to these;
- Housing associations are not doing enough to reach their targets. They focus on the short term and only take easy-to-realize and less costly measures;
- Home-owner associations are increasingly important. However, new associations don't have any reserves they can use to invest in energy savings measures or new ways of heating;
- Although the attention of municipalities is increasing they are not the ones fueling a transition;
- And the national government is not playing a decisive role yet.

Thus, if we carry on like this a climate-neutral built environment will never be realized.

For the heat transition to fly we would like to recommend the following:

- Start with informing the public why a heat transition is needed and what technology to use where (government, municipalities, energy companies and housing associations can all play a role here);
- Create a level-playing field for environmental friendly heating solutions (by the government);
- Involve residents actively in the transition (for all actors);
- Force housing associations to be transparent about renovation plans and let them commit to district heating in areas where this appears to be the best solution (government and municipalities);
- (Co-)invest in heating infrastructure or guarantee needed loans (municipalities) so that the market sector starts rolling out heating networks in existing urban areas;
- Map cities: what heating technology to use where (municipalities together with housing associations, the construction and energy sectors);
- All of the above should be combined in an all-embracing Delta Plan for the Dutch heat transition (government with NGO's, municipalities, provinces, housing associations, construction companies, installation companies, energy companies and distribution companies);

By doing so we can set an example for other countries instead of staying bottom of the class within Europe.

In order to survive in this changing energy landscape energy companies should focus on the customer and explore new business models. They need to be very transparent and develop marketing skills to boost amongst others the image of district heating.

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