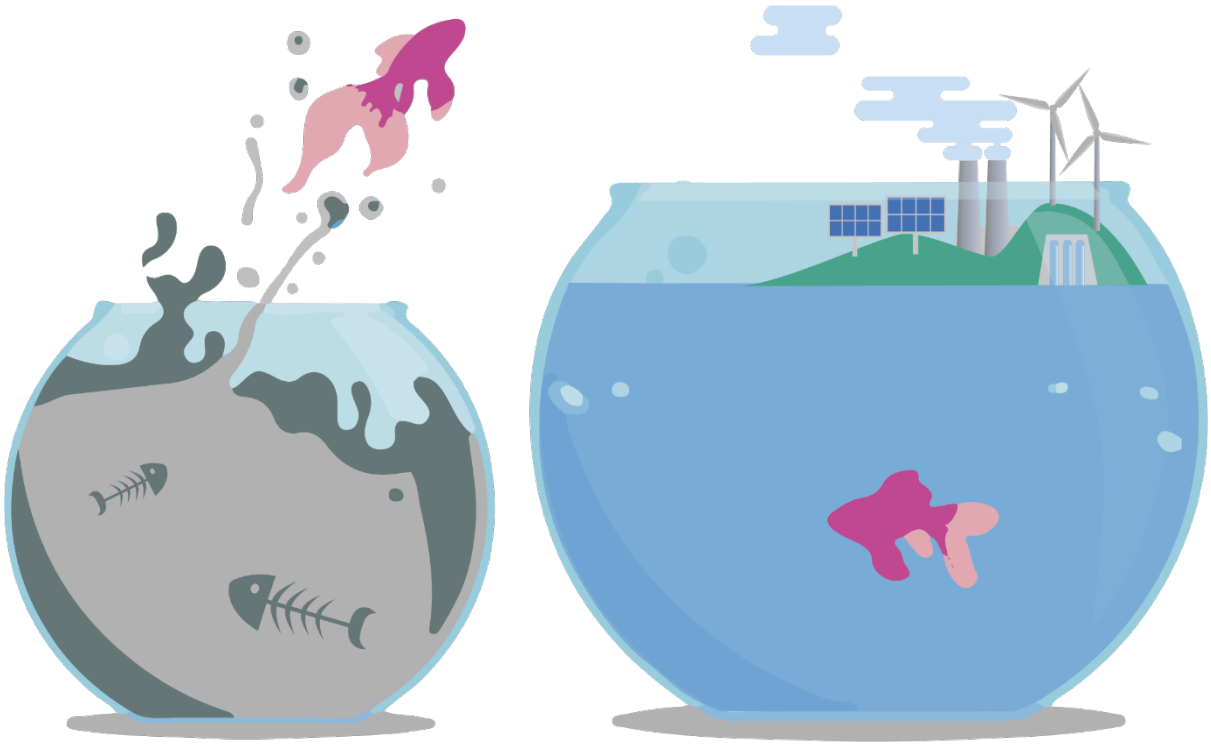
Heating transition in the Netherlands



Analysis of selected municipal pilot plans for the transition to natural gas-free heating for Dutch neighbourhoods

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Summary / Abstract (max 400 words)

By 2050, all Dutch neighbourhoods have to be heated natural gas-free. The Netherlands has decided to minimise natural gas-extraction due to increasing earthquakes in the province of Groningen and as parts of fulfilling the Paris Agreements. In order to meet this goal, all Dutch municipalities must come up with a heat transition plan for their neighbourhoods by 2021. The Dutch government has allowed municipalities to come up with pilot plans, on how they aim to make neighbourhoods natural gas-free in the near future. 27 of these plans were selected and received the funding.

Three of these pilot plans for the energy transition to natural gas-free neighbourhoods in the Netherlands were analysed in this thesis. The aim was to find out the involvement of private homeowners in the pilot plans, and how to improve this involvement to maximise the success of this energy transition. In order to analyse the involvement, a programme theory (logic model) framework was used, together with interviews from the responsible persons at the municipality and supplemented by literature.

For all three pilot plans, homeowner involvement in the pilot plans was found to be insufficient. In the plans, homeowners were to be informed and made aware of the pilot. Plans of concrete steps to involve the homeowners were either missing or incomplete. There was a discrepancy found for two out the three municipalities where homeowners were actively involved in sustainability initiatives.

Municipalities are advised to start informing homeowners about the energy transition and including them in making plans from early on. They are also encouraged to get to know their residents well to increase acceptance for eventual energy transition programmes. Residents who are not engaged in programmes and do not feel that they have contributed to the programme are likely not to accept the programme. With the majority of Dutch homes being privately owned, the energy transition will not become a success without the cooperation of homeowners.

Preface / Acknowledgments

As an African proverb goes: *"If you want to go fast, go alone. If you want to go far, go together."*, the journey for this master and the thesis track was one which I could not have gotten far alone. Mentioned here is but a select number of people who have made this journey worthwhile.

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Credits to my brother **Timon** for the tailor-made front-page illustration!

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1. Introduction

With oceans that have become warmer, sea levels higher, glaciers decreased, the earth's system is changing (IPCC, 2007). Observed climate changes over the last 70 years have been unprecedented (ibid.), much due to the increased emission of greenhouse gases such as carbon dioxide (CO_2) into the atmosphere (IPCC, 2013).

In order to combat climate change and to accelerate the adoption of a sustainable low carbon future, world leaders signed what is commonly called the Paris Agreement during the 21st Conference of Parties (UNFCCC, 2018). By signing this agreement, the leaders agreed to work towards limiting the global temperature rise to under 2 degrees Celsius compared to pre-industrial time and to do their best to limit the temperature increase to a maximum of 1.5 degrees Celsius during this century (ibid.).

To meet the goals of the Paris Agreement, the European Commission implemented drastic measures for their member states to move towards a sustainable low-carbon future. These measures include the binding EU target of 40% domestic reduction in greenhouse gases by 2030 compared to the year 1990, the target of at least 27% share of renewable energy consumed in the EU in 2030, and 27% energy efficiency improvement compared to projections of future energy consumption based on the current criteria (EC, 2014).

Since the most substantial energy efficiency improvements can be made in existing buildings (Filippidou et al., 2017), making changes in the housing sector would help developed countries such as the Netherlands. Renovation of buildings is more cost-effective and sustainable than demolishing and building from scratch (ibid.). An ideal situation would be to renovate the current buildings in the Netherlands to what is known as Zero Energy houses or Nearly Zero Energy Buildings (NZEB). NZEBs are buildings where no fossil fuels are consumed and where the electricity consumption equals the electricity production of the building (Gilijamse, 1995). In the Netherlands, a country with ample natural gas, this would mean that the homes have to be natural gas-free.

In 2016, the Dutch government composed "The Energy Agenda" (Energieagenda) as a step to lower the national emissions, including the switch to gas-free neighbourhoods (Schoots et al., 2016). Most houses in Dutch municipalities were being for 100% heated by natural gas 2016 (Staatscourant, 2018).

The Netherlands has drastically altered the heating systems before during the transition from different heating sources to natural gas-heating for all households in the 1960s (Historisch nieuwsblad, 2018). This transition was mainly funded by the gas distribution companies and the advantages for the residents, such as more equal distribution of heat during the house were very clear (ibid.). Transitioning to natural gas-free heating however will cost residents and its advantages for the residents are not very clear at the moment (Tigchelaar et al., 2019).

In Groningen, a province in the north of the Netherlands, natural gas extraction is believed to play a role in an increasing number of induced earthquakes, leading to severe damage to the houses and the need to strengthen the structures (Scholten et al., 2016). Due to the increased health and safety risk of the residents in Groningen, the Dutch government has decided that the natural gas extraction in the province will be reduced to zero as soon as possible, with 2030 the latest (Rijksoverheid, 2018c).

In order to help municipalities with the transition to natural gas-free heating, the government introduced the so-called Green Deal (Rijksoverheid, 2017). In March 2017, 31 municipalities, 12 provinces and five distribution system operators signed the deal (RVO, 2018a), which is an essential step towards a CO_2 neutral future for the Netherlands for 2050 (Rijksoverheid, 2017).

In April 2018, a governmental fund was announced for pilot projects in making Dutch neighbourhoods natural gas-free (Proeftuin aardgasvrije wijken) (Rijksoverheid, 2018e). The Ministry of Internal Affairs and Kingdom Relations (BZK) announced the funding. Municipalities had three months to hand in the pilot plan proposals. The main goal of these plans is to learn how, together with stakeholders such as residents, companies, property owners, housing associations, network managers and energy suppliers, to make an existing neighbourhood natural-gas free. Other goals for the plans are to find out how living natural gas-free can improve the quality of life, the living environment, minimise energy bills and how this natural gas-free transition can be rolled out in a cost-effective manner (Rijksoverheid, 2018d). BZK selected 27 of the 74 municipal applications for funding in October 2018 based on the following selection criteria (Rijksoverheid, 2018a, 2018b):

- Quick implementation
- Administrative support by the municipality
- Involvement and support from citizens, companies and other stakeholders
- Technical and financial substantiation of the plan
- Implementation plan
- Requested government grant, coupled to the number of buildings to be modified
- Combination with other improvements to the neighbourhood

The selection was made for the best and most comprehensive learning effect, paying particular attention to (ibid.):

- Sufficient regional distribution, with at least one pilot per province
- Sufficient variation in technology and approach
- A balanced distribution between owner-occupied, rental, and other (utility) buildings
- Variation in municipal size and a mix of urban and rural areas

Figure 1 depicts the list of the selected 27 pilot plans.

BZK is expected to invite municipalities for a second round of applications for pilot plans to make neighbourhoods natural gas-free in the autumn of 2019 (PAW, 2019). During a cabinet debate in July 2019, it was requested to take the role of residents and the feasibility and affordability of the heat transition into account for the second round of pilot plan applications. To be able to use these pilots as learnings, new techniques such as hydrogen and green gas were requested. Next to this, the ministry has indicated that the focus will be on a diverse portfolio of locations (ibid.).

Figure 1: List of the pilot plans selected by the Dutch Ministry of Internal Affairs and Kingdom Relations (Rijksoverheid, 2018a)

The transition to natural gas-free heating is radically different from the transition to natural gas. Back in the 1960s, the transition was an opportunity to use an energy source that was available in abundance in the Netherlands at no additional cost to the households (Kemp, 2010). The transition to natural gas-free living however is an obligatory transition for any household connected to the natural gas grid (VNG, 2019). It comes with drastic changes to homes and will require more from the residents than just their open-mindedness to heating homes in alternative ways (Tigchelaar et al., 2019). Considering that the average residents are not aware of the effects of their actions on climate change (Bord et al., 2000), it can be expected that the residents will be hesitant to participate in the transition. Knowing how to engage and motivate residents to participate in this obligatory transition should therefore have a central role in every municipal pilot plan since the energy transition is not going to succeed without the full cooperation of residents (RVO, 2017).

In literature, there are no comparable transitions in the energy sector which the Netherlands can learn from. There are however renewable energy projects where resident participation has been studied and where lessons can be learned on how to maximise the resident participation. These lessons will be discussed in the next chapter (theory).

1.1 Knowledge gap

The knowledge gap that this report aims to cover is therefore the extent to which insights from studies about involving residents in any local change can be applied for the energy transition in the Netherlands, considering that the Netherlands is facing a transition with a mandatory nature for homeowners without it being clear who pays for the additional costs and what the benefits will be for homeowners.

1.2 Research aim & research question

The aim of this research, therefore, is to gain insights into the current homeowner involvement in Dutch pilot plans for natural gas-free heating of neighbourhoods and to learn what the optimal homeowner involvement should be in such plans. The research question that is going to be used to meet this aim is:

"How are private homeowners involved in the pilot plans for the transition to natural gas-free heating of Dutch neighbourhoods, and how could they be involved in future pilot plans in order to maximise the likelihood of a successful transition?"

In this report, the plans for making the transition from natural gas heating to natural gas-free heating for Dutch residential neighbourhoods is referred to as pilot plans. The transition from heating with natural gas to heating with other sustainable alternative is referred to as heating transition or energy transition. Furthermore, the focus for the residents will be on private homeowners and not on tenants because private homeowners comprise the majority of buildings with a variety of characteristics (CBS, 2019). Three pilot plans were used as a basis for the analysis in this report.

1.3 Report structure

This report continues with a chapter on applicable theory, including the conceptual model (chapter two). In chapter three, the methodology of the research is explained in detail including the framework that has been used in this research and the adjustments that were made to this framework. The results and analysis are presented in chapter four. The analysis is based on the pilot plans for three municipalities, interviews with responsible parties at each municipality and supplemented by literature. Chapter five contains the discussion and chapter six has conclusions and policy recommendations, supplemented with tailored advice on how municipalities can engage with their residents and a simplified version of the used framework as a suggestion for future pilot planning.

2. Theory

Looking at energy transition in municipalities, different tasks have to be done. One can divide these tasks in policy & transition management, financing, and technological implementation. The whole list of involved parties within the energy transition can be found at the website of Platform31 (Platform31, 2019). Within these tasks, one should consider the different stakeholders.

Policy & transition management

- The government as policymaker
- The local government as project manager

Financing of measures

- The government as possible subsidy giver and financial lender
- Homeowners[1] as investors of their properties
- Banks as financial lenders and investors

Technology

- Technicians who provide technical solutions
- Installers of technical solutions
- Energy suppliers who generate the energy
- Network and grid operators for energy transport and balancing of energy flows
- Homeowners as decision makers per household

Most of the abovementioned parties have financial gain from the energy transition since their core business is to make profit. The only exceptions are the homeowners and the governments. The government wants to implement the transition so that it meets the Paris Agreements, while the local government has to oblige to the imposition from the national government. For the homeowners however, the gains (financial or otherwise) are not clear. They are however the owners of the homes and will have to invest in the measures needed to become natural gas-free. With the measures costing the homeowners, one can expect much resistance from them. It is therefore important to make sure that the homeowners are supportive of the heating transition as much as possible since without their participation, it is impossible to complete the energy transition.

2.1 Involvements of residents in the transition

An average resident will ascribe the culprits of climate change to be from distant activities and not related to the resident's activities (Whitmarsh et al., 2011). For example, most citizens are not aware of how much energy it takes to heat up water and do therefore not know that energy and the environment can be spared by e.g. showering shorter (Schuitema & Steg, 2005). By informing and educating the residents, awareness for climate change and sustainability will increase, which can also lead to more conscious behaviour in other aspects of the residents' lives (the so-

[1] Businesses, housing corporations and utility owners are excluded since the approach for them is different (e.g. housing corporations in the past have been able to apply for subsidies such as the STEP subsidy. The Incentive Scheme for Energy Performance in the Rental Sector (STEP) focused on renters of rental properties in the regulated rental sector. As a landlord you could apply for a subsidy to improve the energy performance of existing homes. This scheme was closed on December 31, 2018 (RVO, 2019).

called spillover effect[2]) (Schuitema & Steg, 2005; Whitmarsh & O'Neill, 2010). With educating and informing, awareness is created. This awareness however needs to be turned into sustainability measures (Bradley et al., 1999; Staats et al., 1996). Increased awareness can be used in order to engage residents to take sustainability actions.

In order to increase awareness of a resident's action on sustainability, information provided needs to appeal to the resident's central values (Bolderdijk et al., 2013). The information provided should cater to the needs and wants of a residents, and remove any barrier they might have (Abrahamse et al., 2005, 2007; Thøgersen, 2005). Feedback on sustainable actions can motivate residents to implement future sustainable measures (Abrahamse et al., 2005).

In several renewable energy projects, it has been established that top-down decision-making has a negative effect on public acceptance of projects, while seeing residents as collaborators and taking into account their concerns increases the acceptability of projects (Devine-Wright, 2011; Gordon Walker & Devine-Wright, 2008; Wolsink, 2007, 2010; Wolsink & Breukers, 2010). Also, people prefer to have freedom of choice instead of being obliged to take certain measures. Energy policies and energy systems changes are perceived as more acceptable when they do not threaten people's freedom of choice (Leijten et al., 2014; Poortinga et al., 2003; Schuitema et al., 2010; Steg et al., 2006, 2015).

Residents are more likely to undertake sustainability measures when they perceive the measures when the benefits of the measures outweigh their costs (Steg et al., 2015). Benefits that can be enjoyed by the whole society are perceived to be better than benefits that are solely beneficial to individuals (ibid.). Residents will also be more inclined to engage in sustainability measures if they will get pleasure from the actions (Carrus et al., 2008; Gatersleben & Steg, 2012; Pelletier et al., 1998; Smith et al., 1994; Steg, 2005). Willingness to take action is also linked to others' approval of the actions (Harland et al., 1999; Nolan et al., 2008) and cross-reporting of other residents' actions into taking similar measures (Allcott, 2011). If sustainability measures can be linked to an increase in status, they will have a higher chance to be implemented by the residents. This is especially the case when measures are costly, since it signifies a sacrifice of one's self for the greater whole (Griskevicius et al., 2010). The costly aspect gives the idea that the participant cares about others and the environment (Gneezy et al., 2012).

Residents are more likely to be engaged in sustainability measures when the action leads to a positive signal to others in the society (Noppers et al., 2014). Taking sustainability measures increases the likelihood of one's association with being environmental-friendly (Cornelissen et al., 2008; Van der Werff et al., 2013, 2014), which in turn leads to increased likelihood of positive spillover effect in sustainability-related actions (Van der Werff et al., 2014).

Residents pay attention to aspects of sustainable behaviours which have positive or negative implications for what they consider to be important values (Steg et al., 2014). When measures align with and support people's important values, they

[2] Spillover effect is when actions in one aspect have a positive or negative effect on another part, such as when one engages in exercising, one might be more likely to engate in healthier eating habits as well.

are more likely to accept them (Bolderdijk et al., 2013). Important values for residents can be classified into four categories (Steg et al., 2015):

- Hedonic: values related to pleasure and comfort
- Egoistic: values that advocate safeguarding and promoting one's personal resources
- Altruistic: values that focus on the general well-being of the society and the individual
- Biospheric: values that focus on the well-being of the planet and nature

In general, people tend to perceive sustainability measures positively if they have positive biospheric values. The opposite is true if people have strong egoistic and hedonic values (Nordlund & Garvill, 2002; Schultz et al., 2005; Stern et al., 1995). Residents will be more aware of the effects of their behaviour on the environment if they are more inclined to take the environment into account (ibid.).

Motivating residents by using incentives should be done with care because incentives are usually short-lived and typically do not lead to positive spillover effects that are needed in order make the heat transition successful (Steg et al., 2015). It is however necessary to have incentives that lower the barriers for residents. Non-financial incentives are better than financial incentives (Carrico et al., 2011). Incentives that target intrinsic motivation are also perceived much better than those that target extrinsic motivation (Steg et al., 2015). The reason for this is that intrinsic motivation is usually aligned with a person's identity and core values and will therefore have a higher chance of having a positive spillover effect on other behaviours (ibid.). So even though external incentives might be needed in order to make certain technologies affordable, it is more important to understand that incentives are short-lived and will not lead to positive spillover effects that are needed for an energy transition (ibid.).

If sustainability measures are obligatory, they have a weaker signalling value than when they are voluntary since there is no prestige in being forced to do something (Steg et al., 2015). As a result, forcing measures will not lead to strengthening of personal identity of someone who cares for the environment, and thereby not lead to positive spillover effects (ibid.).

When people are informed of the sustainability challenge of the transition, they are more likely to accept policies aimed at tackling the problems, since it is in their power to do something about it (Steg et al., 2005). Policy acceptance is linked to freedom of choice that the residents have: the more their freedom of choice is limited, the less favourable the policies will be perceived (Poortinga et al., 2003).

Measures are considered more acceptable when they have more positive than negative individual and group consequences (Dietz et al., 2007). Public acceptability of measures is dependent on how and who has developed and will implement the measures, with two special aspects to take into account: distribution of costs and benefits, and public engagement and participation (Steg et al., 2015). Trust affects evaluation especially for technologies and changes that people do not know much about (Siegrist & Cvetkovich, 2000). For trusting, perceived competence and perceived integrity of involved parties play a key role (Earle & Siegrist, 2006). Not only the ability of the involved parties, but their past performance, openness, honesty, and experiences with taking the residents' interest into consideration and whether they

share the same values are critical (ibid.). Universities and non-governmental organisations are more trusted than the national government, and the local government (municipality) is trusted more than the national government (ibid.).

Acceptability of sustainability measures and systems also depends on how the benefits, risks, and costs are distributed amongst the groups involved. Unfair distribution leads to lowered acceptability (Schuitema & Bergstad, 2018). Therefore, those who suffer more should be compensated more.

- Risks and costs should be decreased as much as possible for residents so that public acceptance can be increased. If residents consider heat pumps to be noisy, technical solutions should be used to reduce noise nuisance. If they consider measures to be unaffordable, subsidies should be used to reduce the financial barriers (Benjamin J. A. Walker et al., 2014).
- Provide additional benefits to those exposed to most costs and risks (ibid.). Investing in collective benefits such as a local sustainable petting zoo is not viewed as bribery, compared to paying off a number of residents (Ter Mors et al., 2012).

Acceptance is higher when residents believe that the decision-making process is fair, that they are sufficiently involved in decision-making from the initial stages and their interests are considered (Huijts et al., 2012; Perlaviciute & Steg, 2014). Information provision is crucial for public involvement (Devine-Wright, 2011). In order to have participation, residents should be actively involved and included in decision-making processes (Dietz & Stern, 2008; Wolsink, 2007, 2010).

Face to face contact is one of the most effective ways of interacting with residents, especially when it is done by modelling and by using block leaders. Modelling is using persons who the residents can relate to and respect, as inspiration for building certain behaviour, such as sustainability-centric living (Sussman & Gifford, 2013). In block leading, volunteers from the neighbourhood are used as contact persons for their neighbourhood. This works the best when there is cohesion amongst the residents of a neighbourhood (Weenig & Midden, 1991).

Commitments to implementing sustainability measures work well when they are made publicly (Abrahamse et al., 2005). The same applies for implementation intentions which are also linked to long-term success of sustainability projects (Abrahamse et al., 2005). People want others to have a consistent image of them. It is thought that this tendency is what makes public commitments so powerful: not being able to diverge from commitments made (Abrahamse & Steg, 2013).

As evidence in abovementioned literature shows, there are various ways and incentives to interact and engage residents during a sustainability programme such as an energy transition. In order to gain traction with residents, the abovementioned points should however, be integrated in the pilot plans.

In order to analyse the quality of the pilot plans, a checklist or framework is needed. The pilot plans and the energy transition evolve largely around private homeowners (Tigchelaar et al., 2019). Interaction with the private homeowners should therefore be central during analysis of the plans and should take the private nature of the transaction into account. Pilot plans are designed to take place within the boundaries of neighbourhoods (RVO, 2018b), the scale of the operation should therefore be the neighbourhood. In addition to the aforementioned criteria, the

nature of the pilot plans is in the dynamics of the various stakeholders (Platform31, 2019) as noted at the beginning of this chapter. Thus, a degree of interaction between the different stakeholders should be observable by using the framework (Tigchelaar et al., 2019). Some of the aforementioned stakeholders also work towards implementing technological (heating) solutions within the homes, ergo the technological nature of the pilots should be reflected in the framework as well. Priority should be given to frameworks that have been used in initiating successful projects so that the usefulness of the framework is indubitable. Finally, seeing that the change that the pilot plans is top-down in nature (RVO, 2018b), the chosen framework should be able to reflect this too. To summarise the criteria that are to be fulfilled by a framework for analysis of the pilot plans are:

A. Interactions with end-user of product or service are central
B. Applicable for programmes on a neighbourhood scale
C. Applicable for interaction with various stakeholders within a project
D. Applicable for initiating successful projects
E. Applicable for transitions that involve(d) homeowners or other forms of private stake
F. Applicable in situations where a technological change is involved
G. The initiative for change is top-down decision-making e.g. policy related

2.2 Selection of fitting framework

As has been noted before, the pilot plans evolve around energy transition in mostly existing buildings. The most logical place to start the search for a framework that would accommodate all of the above-mentioned criteria seemed to be the renewable energy sector, preferably in relation to building and renovation.

Table 1 depicts the search of a fitting framework in the above-mentioned sector.

Table 1: Evaluation of available frameworks (Green: criteria present in framework, Purple: criteria not present in framework)

Criteria / Framework	A	B	C	D	E	F	G
Palm & Reindl (2016)							
Kamari et al., (2017)							
Martinaitis et al., (2007)							
Kamari et al., (2017a)							
BUILD UPON, (2016)							

Criteria:

A. Interactions with end-user of product or service are central
B. Applicable for programmes on a neighbourhood scale
C. Applicable for all aspects of a project including contact with stakeholders etc.
D. Applicable for initiating successful projects
E. Applicable for transitions that involve(d) homeowners or other forms of private stake
F. Applicable in situations where a technological change is involved e.g. natural gas heating to natural gas-free heating
G. Applicable where initiative for change is policy related e.g. top-down decision-making.

Scholars have studied different aspects of building renovation in connection with energy efficiency and sustainability targets with several frameworks. Below is an outline of these efforts. The frameworks that were used in these studies, together with how they fulfil the criteria of this research are depicted above in

Table 1.

Palm & Reindl (2016) have e.g. looked at the implementation of energy efficiency in Swedish building during the planning and design phase of renovations. Herein they used a framework with the focus on planned renovation and how this renovation can be used as a chance to apply energy efficiency measures. The initiative for energy efficiency is the need to renovate the building. In the energy transition however, the initiative is not to renovate the building but to radically change the heating system which often means that renovations need to take place. Without the energy transition, many buildings would not need to be modified at all.

Kamari et al., (2017) have focused on a framework for the process of decision-making during building renovation. Herein, performance and support for decision making during the lifecycle of the project are central. They pay attention to the analysis of how a programme is made and not the interaction between the stakeholders. The framework is applicable for different project stages and during sustainability considerations for the decision-making process. In the energy transition however, the focus is on a neighbourhood scale, the interaction with the residents and the underlying assumptions for the actions.

Martinaitis et al., (2007) use a two-factor appraisal method for appraising building renovation and energy efficiency improvement projects. Their framework separates investments into energy efficiency improvements and those related to building renovation. It is a framework that accentuates improvements to individual building scale. In this framework, interaction with homeowners is missing.

The European Union-funded BUILD UPON, (2016) project framework concentrates on how local initiatives and resources can be aligned in order to track collective progress on national levels. Focus of the project is collaboration between renovation and companies and how to make sure that the impact in collective progress towards renovations aimed at drastically improving energy performance is tracked. This framework centres around reporting renovation progress and not active engagement with residents.

Kamari et al., (2017a) used a framework for simplification of existing complexity of frameworks and processes in building renovations. Central to this framework is decision making for the project. In this framework, engagement with stakeholders and especially with residents is missing.

As can be noted in

Table 1, the most fitting framework was not found in the building and renovation sector in relation to renewable energy. This meant that the search had to be expanded to outside the building and renovation sector including renewable energy.

The framework that accommodates the criteria was the programme theory framework by Rossi et al. (2004). Even though this framework is mainly used in the social projects, it could be modified and applied to analyse the involvement of private homeowners in the pilot plans. The adaptations that need to be made in order to

utilise the programme theory framework will be explained towards the end of this chapter.

The framework used by Rossi et al. has been applied in the energy domain, however in a different manner than the intended application in this report. Harmelink et al., (2008) used the framework by Rossi et al. in evaluating policies for energy efficiency instruments. Horschig & Thrän, (2017) have used the framework to review energy policy evaluation and its success in estimating successful implementation of renewable energy policies by using energy systems modelling. Rigby, (2005) focuses on the formation and delivery of energy efficiency policy with on one side government ministers and on the other side the creation of programme instruments by those responsible for the delivery of the programmes. Luederitz et al., (2017) used an evaluative scheme based on Rossi et al. to appraise the extent to which a sustainability transition experiment generates the desired effect and how this is accomplished. With programme theory, the following terminology is interchangeable: programme/policy theory, logic model, programme model, outcome line, cause map and action theory.

2.3 Programme theory framework by Rossi et al.

According to programme theory by Rossi et al., (2004), in order to be able to evaluate a programme, it needs to have the following components:

(i) Programme impact theory
(ii) Interaction plan (also known as the service utilisation plan)
(iii) Programme's organisational plan

An overview of Programme Theory can be seen in Figure 2.

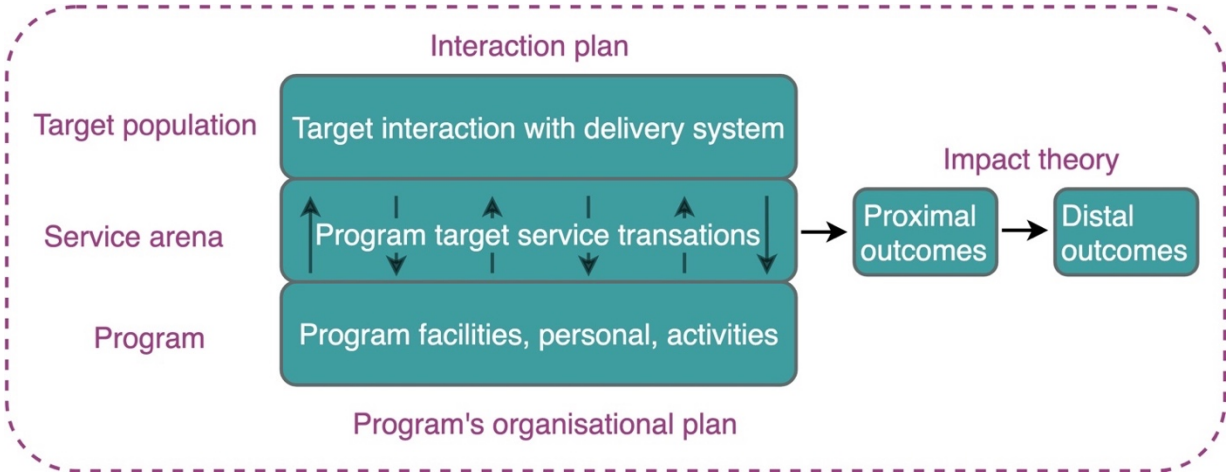

Figure 2: Overview of Programme Theory (Rossi et al., 2004)

The **programme impact theory** contains the assumptions about the change process actuated by the programme and the improved conditions that are expected to result. Herein cause and effect sequences, direct outcomes and distal outcomes are determined, defined and explicated (ibid.).

In the impact theory, the following points are clearly depicted:

- The expected changes (distal outcomes), clearly identified; all assumptions made for pilot programme activities to have effect are shown (All assumptions not explicitly mentioned are to be noted and discussed
- Causal link between the dependence of the direct outcomes (proximal) and the distal outcomes explained and shown in causal relationship
- The possibilities for different paths between activities and social benefits of the pilot programme
- The activities that are undertaken and their link to social benefits envisioned by pilots
- All unclear assumptions that are not explicitly

The **interaction plan** (service utilisation plan) contains the assumptions and expectations on how to reach the target population, provide and sequence contacts and conclude the relationship when services are no longer needed. The interaction plan describes the programme target transactions from the perspective of the recipients and their life spaces as they might encounter the programme and whether these recipients have the necessary means to initiate change processes as presented in the programme impact theory. This process can be described in a flowchart from first contact until discontinuation of the programme. It can also identify possible situations in which programme targets are not engaged with programme as intended (ibid.).

Ideally, the interaction plan is a flowchart of the following elements:

- Clear definition of who the target population is, the other stakeholders and how to reach them
- The frequency of contact with target population and the rest of the stakeholders, language use, tone of voice, what to communicate, when and why
- When to scale the contact up and down, how to terminate the contact with which stakeholders?
- What the expected interactions (transactions) are with which stakeholders, what actions to undertake when the interactions diverge from expectations

The **programme's organisational plan** relates to programme resources, personnel, administration and general organisation. It encompasses functions and activities the programme is expected to perform, and the resources required for that performance to be achieved and identifies programme services which lead to social benefits. An organisational plan should define the consequences such as: if the programme has x resources, facilities, personnel etc, and if it is organised and administered in an x manner, engages activities y and functions z, the viable organisation will result in the intended service delivery system. The adequate resources and effective organisation make it possible to deliver the services intended to the target population. In a full logic model, the inputs, services rendered, and outputs are depicted (ibid.).

Aspects of the programme organisational plan are a clear depiction of the different functions and activities separated under inputs, services rendered, outputs and include the division of the following:

- Resources available during the different phases of the pilot programme

- Administration
- Personnel, which type and how well equipped they are to accomplish the task at hand
- Time
- Finances, etc.

A process theory, which is a description of the programme's ideal functioning and how the intervention produces the intended effects, flows out of the merger between the organisational plan and the interaction plan (ibid.).

Adaptations to programme theory framework

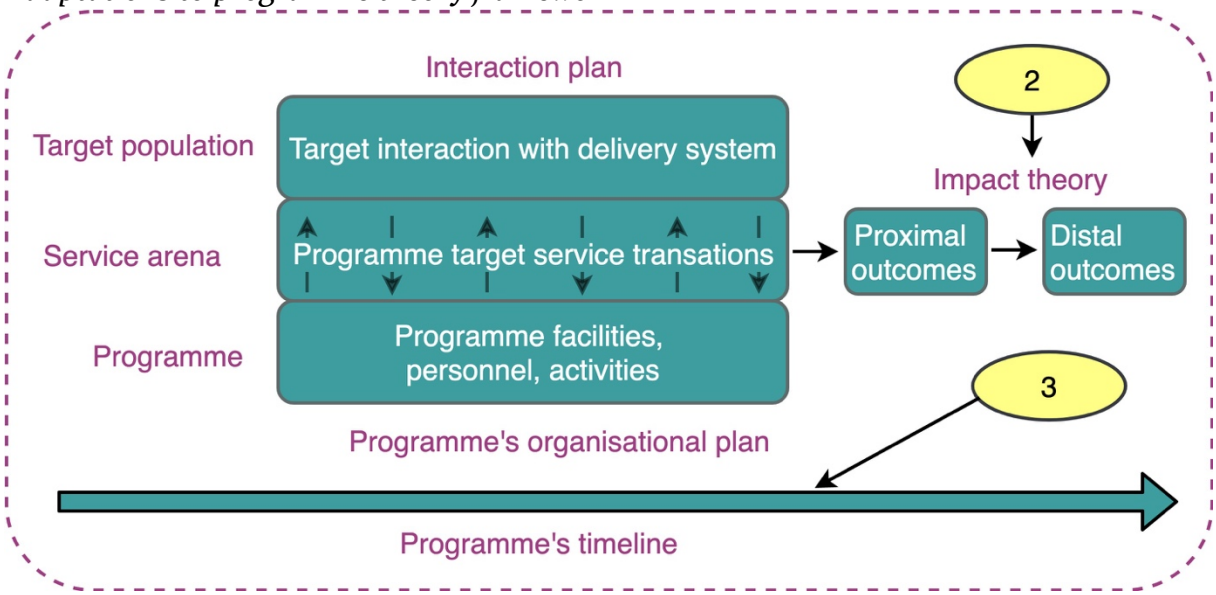

Figure 3: Adaptations to the programme theory framework. 2: Impact theory was curtailed, 3: Programme's timeline was added.

As noted earlier, the programme theory framework needed to be adjusted so that it can be used in this research. The first adjustment that needed to be done is bridging the step from theory to practice. Since the framework has not been used to analyse the energy transition before, there is no checklist that could be used to apply the framework for the energy analysis. This step has been fulfilled by creating a list of questions that together encompass the steps of the energy transition and can be used in order to fill in the framework. Steps that were taken to create the list of questions will be explained in section 2.4. The second adjustment that was made to the framework was after the list of questions was created. While going through the list, a large number of the questions was dedicated to the impact theory. However, upon further inspection, the energy transition on a neighbourhood level is a programme that has few theoretical assumptions. Many assumptions might be needed to fulfil the technological aspect of the programme, but not for fulfilling the resident involvement. Thus, the impact theory section was curtailed to reflect the aim of the research. The final change that has been applied is adjusting the whole framework to encompass the time sensitivity of aspects of the pilot plans. The time sensitivity was discovered after initially experiencing much trouble in placing the right action at the right place in the programme theory visuals (see the results section). The visible adjustments to the programme theory framework (except the list of questions) can be seen in Figure 3.

Program's timeline

As an adaptation to the programme theory framework, it is proposed in this report to account for the programme's timeline. As has been seen in the literature section, some actions such as informing residents have to happen before residents can develop awareness for a project. A timeline in a programme can help put such actions in the right order. In using the framework including the programme's timeline, the timespan of the project starts from the left and develops towards the right. The beginning of the time frame can be perceived as T=0 or the start of a programme, the time interval depends on the duration of the programme. It might be advisable to have a general programme theory framework where the highlights of the activities are seen, and a detailed framework with the more details about the actions taking place. Therefore, when filling in the framework, actions that happen first will be filled in on the left side and actions that happen later come more towards the right, depending on the timespan of each action. One way of visualising the programme's timeline is to imagine it not as an arrow, but a simplified representation of a Gantt chart[3] where all the actions are planned in the right time span. Data needed for this new component are time durations for each activity and when they are to take place.

2.4 Conceptual model

Figure 4. (next page) is the conceptual model of the research where the relationships between the different components of this research are shown. To be able to answer the research question, information from various points was integrated. Three pilot plans were read. From these three pilot plans, an interview was conducted with each of the responsible parties to answer questions that stemmed from reading the plans. This data was used in the analysis of the research. Next to the interviews, data was collected from the pilot plans themselves as answers to questions that build up the programme theory framework (See heading: Data from programme theory framework below). Data stemming from the questions was also used in the analysis of the research. Lastly, literature on resident involvement in sustainability projects was also used in the analysis to test the extent to which the pilots are in line with scientific literature.

[3] "A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities (tasks or events) displayed against time. On the left of the chart is a list of the activities and along the top is a suitable time scale. Each activity is represented by a bar; the position and length of the bar reflects the start date, duration and end date of the activity" (Gantt, 2019).

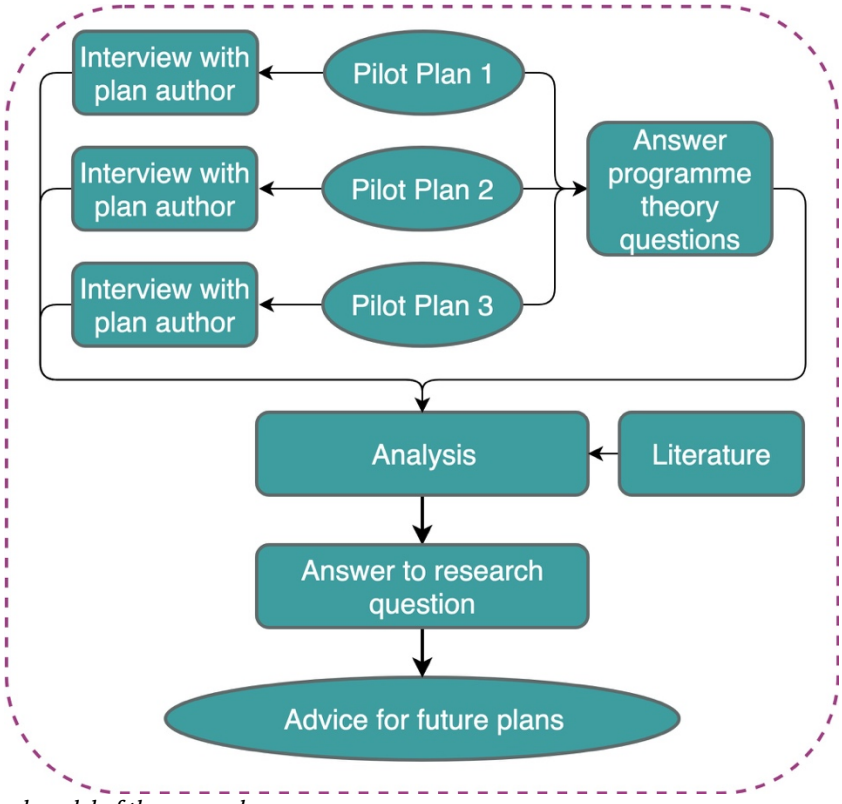

Figure 4: Conceptual model of the research

Data from programme theory framework

Data from programme theory framework are the answers to the programme theory questions as answered by gathering data from each respective pilot plan. This data can be broken down into the programme theory components (impact theory, interaction plan and programme organisational plan). The data was used to (attempt to) reconstruct the programme theory for each pilot plan and in analysing the completeness of the pilot plan in light of scientific literature.

In order to be able to evaluate a programme, the different components of the programme need to be considered such as the programme impact theory, interaction plan and the programme's organisational plan (Rossi et al., 2004). To operationalise these components, a list of questions has been composed (see Table 2). Even though the framework gives a description of each of its components, it does not provide instructions on how to start from scratch and come up with a programme theory. In order to do this, it was therefore necessary to invent the steps, in this case in the form of questions. To do this, the program theory was conceptualised in reverse order, starting with the wanted outcomes, the needed actions that would result in these outcomes, the programme planning and finishing with the theory behind these three components. From here, the process of an energy transition was virtually walked through. During each phase, aspects that would be needed in order to fulfil that phase were determined. For example, in an organisational plan resources are to be described, in relation to the services that are being rendered. Therefore, in order to contact a resident, resources to reach the resident should be clear. This leads up to the question: "What resources are being used in order to target the intended recipients?". After many questions were composed, they were divided into logical order according to the programme theory framework. Any identified double questions were removed. It is expected that when a programme has answered these questions in the plan, a

programme theory emerges. This programme theory can then be used to implement the changes as envisioned by the energy transition. In Chapter 4 (Results & Analysis), these questions are used to analyse the quality of the pilot plans.

Table 2 shows the list of questions that was created in order to fill the programme theory framework.

Table 2: Questions for programme theory analysis

Impact theory
Description What are the expected long-term effects intended by the programme (distal outcomes)? What are the actions that lead to the long-term effects of the programme? What are the expected short-term effects intended by the programme (proximal outcomes)? What are the actions that lead to the short-term effects of the programme? Are all assumptions for effective pilot programme activities/actions clearly shown? *Causality* Is there a causal relationship between the short-term and long-term outcomes? Are all possibilities for different paths between activities and social benefits of the pilot programme depicted? What is the logic of the pathways for accomplishing the programme outcomes? *Well-articulated* Have markers of completion, progress and effectiveness (indicators) been clearly defined? Are the targets SMART[4] *Realistic* Are the time frames for implementation of the measures realistic? What is the current perception of the project as found out by market research? How can the perception be improved in favour of success? Are there alternative methods of reaching the recipient? What are these alternative methods and why are these methods not preferred? *Feasibility* What assumptions have been made that are unclear and need substantiating?
Interaction plan
Description Who are the targeted recipients of the intended services?

[4] SMART is an acronym for target setting. It stands for Specific, Measurable, Achievable, Realistic and Time-bound. (TechRepublic, 2005)

What are exclusion criteria to participate in the programme?
What are inclusion criteria to participate in programme?
Who are the other stakeholders providing services?
What are the exclusion criteria to participate in the programme?
Have personas been defined (are the recipients categorised, and how are they categorised (i.e. age, gender, socio-economic classification, other markers etc.))?
What are the planned inclusion ratios per persona?
How are the different recipients being targeted?
Is there prioritisation of the participants after recruitment?
What are the criteria for prioritisation?
Is there a "plan B" when the interaction is not going as planned?
Are there alternative methods of reaching the recipient?
Are participants allowed and able to reject the programme?
What happens when participants reject the programme?
How and how often is the programme evaluated?
Is programme adjusted after evaluation?
Does the programme have structured protocols and which measures are in place to make sure these protocols are being followed?
How does the programme make sure the protocols are being kept up to date, and which measures are there to make sure the newest protocols are being used?
How is participation defined and measured?
Is the schedule for the programme and programme components clearly defined?

Assumptions and expectations on how to reach the recipient

Are the platforms of interaction fitting for the (different) recipients?
How are the recipients expected to react to activities aimed at them?
Are there anti-bias measures in place for participant interaction and selection?
What are the anti-bias measures for participant selection?
Is there a likelihood that some personas will be unfairly treated compared to others?
Are certain groups expected to be over/underrepresented?

Engagement/communication

What is the outreach-plan with recipient (frequency, platform, etc)?
How are alternative methods being used to reach the targeted recipients?
What is the message to be communicated with the (different) target recipients?
Is there a specific language-use defined for the different segments of the recipient?
What is this specific language-use based upon?
Is there a specific attitude and tone of voice defined for the interaction with the different personas?
How are recipients made aware of the existence of the programme?
How are the recipients being recruited?
How does the programme keep the recipients engaged?
How and when is interaction discontinued after programme completion?
How to deal with groups who are over/underrepresented?

Which measures do the different stakeholder take in order to reach a larger group?

Realistic

How are successful interactions defined and how are the interactions measured (indicators)?
Are these indicators realistic?
How accessible are the stakeholders of the programme?
What percentage of the population is targeted?
Is there equal access to physical locations for the recipients?
How is the access (physical, online media, printed media) taken into account for the different recipient groups?
Are the programme resources (technology, financing, service intensity etc) in proportion to the receiving household's needs (usage, income, family composition etc)?
Is the programme schedule realistic?

Feasibility

How is awareness measured for the target recipients?
How are successful outcomes of communication defined and how are these outcomes measured?
What proportions of the targeted recipients are participating in the programme?
Are there groups which are over/underrepresented?
Has the handling of private personal data been considered and does this have any consequences for the programme?

Evaluation

How much of the intended effect is being achieved?
Is there a discrepancy between the intended and observed interaction?
Is there a discrepancy between the intended and observed outcomes?
Are there any drawbacks of the programme?

Organisational plan

Description

What resources are being used in order to target the intended recipients?
How much resources are available to fulfil the aim of the programme?
Is it possible to increase or decrease the resources for the programme?
How are the resources distributed across the programme?
How are the resources being divided between the recipients?
Does each service and action fulfil the aim of the programme?
What is the role of each stakeholder in order to fulfil the aim of the programme?
What are the accountabilities of each stakeholder?
How are successful services of the stakeholders defined and how are the services measured?
Which resources are needed to fulfil the programme?
Does the municipality facilitate the fulfilment of the programme?
Which accountabilities and roles are needed to fulfil the programme?

Who is responsible for the administrative tasks for each of the programme components?
How are resources available for programme monitoring?
What is the chain of responsibility for reporting?
Are the personnel qualified for the service they are providing?
Which measures are in place to prevent irresponsible programme spending?
Do the programme recipient have enough attainable financial resources to fund the expected changes to fulfil the aim of the programme?

Engagement/Communication

Is there communication between the different stakeholders?
Is there cooperation between the different stakeholders?

Realistic

What is the minimum required service from the stakeholders in order to fulfil the programme aim?
Are the financial resources available realistic to fulfil the aim of the programme?
Are the resources adequate, effective and in line with the services to be provided?

Evaluation

Are the type of staff delivering the programme those specified in the plan?
Do the staff have adequate resources available to provide the actions needed?
Who is in charge of evaluating the programme?
How often should the programme be evaluated?
Who is in charge of monitoring the actions and outcomes of the programme?
What is the monitoring plan?
Is the monitoring plan realistic?
Is the programme being audited (reporting quality, programme quality, outcomes etc)?
Do the auditors have unrestricted access to all parts for the programme (external audit)?
Is there an evaluation plan?
Were the resources adequate, effective and in line with the services rendered?

Timeline

Has a timeline estimate for each of the actions and components in the programme been stated?
Are the timelines that are stated in a logical order (e.g. that the gas pipe does not get removed before alternative heating systems are installed and running)?
Have contingencies been taken into account when timelines deviate from original planning?

3. Methods

3.1 Pilot plan selection & interviews for additional information

27 out of the 74 pilot plans that were handed in for the governmental funds were accepted (Rijksoverheid, 2018a). Three of these pilot plans were analysed in this report. The following is the process in which the three pilot plans were selected.

Literature states that including residents from the beginning will increase the acceptability of a project, especially when the residents feel that their interests are considered and they are actively involved in decision-making processes (Devine-Wright, 2011; Dietz & Stern, 2008; Huijts et al., 2012; Perlaviciute & Steg, 2014; Wolsink, 2007; Wolsink & Breukers, 2010). Considering the goal of this research was to understand the involvement of private homeowners in the heating transition, it was important to analyse pilot plans that included private homeowners. Pilot plans that did not include private homeowners, due to strategic reasons or otherwise, were excluded. The number of pilot plans excluded in this round were seven out of twenty-seven. Figure 5 is a depiction of the selection and elimination process. A summary of the approved pilot plans by BZK, with an indication on the inclusion of residents can be found in Appendix A.

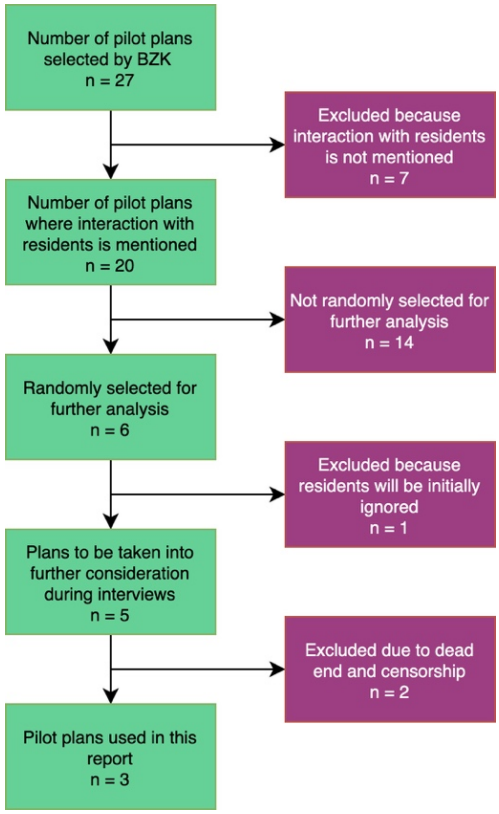

Figure 5: Visualisation of selection and elimination process for pilot plans. BZK is the Dutch Ministry of Internal Affairs and Kingdom Relations.

From the remaining 20 plans, a random selection was made for six plans that were going to be studied in more details. While reading through the plans, it became clear that one of the municipalities was not going to involve the residents during the first few years of the pilot until housing corporation projects were completed. The lack of interaction with private homeowners meant that it could be excluded.

The remaining five plans were studied in depth, and any questions that arose were noted. After studying these pilot plans, the responsible municipalities were

contacted by e-mail to arrange interviews with the authors of the pilot plans. When municipalities did not respond, the contact persons were approached through professional social network LinkedIn and later by phone. The names and contact details in the colophon of the pilot plans were used. Where no contact details or outdated data was found, other employees of that municipality were approached through LinkedIn. These colleagues were asked who the responsible person for the pilot project was. The responsible colleagues were then contacted through the information that was provided or through their profile pages on LinkedIn.

All municipalities responded to the request for an interview. The interviews were held by phone, with a set of written questions, unique per municipality, in order to clarify questions that arose when reading their pilot plans. Each interview lasted between 30 minutes and 60 minutes, and one interviewee per municipality was interviewed. All interviews were held within the same week (week 29). Notes were taken during the interview. The last two interviews were also recorded (with the interviewees consents), in order focus on the dynamics during the interview. Additionally, for the municipality of Eindhoven, the interviewee was not able to answer all questions. An e-mail was sent by a colleague with answers to the unanswered questions. The information in this e-mail, together with the interviews can be found in Appendix B. The answers from the interviews were used in the analysis of this report and were referred to where applicable.

After the interviews, two plans were eliminated. One plan was excluded for two reasons. The first reason was temporarily terminating the start of the pilot until another smaller pilot was completed. Anything written in the pilot plan was therefore going to be ignored for the near future. The second reason was that the interviewee demanded to have full control over what was being written and therefore have the final word on the outcome of the research. This was perceived to be unfair for the other municipalities, would cost a lot more time and effort and the effects of the censorship were too unpredictable. The second eliminated interview was because of meeting a dead end. After having spoken to multiple people, no one was going to be able to answer all the questions that arose while studying the pilot plan. The final selection of pilot plans therefore comprised of:

- Municipality of Eindhoven,
- Municipality of Noordoostpolder and
- Municipality of Tytsjerksteradiel.

3.2 Pilot plan analysis and interpretation

During the interviews, aspects that were not clear when reading the pilot plans were discussed and most questions that arose during reading were clarified. After the interviews and the definitive selection of the three pilot plans, each selected plan was analysed. For each pilot plan, any text that described any form of interaction with the residents was noted. These texts were compiled together, in the order of appearance. Examples of texts that were compiled were planned meetings with residents, information sessions etc. Additionally, all resources, and stakeholders that were mentioned in the pilot plan were also noted. This information was bundled together in a document per pilot plan to be analysed

The data that was collected and analysed in this report can therefore be divided into the following groups:

- Information from the pilot plans
- Information acquired through interviews with municipal employees responsible for the pilot plans
- Literature gathered during the research process

Data that was analysed were the documents compiled from the pilot plan information. This information was used to answer the questions from the program theory framework by Rossi et al. (2004) as presented in Table 2, which were used to analyse the resident interactions per pilot plan. These questions were answered one by one based on the compiled information. The questions and their answers are presented in Table 3. It was assumed that answering the aforementioned questions would reveal the different building blocks of the programme theory. The outcomes of this framework: assumptions, planned interaction, and organisation of the pilot were then depicted on a visual per pilot plan. From these building blocks, an attempt was made to reconstruct a programme theory, much as putting together pieces of a puzzle. The results of the reconstructions are visually presented in the results section. Analysing the visuals is done by accounting for whether it is possible to reconstruct the programme theory on participation of homeowners in the pilot plans from the presented information or not, and also to what extent this information is in line with literature on residential participation during sustainability projects.

The second data analysed was the information provided through interviews with municipal employees responsible for the pilot plans and e-mail contact with the co-author of the pilot plan for Eindhoven. This information was used to supplement the information that was already provided in the visuals presented in the results section. Any information that was not used in the visuals but was perceived relevant for this report was discussed in the analysis section of the results.

Finally, the third data that was analysed was literature on resident involvement for sustainability projects. Much of this literature is presented in the theory section. In the presentation of the results, this literature was used to evaluate how much the plans as presented in the visuals are in line with the literature.

Interpreting the data is done in two-fold. First, the plans were assembled into a programme theory and the completeness of this theory is discussed upon, together with its embeddedness in literature. This process is done per pilot plan. Secondly, the three pilot plans are compared to each other and general findings are discussed. From this two-fold process, the research question was answered and recommendations for future pilot plans were made.

Build-up of the results

The results chapter starts with the programme theory framework findings for all municipalities in one table. After this, each pilot plan is introduced, and the findings from the aforementioned table are analysed. Thereafter, a visual of the programme theory framework findings is presented and explained, followed by a literature reflection of the pilot plan. Finally, the three pilot plans are compared.

4. Results & Analysis

In this chapter, each pilot plan is initially presented separately. To start with, the programme theory framework findings are bundled together for all three pilot plans inTable 3. This table presents all the findings from the review of the interaction with the private homeowners in the pilot plans. All questions previously presented in the theory were answered per pilot plan in the table. After Table 3, each pilot plan is introduced, and findings analysed. Thereafter, a visual of the program theory framework is presented and explained. Finally, the three pilot plans are compared.

Table 3: Programme theory framework results on how three municipal pilot plans involve residents in the natural gas-free energy transition.

Impact theory			
Description	Eindhoven ('t Ven)	Nagele	Garyp
What are the expected long-term effects intended by the programme (distal outcomes)?	1. To fulfil the Paris Climate Agreement by making mobility and the built environment fossil fuel free. 2. Shorter term goal is to make the neighbourhood 't Ven natural gas-free and use the learnings to make the rest of Eindhoven natural gas-free.	1. To make all houses and building in Nagele natural gas-free and energy neutral. 2. To make Nagele a leader in becoming energy neutral. 3. keeping the village as a pleasant place to live that has a housing stock energetically ahead of its time. 4. Become a national and international example of integrated approach to energy transition	1. To make all houses and building in Garyp natural gas-free and energy neutral. 2. To make Garyp the first village that becomes energy neutral in the transition period. 3. To make Garyp circular.
What are the actions that lead to the long-term effects of the programme?	Changing the heating system in buildings from natural gas to (cascading) district heating or making the buildings all-electric.	1. Insulate the buildings 2. Install alternative systems for natural gas heating of buildings	1. Insulate the buildings 2. Install all-electric systems which will use the electrical energy that is locally generated in Garyp.
What are the expected short-term effects intended by the programme (proximal outcomes)?	Not clearly stated. Assumptions are to get the homeowners so far that they take the desired actions (deeper insulation and applying alternative heating).	1. Homeowners become interested in sustainability measures and take steps to make their homes natural gas-free.	1. Homeowners become interested in sustainability measures and take steps to make their homes natural gas-free.
What are the actions that lead to the short-term effects of the programme?	Actions to motivate residents to take measures are unclear. It is stated that Buurkracht and Susteen are working on motivating the residents. No information is given on how they will accomplish this other than visiting the residents and organising neighbourhood challenges energy efficiency challenges.	Actions to motivate residents to take measures are unclear. Energiek Nagele is responsible for increasing support with the homeowners, but no information is given on how they will accomplish this.	There are various actions that Garyp is taking to motivate residents to implement sustainability measures: - Inform residents - show residents examples - make the resident's experience central in all communication. - facilitate the resident with regulations.
Are all assumptions for effective pilot programme activities/actions clearly shown?	No. Practical project actions are described well and in detail, with enough stated assumptions. The approach towards residents is not there, other than mentioning that the residents are being made enthusiastic and are informed.	No. Practical project actions are described well and in detail, with enough stated assumptions. The approach towards residents however is not there.	No. there are no assumptions stated. Practical project actions are described well and in detail but without stated assumptions. The approach towards residents is not further elaborated than keeping the resident central and which communication channels to use to contact the resident.

Causality			
	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Is there a causal relationship between the short-term and long-term outcomes?	Yes. Even though not clearly stated, there is a causal relationship between heating dwellings with sustainable energy forms and making the neighbourhood natural gas-free.	Yes. Even though not clearly stated, there is a causal relationship between generating enough heat and electricity to become energy neutral.	Yes. Generating all the electricity that the village needs locally with solar and wind power leads to the village becoming energy neutral. It is however not stated how making the village energy neutral will lead to the village becoming circular as well (the ambition of the whole municipality).
Are all possibilities for different paths between activities and social benefits of the pilot programme depicted?	No, the interaction with residents is not elaborated.	No, the interaction with residents is not elaborated.	No, the interaction with residents is not elaborated.
What is the logic of the pathways for accomplishing the programme outcomes?	There is no clear interaction with the residents, therefore the logic cannot be shown clearly.	There is no clear interaction with the residents, therefore the logic cannot be shown clearly.	There is no clear interaction with the residents, therefore the logic cannot be shown clearly.
Well-articulated			
Have markers of completion, progress and effectiveness (indicators) been clearly defined?	No.	No.	No.
Are the targets SMART[5]	No, financing for private homeowners is partially dependent on a system that the municipality is developing. This is therefore an unpredictable factor on the timing of the project. Unless all the homeowners in the first street are wealthy enough to manage the projects without the housing subscription for the measures, the plans are not realistic yet. Even with the presence of the housing subscription, there is no guarantee that all private homeowners will decide to participate.	No, financing for private homeowners is partially dependent on object-bound financing. This form of financing is still in development and can therefore not be used yet. So, unless all the homeowners in the first street are wealthy enough to manage the projects without object-bound financing, the plans are not realistic yet.	No, financing for private homeowners is partially dependent on object-bound financing. This form of financing is still in development and can therefore not be used yet. So, unless all the homeowners in the first street are wealthy enough to manage the projects without object-bound financing, the plans are not realistic yet, except for the model homes which receive more financial backing.

[5] SMART is an acronym for target setting. It stands for Specific, Measurable, Achievable, Realistic and Time-bound. (TechRepublic, 2005)

Realistic			
	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Are the time frames for implementation of the measures realistic?	Not at all. The municipality is still engineering what temperature district heating should come where and what heating alternatives there are per neighbourhood. It is therefore not realistic to expect the infrastructure to be finished for the first streets in 2021 and have the homes on district heating. Furthermore, financing of the measures is also still being developed. Resident participation is not defined and considering that it is residents who have to implement the changes, it seems unrealistic.	No. financing is still a stumbling block. Resident participation is not defined and considering that it is residents who have to implement the changes, it seems unrealistic.	No. financing is still a stumbling block. Resident participation is not defined and considering that it is residents who have to implement the changes, it seems unrealistic. There however is a lot of goodwill and momentum with regards to sustainability measures in Garyp. This can work in the advantage of the programme.
What is the current perception of the project as found out by market research?	No market analysis on perception of becoming natural gas-free is done.	No market analysis is done.	No market analysis is done. It is expected however that the residents are positive considering the last project done by the village, which was to make a large solar park was accomplished successfully.
How can the perception be improved in favour of success?	N.A.	N.A.	N.A.
Are there alternative methods of reaching the recipient?	N.A.	N.A.	N.A.
What are these alternative methods and why are these methods not preferred?	N.A.	N.A.	N.A.
Feasibility			
What assumptions have been made that are unclear and need substantiating?	Means of reaching the residents are unclear. Also, the report states varying demographics in the neighbourhood, some with social problems. How this will be solved as a part of the project is also not mentioned. Exactly how financing will be made possible for all participants is also not clear at the moment.	N.A.	N.A.

Interaction plan

Description	*Eindhoven ('t Ven)*	*Nagele*	*Garyp*
Who are the targeted recipients of the intended services?	Private homeowners, social housing corporations, social housing tenants, businesses and local government (public buildings).	Private homeowners, social housing corporations, social housing tenants, businesses and local government (public buildings).	Private homeowners, social housing corporations, social housing tenants, businesses and local government (public buildings).
What are exclusion criteria to participate in the programme?	N.A.	N.A.	N.A.
What are inclusion criteria to participate in programme?	N.A.	N.A.	N.A.
Who are the other stakeholders providing services?	**Municipality**: - Initially providing heating from the bioenergy station in the neighbourhood (Meerhoven). - Pledge to provide other energy alternatives for low social costs. - Play a facilitative role for the transition in Eindhoven. - Document learnings from the project and shares to roll-out. - Ensure resident participation. - Facilitate neighbourhood challenge (a competition in CO_2 savings between four neighbourhoods in Eindhoven.) - Provide a subscription form of financing for purchasing of the sustainability measures. The municipality defines the conditions for the financing. **Social housing corporations**: -Provide services to their tenants. They are expected to implement the sustainability measures by using other forms of funding. **Enpuls**: invest in the construction and operation of an open heating network (possibility for multiple suppliers of heat) **Buurkracht**: together with the municipality assist residents by answering their questions, fulfilling communication and support needs and support with plans for joint purchasing of	**Dorpsbelang**: Role undefined **HoCoSto**: Supplier of seasonal storage systems, responsible for scaling out the storage system for cost reduction. **RCE** (National Service for Cultural Heritage): financing of plan of action. Financial support, further details unknown. **Energiek Nagele**: Responsible for generating support with residents. Undefined how. **Province**: Financial support. Undefined how. **Nagele in Balans**: design concept for energy neutrality in Nagele. **Municipality**: Financing of plan of action, further support unknown. **Alliander**: setting up a local heating grid and perhaps temporary storage in the electrical network.	**Dorpsbelangen**: - Inform and involve residents, are sparring partner for the municipality. - Are cooperating partner in preparation, planning and implementation of the programme. **Project manager**: - guides and monitors the progress of the project in close consultation with the EKG board, Dorpsbelangen and the municipality. - Is responsible for monitoring progress, evaluate the strategy and adjust if necessary. - Has consultations and coordination with associations in the village, municipality, Buurkracht, network managers and housing corporation. This concerns organization and communication aspects. **Energie Kooperaasje Garyp (EKG)**: - Inform and involve residents - Are responsible for coming up with financial arrangements together with the Rabobank in order to support the private homeowners. - Have the ambition to make Garyp energy neutral through energy saving, insulation of homes and generating sustainable energy and facilitate residents in the energy transition. - Are cooperating partner in preparation, planning and implementation of the programme.

	improvement measures. No information is given on how they do all these. - Will approach, mobilise and bring residents together for energy savings. **Susteen**: Provide tailored advice to private homeowners in the context of the neighbourhood challenge. **Lumens**: Role in the programme is unknown.		**Municipality**: - Inform and involve residents - Are responsible for coming up with financial arrangements together with EKG and Rabobank in order to support the private homeowners. - Are the point of contact and sparring partner for the board of the EKG, Dorpsbelangen and the external programme manager during the programme. - Draw up a subsidy regulation for the payment of the government subsidy to private individuals. - Facilitate, draw up an appointment schedule with the residents and supply building plans. - Together with Buurkracht, will launch activities aimed at recruiting and encouraging participants to take measures in their homes to become natural gas-free. - Open a municipal desk for natural gas-free living. **Buurkracht**: - Are responsible for a project to stimulate insulation of existing buildings. - Are responsible for stimulating and realising energy savings in homes. - Together with the municipality, will launch activities aimed at recruiting and encouraging participants to take measures in their homes to become natural gas-free. **Entrepreneurs association**: - Are representatives in a steering group. - Are cooperating partner in preparation, planning and implementation of the programme. **Rabobank**: Are responsible for coming up with financial arrangements together with EKG in order to support the private homeowners. **Liander**: - Are cooperating partner in preparation, planning and implementation of the programme.

			Stedin: - Are cooperating partner in preparation, planning and implementation of the programme. **Alliander**: - Were responsible for analysis of possibilities for alternative heating sources.
	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Have personas been defined (are the recipients categorised, and how are they categorised (i.e. age, gender, socio-economic classification, other markers etc.))?	No	No	No
What are the planned inclusion ratios per persona?	N.A.	N.A.	N.A.
How are the different recipients being targeted?	N.A.	N.A.	N.A.
Is there prioritisation of the participants after recruitment?	N.A.	N.A.	N.A.
What are the criteria for prioritisation?	N.A.	N.A.	N.A.
Is there a "plan B" when the interaction is not going as planned?	N.A. Only learning by doing as the project develops.	N.A. Only learning by doing as the project develops.	N.A.
Are there alternative methods of reaching the recipient?	N.A.	N.A.	N.A.
Are participants allowed and able to reject the programme?	N.A.	N.A.	N.A.
What happens when participants reject the programme?	Choosing to take no measures is one of the options. It is however not explained what happens then.	N.A.	N.A.
How and how often is the programme evaluated?	N.A.	N.A.	A dedicated project manager is hired whose task is to monitor the progress of the programme and steer timely. S/he also maintains contact with the various stakeholders.
Is programme adjusted after evaluation?	N.A.	N.A.	Yes.
Does the programme have structured protocols and which measures are in place to make sure these protocols are being followed?	N.A.	N.A.	N.A.

	Eindhoven ('t Ven)	*Nagele*	*Garyp*
How does the programme make sure the protocols are being kept up to date, and which measures are there to make sure the newest protocols are being used?	N.A.	N.A.	N.A.
How is participation defined and measured?	N.A.	N.A.	N.A.
Is the schedule for the programme and programme components clearly defined?	Only for the practical part (when the first street will be tackled and generally when the rest will be tackled) is the schedule known. There is no schedule for the components of the programme. All buildings are expected to be natural gas-free by 2030. 55% of the homes are social housing (rental), 45% are privately owned. There is no clear specification of which house is being addressed when and no interaction plan known for the residents.	Only for the practical parts (when the first street will be tackled and generally when the rest will be tacked.)	Only in general when how many homes are expected to be natural gas-free.
Assumptions and expectations on how to reach the recipient			
Are the platforms of interaction fitting for the (different) recipients?	No. The platforms are mentioned and not elaborated enough to be able to analyse whether they cover the extent of all the recipients' needs (e.g. what about the illiterate residents or residents with disabilities, how are these being reached?). The following are the physical platforms mentioned: - Social Café - Neighbourhood challenge (location unknown) - Evoluon - Gas-free homes (on open house routes) - At private homeowners' homes (assumed since Susteen has been to these homes) Additionally, the residents are to be contacted at physical information point (undefined),	Undefined	The recipients of the services are not specified, it is therefore not possible to state whether or not the platforms that are chosen will fit the interaction.

	digital platform (undefined), telephone helpdesk.		
	Eindhoven ('t Ven)	*Nagele*	*Garyp*
How are the recipients expected to react to activities aimed at them?	N.A.	N.A.	N.A.
Are there anti-bias measures in place for participant interaction and selection?	N.A.	N.A.	N.A.
What are the anti-bias measures for participant selection?	N.A.	N.A.	N.A.
Is there a likelihood that some personas will be unfairly treated compared to others?	N.A.	N.A.	N.A.
Are certain groups expected to be over/underrepresented?	N.A.	N.A.	N.A.
Engagement/communication			
What is the outreach-plan with recipient (frequency, platform, etc)?	There is no outreach plan for the residents. Therefore, it is not possible to state how often, where residents are being contacted etc.	There is no outreach plan for the residents. Therefore, it is not possible to state how often, where residents are being contacted etc.	A schedule of when what will happen is mentioned in the reporting. It is undefined by when this schedule will be finished and what is stated in it.
How are alternative methods being used to reach the targeted recipients?	N.A.	N.A.	N.A.
What is the message to be communicated with the (different) target recipients?	N.A.	N.A.	Undefined, only that the message has to be coherent to increase the trustworthiness.
Is there a specific language-use defined for the different segments of the recipient?	N.A.	N.A.	N.A.
What is this specific language-use based upon?	N.A.	N.A.	N.A.
Is there a specific attitude and tone of voice defined for the interaction with the different personas?	N.A.	N.A.	N.A.
How are recipients made aware of the existence of the programme?	N.A.	N.A.	N.A. Considering though that most of the residents are member of EKG, they will in some way or another hear about the existence of the programme from EKG.

	Eindhoven ('t Ven)	*Nagele*	*Garyp*
How are the recipients being recruited?	Buurkracht together with Susteen are supposed to mobilise residents for CO_2 saving measures. Whether this is tied in with recruitment for participation in the pilot is unknown.	N.A.	N.A.
How does the programme keep the recipients engaged?	N.A.	N.A.	N.A.
How and when is interaction discontinued after programme completion?	N.A.	N.A.	N.A.
How does one deal with groups which are over/underrepresented?	N.A.	N.A.	N.A.
Which measures do the different stakeholder take in order to reach a larger group?	N.A.	N.A.	N.A.
Realistic			
How are successful interactions defined and how are the interactions measured (indicators)?	N.A.	N.A.	N.A.
Are these indicators realistic?			
How accessible are the stakeholders of the programme?	There is no information given about the accessibility of the stakeholders.	N.A.	The stakeholders are clustered centrally so that the residents can interact with them easily. The location of the information centre is also very central so that most residents can reach it without problems.
What percentage of the population is targeted?	N.A.	N.A.	N.A.
Is there equal access to physical locations for the recipients?	N.A.	N.A.	N.A.
How is the access (physical, online media, printed media) taken into account for the different recipient groups?	N.A.	N.A.	Different media are going to be used. How they are distributed and their coverage with regards to the recipients is unknown.
Are the programme resources (technology, financing, service intensity etc) in proportion to the receiving household's needs (usage, income, family composition etc)?	N.A.	N.A.	No. The calculations that are made for financial resources are based on a theoretical average model, not based on the needs of the residents of Garyp. Other resources are not mentioned.

	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Is the programme schedule realistic?	There is no programme schedule for residential interactions.	There is no programme schedule for residential interactions.	There is no programme schedule for residential interactions. The schedule for making the homes natural gas-free however seems realistic. The only point of doubt is getting the initial homes (40) natural gas-free in 2019 while the different forms of financing are still being developed.
Feasibility			
How is awareness measured for the target recipients?	N.A.	N.A.	N.A.
How are successful outcomes of communication defined and how are these outcomes measured?	N.A.	N.A.	N.A.
What proportions of the targeted recipients are participating in the programme?	N.A.	N.A.	N.A.
Are there groups which are over/underrepresented?	N.A.	N.A.	N.A.
Has the handling of private personal data been considered and does this have any consequences for the programme?	N.A.	N.A.	N.A.
Evaluation			
How much of the intended effect is being achieved?	Too early to say	Too early to say	Too early to say
Is there a discrepancy between the intended and observed interaction?	Too early to say	Too early to say	Too early to say
Is there a discrepancy between the intended and observed outcomes?	Too early to say	Too early to say	Too early to say
Are there any drawbacks of the programme?	Too early to say	Too early to say	Too early to say

Organisational plan

Description	*Eindhoven ('t Ven)*	*Nagele*	*Garyp*
What resources are being used in order to target the intended recipients?	There is no information given over the resources or budget that are being deployed in order to reach the recipients. The only information given is that the municipality, together with Susteen and Buurkracht are responsible for contact with the residents, raising awareness, support and mobilising the residents to take action towards making their homes natural gas-free.	There is no information given over the resources or budget that are being deployed in order to reach the recipients.	€10 000/year is used for means of communication and €10 000/year. Is being used for the financing of the information centre. Furthermore, the project management costs are calculated to be €11 700/year.
How much resources are available to fulfil the aim of the programme?	There is €3 500 000 for the development of the heating grid, €1 150 000 for supporting of the private homeowners. €520 000 as subsidy for 90 privately owned homes, €500 000 as start capital for the housing subscription and €130 000 for home improvement plans for all privately-owned homes. There are no non-financial resources mentioned.	€8 500 average per home from the government (Investment costs are 39 500 per home, with payback period of 40 years and irr 2,36%)	€8 318 per home + €150 for energy scan per home (Investment costs are between €28 000 and €37 000 per home, with payback period of 15 years)
Is it possible to increase or decrease the resources for the programme?	N.A.	N.A. It is stated that the province is willing to eventually back up the pilot project.	N.A.
How are the resources distributed across the programme?	The subsidy for the privately-owned homes is only for 90 homes. Which are being made natural gas-free until 2021. Whether this amount will cover all costs is not mentioned. How the remaining 784 homes are going to be financed is not clearly stated either.	Undefined, it is assumed that the funding of €8 500 remain the same for all homeowners.	€5 665 000 is the total funding from the government, of which €300 000 is to be invested in the electrical grid infrastructure.
How are the resources being divided between the recipients?	The subsidy for the privately-owned homes is only for 90 homes. In total there are 874 privately-owned homes. It is not stated how the subsidy is going to be divided between the 90 homes other than the more the homes insulate, the higher the subsidy will be (highest subsidy to renovate to energy label A or all-electric ready). How the remaining 784 homes are going to be financed is not clearly stated.	N.A.	N.A.

	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Does each service and action fulfil the aim of the programme?	Stakeholders are mentioned including their roles. The roles are aimed at accomplishing the aim of the programme even though some details need to be disclosed in order to be able to state whether the approach they use is the best course of action for fulfilling the aims of the goal.	No. Most of the services are not clearly stated.	No. Most of the services are not clearly stated.
What is the role of each stakeholder in order to fulfil the aim of the programme?	**Municipality**: - Initially providing heating from the bioenergy station in the neighbourhood (Meerhoven). - Pledge to provide other energy alternatives for low social costs. - Play a facilitative role for the transition in Eindhoven. - Document learnings from the project and shares to roll-out. - Ensure resident participation. - Facilitate neighbourhood challenge (a competition in CO_2 savings between four neighbourhoods in Eindhoven.) - Provide a subscription form of financing for purchasing of the sustainability measures. The municipality defines the conditions for the financing. **Social housing corporations**: -Provide services to their tenants. They are expected to implement the sustainability measures by using other forms of funding. **Enpuls**: invest in the construction and operation of an open heating network, a heating grid that is open for multiple suppliers of heat. **Buurkracht**: together with the municipality assist residents by answering their questions, fulfilling communication and support needs and support with plans for joint purchasing of improvement measures. No information is given on how they do all these.	N.A.	**Dorpsbelangen**: - Inform and involve residents, are sparring partner for the municipality. - Are cooperating partner in preparation, planning and implementation of the programme. **Project manager**: - guides and monitors the progress of the project in close consultation with the EKG board, Dorpsbelangen and the municipality. - Is responsible for monitoring progress, evaluate the strategy and adjust if necessary. - Has consultations and coordination with associations in the village, municipality, Buurkracht, network managers and housing corporation. This concerns organization and communication aspects. **Energie Kooperaasje Garyp (EKG)**: - Inform and involve residents - Are responsible for coming up with financial arrangements together with the Rabobank in order to support the private homeowners. - Have the ambition to make Garyp energy neutral through energy saving, insulation of homes and generating sustainable energy and facilitate residents in the energy transition. - Are cooperating partner in preparation, planning and implementation of the programme. **Municipality**: - Inform and involve residents

	- Will approach, mobilise and bring residents together for energy savings. **Susteen**: Provide tailored advice to private homeowners in the context of the neighbourhood challenge. *Assumption: providing advice will lead to implementation?* **Lumens**: Role in the programme is unknown.		- Are responsible for coming up with financial arrangements together with EKG and Rabobank in order to support the private homeowners. - Are the point of contact and sparring partner for the board of the EKG, Dorpsbelangen and the external programme manager during the programme. - Draw up a subsidy regulation for the payment of the government subsidy to private individuals. - Facilitate, draw up an appointment schedule with the residents and supply building plans. - Together with Buurkracht, will launch activities aimed at recruiting and encouraging participants to take measures in their homes to become natural gas-free. - Open a municipal desk for natural gas-free living. **Buurkracht**: - Are responsible for a project to stimulate insulation of existing buildings. - Are responsible for stimulating and realising energy savings in homes. - Together with the municipality, will launch activities aimed at recruiting and encouraging participants to take measures in their homes to become natural gas-free. **Entrepreneurs association**: - Are representatives in a steering group. - Are cooperating partner in preparation, planning and implementation of the programme. **Rabobank**: Are responsible for coming up with financial arrangements together with EKG in order to support the private homeowners. **Liander**: - Are cooperating partner in preparation, planning and implementation of the programme. **Stedin**: - Are cooperating partner in preparation, planning and implementation of the programme.

	Eindhoven ('t Ven)	*Nagele*	*Garyp*
What are the accountabilities of each stakeholder?	N.A.	N.A.	N.A.
How are successful services of the stakeholders defined and how are the services measured?	N.A.	N.A.	N.A.
Which resources are needed to fulfil the programme?	N.A.	N.A.	N.A.
Does the municipality facilitate the fulfilment of the programme?	Yes. The Municipality: - Initially provide heating from the bioenergy station in the neighbourhood (Meerhoven). - Pledge to provide other energy alternatives for low social costs. - Play a facilitative role for the transition in Eindhoven. - Document learnings from the project and shares to roll-out. - Ensure resident participation. - Facilitate neighbourhood challenge (a competition in CO_2 savings between four neighbourhoods in Eindhoven.) - Provide a subscription form of financing for purchasing of the sustainability measures. The municipality defines the conditions for the financing.	Paid for costs of writing the plan of action. Will play a facilitative role, further support N.A.	Yes. Play multiple roles. - Help residents with regulations. - Inform and involve residents - Are responsible for coming up with financial arrangements together with EKG and Rabobank in order to support the private homeowners. - Are the point of contact and sparring partner for the board of the EKG, Dorpsbelangen and the external programme manager during the programme. - Draw up a subsidy regulation for the payment of the government subsidy to private individuals. - Facilitate, draw up an appointment schedule with the residents and supply building plans. - Together with Buurkracht, will launch activities aimed at recruiting and encouraging participants to take measures in their homes to become natural gas-free. - Open a municipal desk for natural gas-free living.
Which accountabilities and roles are needed to fulfil the programme?	N.A.	N.A.	N.A.
Who is responsible for the administrative tasks for each of the programme components?	N.A. The municipality are to record learnings, but whether they perform all administrative tasks it unclear.	N.A.	The programme manager is responsible for monitoring the progress of the programme. It is however undefined who is responsible for the administration.
Are resources available for programme monitoring?	N.A. Only that the municipality focus on the key learnings and share these so that the project can be improved.	N.A.	Yes, there is a budget set apart for a programme manager to monitor the programme.
What is the chain of responsibility for reporting?	N.A.	N.A.	N.A.

	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Are the personnel qualified for the service they are providing?	N.A. No clear plan is present on who the personnel are and what their qualifications are compared to their roles.	N.A. No clear plan is present on who the personnel are and what their qualifications are compared to their roles.	N.A. No clear plan is present on who the personnel are and what their qualifications are compared to their roles.
Which measures are in place to prevent irresponsible programme spending?	N.A.	N.A.	N.A.
Do the programme recipients have enough attainable financial resources to fund the expected changes to fulfil the aim of the programme?	Highly unlikely. The measures are too expensive for an average resident to (be willing to) finance with savings. There also is a proportion of the residents of 't Ven who are dependent on social welfare, are aged and are at risk of energy poverty. These residents will not likely be able to manage the changes with their own financing.	Highly unlikely. The measures are too expensive for an average resident to (be willing to) finance with savings.	Unlikely. The measures are too expensive for an average resident to (be willing to) finance with savings.
Engagement/Communication			
Is there communication between the different stakeholders?	The municipality state that they are making sure that there is communication between the stakeholders. How they (intend to) do this is not mentioned.	Energiek Nagele is the central party. They keep contact with the different stakeholders.	The different stakeholders are clustered in physical spaces. One can assume that they communicate with each other. Furthermore, there are regular consultations between the stakeholders.
Is there cooperation between the different stakeholders?	The municipality state that they are making sure that there is cooperation between the stakeholders. How they (intend to) do this is not mentioned.	N.A.	The different stakeholders are clustered in physical spaces. One can assume that they cooperate with each other.
Realistic			
What is the minimum required service from the stakeholders in order to fulfil the programme aim?	N.A.	N.A.	N.A.
Are the available financial resources realistic to fulfil the aim of the programme?	No. The municipality is working on a subscription form of financing. At the moment there is therefore no suitable funding for all recipients.	No. External funding is needed.	No. External funding is needed.
Are the resources adequate, effective and in line with the services to be provided?	No, not all resources are known. Financing is not finished at the moment. Also, resources are not directly linked to the interactions with the recipients.	N.A. There is no clear plan of all resources and their interactions with the recipients.	N.A. There is no clear plan of all resources and their interactions with the recipients.

Evaluation			
	Eindhoven ('t Ven)	*Nagele*	*Garyp*
Are the type of staff delivering the programme those specified in the plan?	N.A.	N.A.	N.A.
Do the staff have adequate resources available to provide the actions needed?	N.A.	N.A.	N.A.
Who is in charge of evaluating the programme?	The municipality states that they monitor the project in order to share learnings. This is not the same as critically evaluating the programme though.	N.A.	The programme manager is responsible for monitoring the progress. It is however not mentioned who is responsible for evaluating the programme.
How often should the programme be evaluated?	N.A.	N.A.	N.A.
Who is in charge of monitoring the actions and outcomes of the programme?	N.A.	N.A.	The programme manager is responsible for monitoring the progress.
What is the monitoring plan?	N.A.	N.A.	N.A.
Is the monitoring plan realistic?	N.A.	N.A.	N.A.
Is the programme being audited (reporting quality, programme quality, outcomes etc)?	N.A.	N.A.	N.A.
Do the auditors have unrestricted access to all parts for the programme (external audit)?	N.A.	N.A.	N.A.
Is there an evaluation plan?	N.A.	N.A.	N.A.
Were the resources adequate, effective and in line with the services rendered?	Too early to say.	Too early to say.	Too early to say.
<u>Timeline</u>			
Description	Eindhoven ('t Ven)	Nagele	Garyp
Has a timeline estimate for each of the actions and components in the programme been stated?	No.	No.	No.

Description	*Eindhoven ('t Ven)*	*Nagele*	*Garyp*
Are the timelines that are stated in a logical order (e.g. that the gas pipe does not get removed before alternative heating systems are installed and running)?	N.A.	N.A.	N.A.
Have contingencies been taken into account when timelines deviate from original planning?	N.A.	N.A.	N.A.

4.1 Pilot plan of Eindhoven (ʻt Ven):

Introduction of pilot plan

The neighbourhood of ʻt Ven is situated in Eindhoven, fifth largest city in the Netherlands and largest city in the province of North Brabant (Eindhoven, 2017). ʻt Ven has 1946 homes, of which 874 are privately owned and 1072 are social housing. More than fifty five percent of the buildings have energy label F or G. 526 Homes are expected to be natural gas-free by 2021, the entire neighbourhood by 2030. The current homes are heated with natural gas (Eindhoven, 2018).

Future heating of homes is to be done by (i) All-electric (20% of homes) with low temperature heating and insulation to energy level A, (ii) cascading district heating network (80% of homes) with insulation to energy level B and higher and heating with high, medium or low temperature. The lower the heating temperature, the better the building needs to be insulated. In return, the lower the temperature, the cheaper the heat will be for homeowners.

The municipality has calculated that the alternative heating methods are cheaper for the long run than for the homeowner than not taking any measures. Residents can finance the measures by a form of home energy subscription, sustainability loans, subsidies and building-related financing (Eindhoven, 2018).

Findings from the programme theory framework

In Table 3, the programme theory findings of the pilot plan for Eindhoven ʻt Ven can be seen. Herein, it can be seen that the short-term effects of the programme are not clearly stated. It can be deducted from the pilot plan that these are to motivate the homeowners to take actions such as increasing the level of insulation and applying alternative heating methods to natural gas. There is however no clarity on how to motivate the homeowners to take these actions. Buurkracht and Susteen are mentioned to work on this by visiting residents, giving advice on measures and organising energy saving challenges. Assumptions for effective pilot programme activities are not mentioned as such, especially not in relation to the residents. Plans are made such as that the first 95 homes will be made natural gas-free, however there is no clear plan on how the homeowners are to be engaged.

Targets that are made are SMART[6] to a certain level. In order to call them smart they need to be measurable as well. As no indicator for the levels of success is stated, it is difficult to measure. Is success therefore the removal of natural gas connection, insulation of the house, or both? Also, it is unclear when and how projects can start and finish if the means of financing are still being developed. Connected to this point, the time frame at least for the disconnecting the first 526 homes from natural gas seems overly ambitious considering the lack of clarity on financing and a clear approach to involve homeowners. Furthermore, there is no information of the different types of residents mentioned or their perception towards the energy transition; it is therefore difficult in knowing how to engage them. No means to reach the homeowners are mentioned, neither what to do when attempts to reach them fail.

[6] SMART is an acronym for target setting. It stands for Specific, Measurable, Achievable, Realistic and Time-bound. (TechRepublic, 2005)

Homeowners have the option to deny the services, but there is no clarity on what to do when the homeowners deny the programme.

Various stakeholders are mentioned, and their roles are generally described. How much resources the stakeholders have at their disposal and how these resources are going to be used in order to fulfil the goals of the energy transition is not mentioned, neither are the accountabilities for each stakeholder. The municipality states that it will facilitate cooperation between the different parties. Communication between these parties is not explained or how the actions are coordinated between them.

A rough schedule for when work on the first streets will commence is included in the planning. A detailed schedule and plan for what happens then, by who and the necessary resources is not described. Platforms that are going to be used in order to reach the residents are mentioned. It is however not possible to judge how well suited these platforms are in relation to the programme due to lack of information and plans on both the involvement of the homeowners and the composition of this demographic. For example, there is a list of physical locations stated, what exactly happens at the locations is not mentioned or how an immobile resident for example would be able to interact with the programme. No outreach plan on how to target the residents is mentioned and therefore questions such as how the residents get recruited, how their involvement is managed etc. remain unanswered.

Costs of the transition for the neighbourhood are discussed in general. Much of the funding will be spent on installing a district heating grid in the neighbourhood. In the pilot plan, the first 90 homes will be subsidised. How this subsidy will be used and based on what criteria is not mentioned, other than the more the homeowners insulate, the higher the subsidy will be for them. Not all the resources that the residents have at their disposal are known, the plans state that the municipality is working on a home subscription system funding but the details to this plan are lacking.

In the interview with the heat director of the municipality of Eindhoven, more information is given on participation with residents. There is a group of residents who act as a thinktank for the transition even though difficulties are experienced in involving of homeowners. It seems that because the residents feel that they are not obliged to participate in the pilot plan, they therefore choose to not be engaged with the programme. It seems that the homeowners need incentives in order to participate and that the financial aspect of the transition is forcing residents to choose for the cheapest alternative in the short run, which is to not take measures to insulate the home or heat it with alternatives to natural gas.

Financing seems to be a barrier for the homeowners in the pilot plan in Eindhoven. According to the heat director, the home subscription plan is also still in development. Possibly, when this form of financing is finished, residents could change their mind. Furthermore, it seems that the technical solutions for the residents are not fully presentable since the technical possibilities for heating the neighbourhood are still being explored. The link between the energy transition, the role of the homeowners in it and how they will be involved is unclear.

As part of the organisational plan, the municipality has taken on many roles. How these roles are going to be fulfilled, together with the roles of the other stakeholders is not mentioned. There is therefore no possibility of drawing out the logic without the intended effects (taking natural gas-free measures) being interlinked with the resident participation and how the stated resources are going to facilitate this.

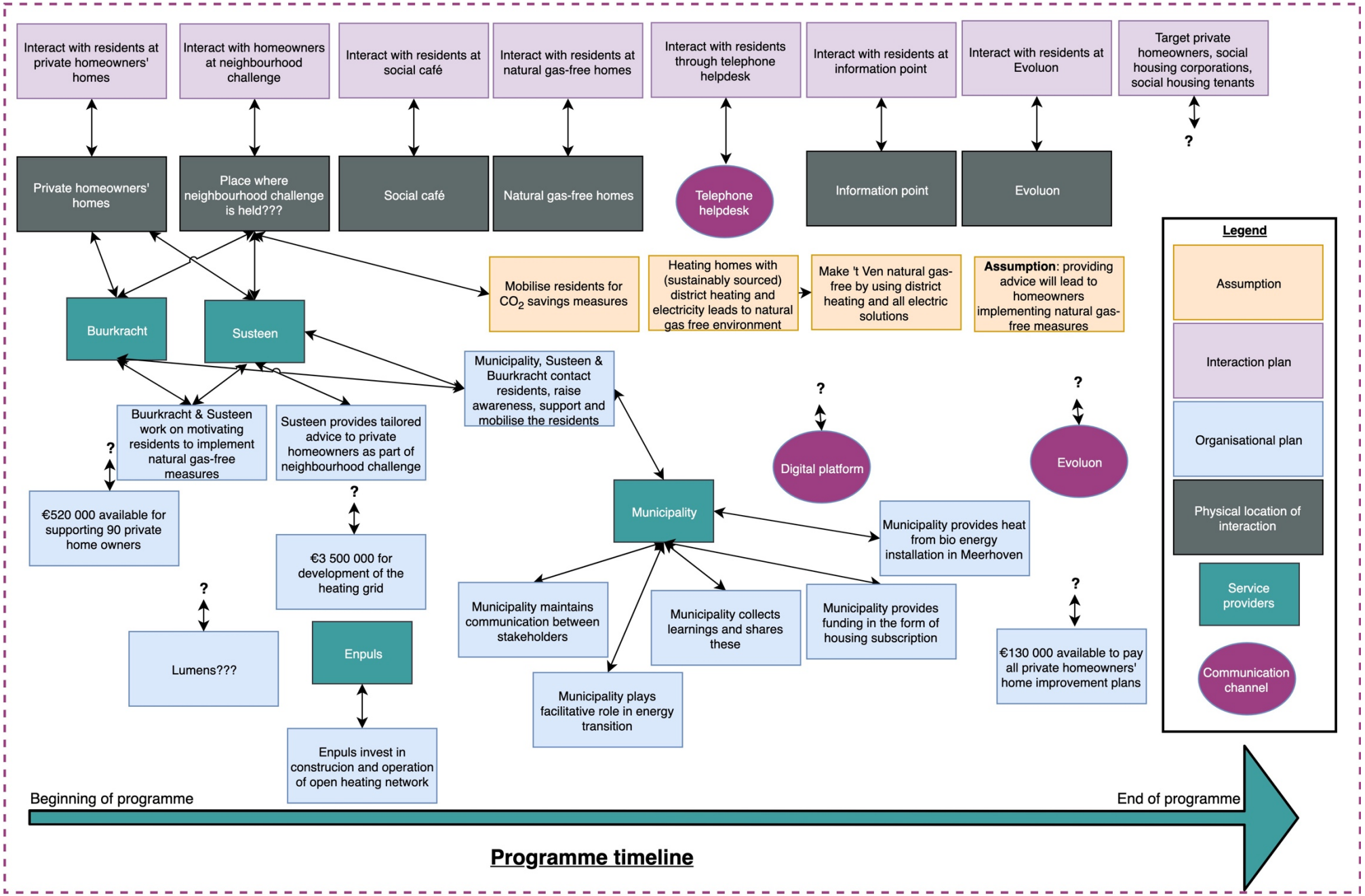

Figure 6: Programme theory framework of Eindhoven showing how the pilot plan involves residents in the natural gas-free transition

is the visual of the programme theory framework showing how the pilot plan of Eindhoven involves private homeowners in the natural gas-free transition. Each line shows a connection between one block and another. As can be seen in the figure, the programme theory is incomplete because there is no link between how the private homeowners are involved in the programme and all the different activities that are to take place. It can be seen for example that Buurkracht interacts with private homeowners in the private homeowners' homes. Buurkracht, together with Susteen are also responsible for working on motivating residents to implement natural gas-free measures. This is an example of a clear connection. How the programme interacts with the residents at the Social café however is not clearly stated. There is no responsible party stated in the plans, neither how the interaction is linked to other aspects of the programme.

As Figure 6 shows, there are many activities in the pilot plan that are going to take place without a clear reason why, or a link to the rest of the programme. The

interaction between the homeowner and the programme remains therefore largely unexplained.

The resources that are mentioned in the programme are not all linked to the activities that happen in the programme. For example, there is a sum of €520 000 that is available to support private homeowners. How this amount is going to be divided between the homeowners and what the eligibility criteria applies is not mentioned.

Due to the pilot plan not including any time frames or time span for the programme, it was impossible to organise the actions in the framework according to the order in which they have to take place.

Comparison of pilot plan with literature

When Buurkracht and Susteen visit residents, one may assume that they communicate face to face. Direct communication is one of the most effective ways of interaction with residents (Sussman & Gifford, 2013), especially if the group of private homeowners who now participate in the think tank also join these conversation and have respect from the other homeowners. The pilot plan does not mention a clear understanding of the homeowners' demographics. It is suggested to integrate information collection of the demographics together with the conversations that Buurkracht and Susteen have with residents.

In literature, it is recommended to involve residents in the decision-making process from very early on, to make the decision-making process fair and take the interests of the residents into account (Huijts et al., 2012; Perlaviciute & Steg, 2014). Involving residents in a think tank group resembles the above-mentioned recommendations. There is however not enough information given on the functioning of the think tank in order to state this clearly.

During the interview with the energy director for Eindhoven, it was suggested that residents might need (financial) incentives in order to participate in the pilot plan. Literature however discourages the use of financial incentives in swaying residents to make certain decision since these decisions are financially motivated and usually short-lived (Steg et al., 2015). Incentives are however important in making technologies affordable (ibid.)

For the rest the pilot plan does not state many activities that are in line with literature on involving residents in sustainability projects. There seem to be many uncertainties from the homeowner's perspective. A small selection of these uncertainties are the lack of when and how homeowners will be engaged, how they will get the subsidies for renovating the homes, what other resources they have at their disposal, which technology is suitable for their homes (because this step is still being explored). One suggestion is to start informing residents well to prevent the lack of clarity developing into a fearful project for homeowners.

4.2 Pilot plan of Noordoostpolder (Nagele)

Situated in the municipality of Noordoostpolder, the province of Flevoland in the Netherlands is the village of Nagele. Nagele has 497 homes, of which 268 are privately owned and 229 are social housing. As a unique feature, the whole village is

architecturally designed, and all the homes are flat roofed. Nagele is expected to be natural gas-free by the year 2028. In the 1950s, the village of Nagele was designed to be the most architectural village of Europe according to the principles of Modern architecture[7]. Due to this unique architecture of the village, Nagele has been given the status of a reconstruction area of national importance by the Dutch National Service for Cultural Heritage (In Dutch: Rijksdienst voor het Cultureel Erfgoed) (RCE, 2015).

Future heating of the homes will be through central heating per household using thermal collectors on roof to generate heat with short term heat storage through in-house buffer tanks and communal long-term storage underground. As a backup, a collective heat pump installation is going to be used. Solar panels (PV) on roof generate electricity. Residents can finance the measures by subsidies, building related financing and possibly extra funding through the cultural heritage status of the houses. Current heating of homes is with central heating boilers run on natural gas (Noordoostpolder, 2018).

Analysis of results of pilot plan of Noordoostpolder (Nagele)

In Table 3, the programme theory findings of the pilot plan for Noordoostpolder (Nagele) can be seen. The long-term effects of the programme are to make the buildings in Nagele natural gas-free and energy neutral, to make Nagele a leader in becoming energy neutral, keep the village as a pleasant place to live and to become a national and international example of integrated approach to energy transition. Short term plans are to insulate the buildings and install alternative systems for natural gas heating of buildings. The short-term effects intended by the programme are to make homeowners interested in sustainability measures and take steps to make their homes natural gas-free. The actions that are needed in order to motivate the homeowners to take measures are unclear. From the pilot plan, it seems that there is a lot of support for sustainability measures in Nagele.

Energiek Nagele (local energy cooperative) is responsible for increasing support with the homeowners but no information is shared on how they are planning to do this. Assumptions for effective pilot programme activities are not mentioned as such, especially not in relation to the homeowners. However, practical project actions are described well and in details with enough stated assumptions. No plan for private homeowners' approach is mentioned, however. Relationship between short term and long-term outcomes are not explicitly mentioned, even though it is logical to assume that generating enough sustainable heat and electricity locally leads to becoming energy neutral. Interaction with the residents is not elaborated.

Targets that are made not completely SMART. Financing for the homeowners is partially dependent on object-bound financing which is still being developed. Before the financing is completed for the residents, it would be difficult to state a realistic time planning. No means to reach the residents are mentioned, neither what

[7] Modern architecture: minimalistic design without ornaments where form follows function and with intensive use of reinforced concrete, steel and glass. The emphasis was on volume and asymmetrical compositions. In Europe, Walter Gropius and Le Corbusier are seen as pioneers of this style. (RIBA, 2019)

to do when attempts to reach them fail. It is also unclear what to do when homeowners turn down participation in the programme.

Various stakeholders are mentioned, and their roles are generally described. How much resources the stakeholders have at their disposal and how these resources are going to be used in order to fulfil the goals of the energy transition is not mentioned, neither are the accountabilities for each stakeholder. Communication between these parties is not explained or how the actions are coordinated between them.

A rough schedule for when work on the first streets will commence is stated. A detailed schedule and plan for what happens then, by who and with what resources is not described. Platforms that are going to be used in order to reach the homeowners are not mentioned. It is therefore not possible to judge the fitness of communication platforms in relation to the project due to lack of information and plans. For example, what happens when an immobile resident would want to interact with the programme? No outreach plan on how to target the homeowners is mentioned.

Costs of the transition for the neighbourhood are discussed in general. The village has the possibility to acquire extra financing due to the national heritage status that it has. There is no subsidy that is mentioned. Not all the resources that the homeowners have at their disposal are explicated. Homeowners will need external financing, but how they will be facilitated in getting this is unclear.

After the supplementary interview with the author of the pilot plan for Noordoostpolder, it is clear that homeowners are being engaged in the pilot plans. At the time of the interview, the residents and technicians were discussing technical and financial possibilities. It seemed however that the one-on-one approach is very energy and time-consuming. Attention seems to have been given to positioning the information point centrally so that all homeowners can easily access it. Furthermore, it seems that a block leader approach has been employed in order to get to know the homeowners of the different residential courts. Finally, the interaction with the homeowners is encouraged to take place face-to-face.

The municipality has taken an observant role and lets the homeowners and the cooperative take initiatives. It is impressive that a lot is happening in the village without active initiatives from the municipality. One wonders though if the interaction and support for the pilot cannot be increased even further by the municipality through playing a more active role such as providing educational materials or facilitating with regulations etc.

The pilot plan fails to elaborate how the recipients of the programme can interact with the programme at all, apart from stating that Energiek Nagele is the responsible party for communication between the homeowners and other stakeholders. It can therefore be said that the plan completely lacks pathways to interact with homeowners.

The municipality of Noordoostpolder seems to have ample financial resources in comparison to other municipalities in order to implement the pilot. This seems to be the case because they can get funding from the National Service for Cultural Heritage as well in order to preserve the special architecture of the village. Even with

the extra financial possibilities, it is difficult to judge the implementation of natural gas-free measures due to the lack of an elaborate organisational plan.

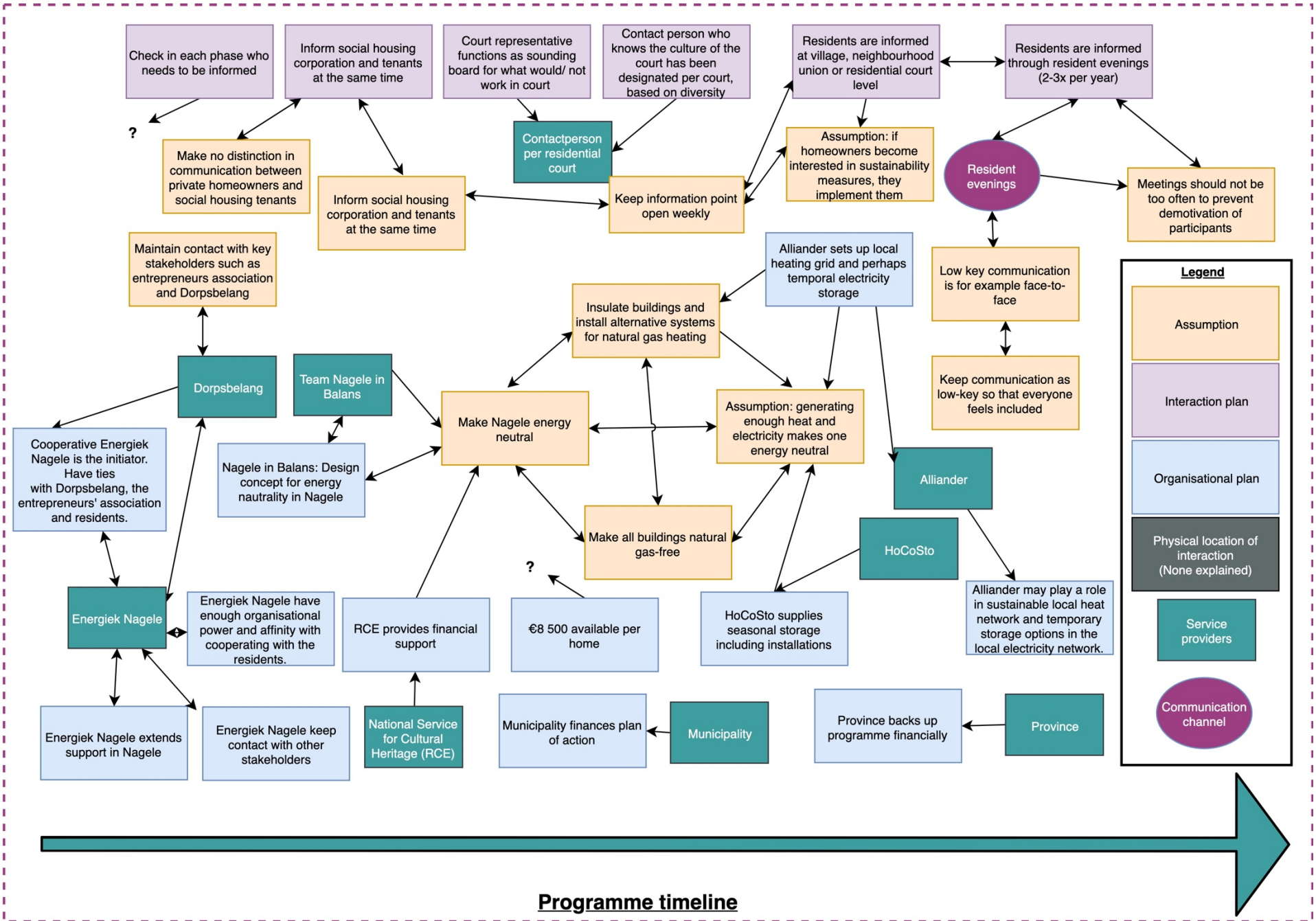

Figure 7: Programme theory framework of Noordoostpolder showing how the pilot plan involves residents in the natural gas-free transition

Figure 7 is the visual of the programme theory framework for Noordoostpolder (Nagele) showing how the pilot plan involves private homeowners in the natural gas-free transition. Each line shows a connection between one block and another. From the visual, it is clear that the pilot plan has incorporated many assumptions. These assumptions are linked to many activities that are to take place in Nagele. What is evident however is the apparent lack of physical locations of interaction being mentioned in the pilot plan. Furthermore, the communication channels are not presented apart from mentioning that homeowners are informed through resident evenings.

Even though attention has been paid to include assumptions on how to interact with the homeowners, without clarifying the means of how to interact with the homeowners, the framework is incomplete.

Due to the pilot plan not including any time frames or time span for the programme, it was impossible to organise the actions in the framework according to the order in which they have to take place.

Comparison of pilot plan with literature

Nagele seems to be a coherent village where there is a lot of support for sustainability measures. In the interview with the author of the pilot plan, it was stated that whole village has agreed to participate in the programme as long as they have financial means to do so. One of the possible reasons for such coherence is that the homeowners are united towards the same goals which is are: to make Nagele a leader in becoming energy neutral, to keep the village as a pleasant place to live and to become a national and international example of integrated approach to energy transition. Residents are more likely to participate in a programme where benefits are for the whole community (Steg et al., 2015), especially when they get pleasure from the actions, such as seeing their village acquire a high status (Carrus et al., 2008; Gatersleben & Steg, 2012; Pelletier et al., 1998; Smith et al., 1994; Steg, 2005). Furthermore, residents are more willing to take actions when they know that others, in this case the fellow-villagers will be approving of the measures (Harland et al., 1999; Nolan et al., 2008).

Communication in Nagele has to be as low-key as possible, meaning that most of the time it is through face to face. As has been seen in literature, this means of communication is one of the best in order to involve residents (Sussman & Gifford, 2013). Face to face works very well when block leaders approach is used, especially in an environment where the cohesion amongst the residents is high (Weenig & Midden, 1991). Nagele is approaching the homeowners one by one and holding conversation on the implications of the energy transition for their homes and budgets. This way of communication seems very personal and takes the situations of the residents into account. One could state that this step increases the acceptance of the programme in Nagele (Huijts et al., 2012; Perlaviciute & Steg, 2014).

In literature, non-financial incentives are recommended over financial incentives (Carrico et al., 2011). These incentives should have a barrier-lowering function to participating in the programme (ibid.). Placing the information point in

the centre of the village where everyone can easily access the programme manager is one of these incentives and therefore a good step to take.

As can be noted, there seems to be cohesion in Nagele, and many activities are being done that are in line with literature. There however is a number of points that are missing for a comprehensive approach towards involving residents in the pilot plan. It is not mentioned how homeowners are being facilitated, how they can finance the energy transition for their homes and above all, a clear plan of how the residents are going to be involved in the whole programme is missing.

4.3 Pilot plan of Tytsjerksteradiel (Garyp)

Garyp is a village in the municipality of Tytsjerksteradiel in the Dutch province of Friesland. It has a population of 1900 inhabitants and has 603 homes. The whole village participates in the Proeftuin pilot to become natural gas-free. Eighty to ninety percent of the buildings are expected to be natural gas-free by the year 2023. By the year 2040 the municipality wants to be natural gas-free (Tytsjerksteradiel, 2018).

Due to low house density and lack of heating sources, all the homes are going to be heated all-electric with combinations of heat pumps, pellet stoves, infrared heating and solar panels (PV and PVT) on the roofs. The measures can be financed by sustainability loans, subsidies and building related financing. Current heating of homes is by central heating boilers running on natural gas (Tytsjerksteradiel, 2018).

Garyp is striving to become the first village that is completely energy-neutral during the energy transition period by saving energy, insulating buildings, generating renewable energy locally and facilitating of the residents in the transition. (Tytsjerksteradiel, 2018).

Analysis of results of pilot plan of Tytsjerksteradiel (Garyp)

Table 3 shows the programme theory findings of the pilot plan for Tytsjerksteradiel and Figure 7 is an attempt at visually depicting them. The long-term effects of the programme are to make all houses and buildings in Garyp natural gas-free and energy neutral, to make Garyp the first village that becomes energy neutral in the energy transition period, and to make Garyp circular. Short-term plans are to insulate the buildings and install all-electric systems which will use the electricity that is locally generated in Garyp. Expected short term effect of the programme is that homeowners become interested in sustainability measures and take steps to make their homes natural gas-free. There are various actions that Garyp is taking in motivating residents to implement sustainability measures. These are informing residents, show the residents examples of natural gas-free solutions, facilitate the regulatory aspect for the residents and give the residents a central position in the communication.

Assumptions for effective pilot programme activities are not mentioned as such, especially not in relation to the homeowners. Costs for making the homes all-electric are based on four types of buildings. It is implicitly assumed that the rest of homes in the village which share the same home type will cost exactly the same. Furthermore, the costs are based on an online tool instead of real-life scenario of some

of the homes. Generating all the electricity that the village needs locally with solar and wind power leads to the village becoming energy neutral. It is however not stated how making the village energy neutral will lead to the village becoming circular as well, which is the ambition of the whole municipality. Interaction with the homeowners is not elaborated.

Targets that are made are SMART not completely smart. Financing for the measures is partially dependent on object-bound financing which is still under development. Until then, it will not be possible to set realistic goals. Also, it is unclear when and how projects can start and finish if the means of financing are still being developed. Furthermore, there is no information of the different types of residents mentioned. It is therefore difficult in knowing how to engage them. No means to reach the residents are mentioned, neither what to do when attempts to reach them fail. It is not clear what to do when the residents deny the services.

Various stakeholders are mentioned, and their roles are generally described. How much resources the stakeholders have at their disposal and how these resources are going to be used in order to fulfil the goals of the energy transition is not mentioned, neither are the accountabilities for each stakeholder. Communication between these parties is not explained or how the actions are coordinated between them. It is however stated that the stakeholders are centrally located in the heart of the village so that the residents have easy access to them. A project manager manages and monitors the project.

A rough schedule for when work on the first streets will commence is stated. A detailed schedule and plan for what happens then, by who and with what resources is not described. In 2019, the ambition is to make the first 40 buildings natural gas-free. How this will happen while the different forms of financing are being developed is not stated. Platforms that are going to be used in order to reach the residents are mentioned. It is however not possible to judge the fitness of these platforms in relation to the project due to lack of information and plans. No outreach plan on how to target the residents is mentioned. There is a sum of money (average of €8 318 per home) that has been organised as a part of the governmental funding. How this will be used is unclear.

Results from the interview with the author of the pilot plan for Tytsjerksteradiel confirm that there is a lot happening in Garyp with regards to the residents and their participation in the energy transition. homeowners have taken the initiative to form neighbourhood teams that facilitate other homeowners by offering services from a central point in the village. Also, a lot of communication is done, together with celebrating of small milestones. These are all aspects that are supported by literature to increase cohesion between residents. As a result, it is evident that the residents are very motivated, and results of bottom-up initiatives are being seen. The municipality is also taking the right steps to facilitate the residents well. An example of this is performing tasks such as filling in the application forms on behalf of the residents, a step that might be simple for a municipality, but one that can be quite challenging for many residents.

From an organisational perspective, the plan for Garyp is elaborate. There are many stakeholders mentioned and their tasks are stated. There is no link that has been

made between the functions of the stakeholders and how these tie in with the homeowners' actions and the underlying impact theory. If the connective pathways were described between the stakeholders, the residents and the underlying impact theory, this plan would have been quite comprehensive.

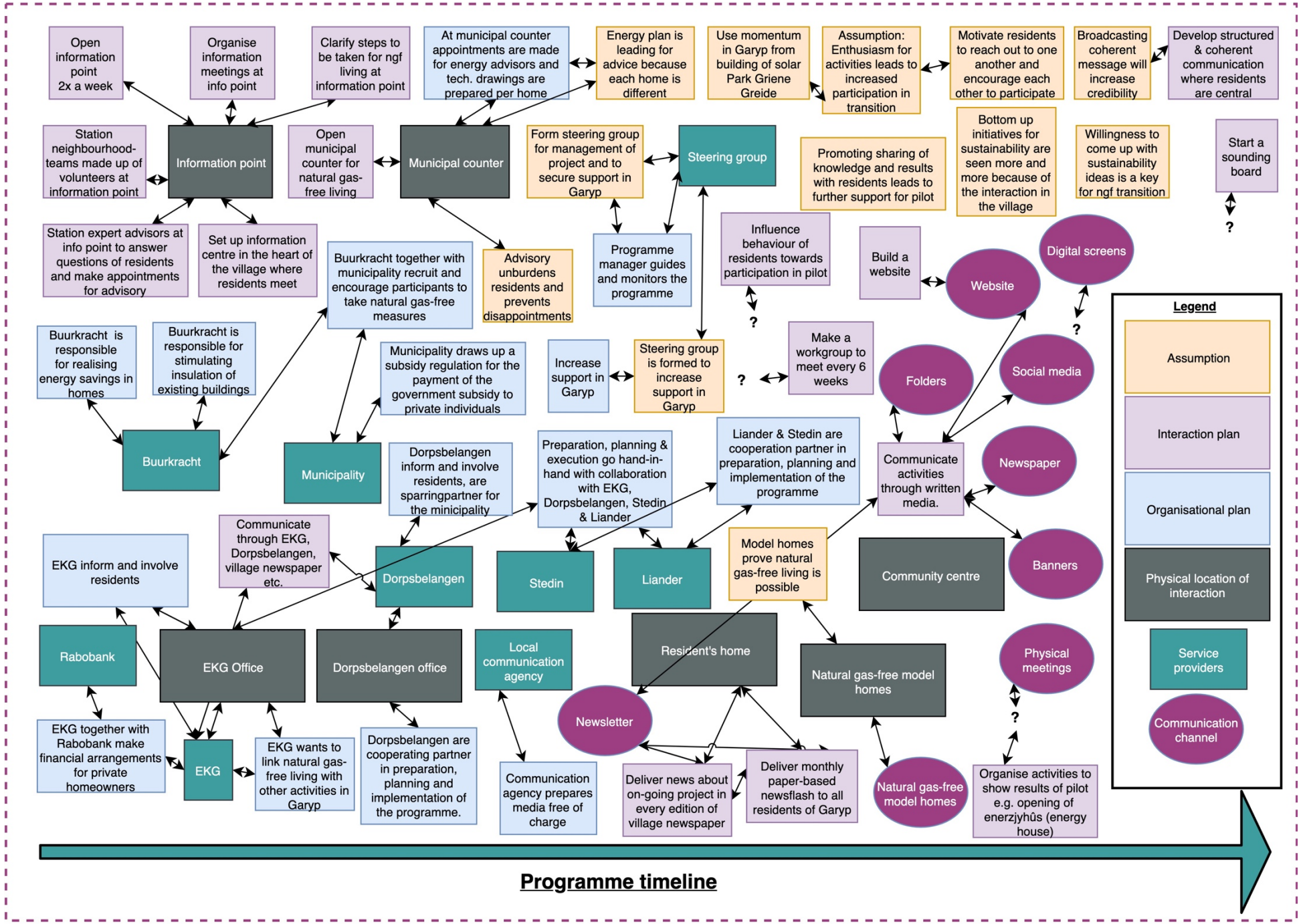

Figure 8: Programme theory framework of Tytsjerksteradiel showing how the pilot plan involves residents in the natural gas-free transition

Figure 8 is the visual of the programme theory framework for Tytsjerksteradiel (Garyp) showing how the pilot plan involves private homeowners in the natural gas-free transition. As can be clearly noted, the pilot plan states many activities, assumptions and communication media. Most of the stakeholders who are stated are also clearly linked to certain activities. Through the large number of activities, it can be difficult to clearly see all the links within the project. Even though the plan has many activities stated, there is a lack of explanation on how those activities will be carried out. For example, Buurkracht is responsible for stimulating insulation of existing buildings. What steps Buurkracht will take to make sure that this happens are unclear. This pilot plan has many activities mentioned, but also lacks integrating links between the different activities and how these will lead to more homeowner involvement and ultimately lead to a successful project.

Due to the pilot plan not including any time frames or time span for the programme, it was impossible to organise the actions in the framework according to the order in which they have to take place.

Comparison of pilot plan with literature

According to the interview with the pilot plan author for Garyp, multiple resident initiatives are observed. This is ascribed to the past effort of the villagers' success with building their own solar park. The success has united the village and motivated them to come up with sustainability ideas. Residents are more likely to participate in a programme where benefits are for the whole community (Steg et al., 2015), especially when they get pleasure from the actions, such as in this case create a possibility to become the first energy neutral village in the energy transition by building their own solar park (Carrus et al., 2008; Gatersleben & Steg, 2012; Pelletier et al., 1998; Smith et al., 1994; Steg, 2005). Furthermore, residents are more willing to take actions when they know that others, in this case the fellow-villagers will be approving of the measures (Harland et al., 1999; Nolan et al., 2008).

According to literature, non-financial incentives work well for facilitating resident participation in a programme (Carrico et al., 2011). There are two examples of these incentives that are used in Garyp. Firstly, there is a neighbourhood team that is made up of volunteers who convene twice a week in a building that is centrally located in the village. This team answers questions that homeowners might have regarding the pilot. Secondly, the municipality has taken steps to facilitate the actions of the homeowners such as help them with applications for subsidies to renovate the homes.

From the interview with the pilot plan author, it is stated that a lot of information is shared with the homeowners from every action that has been done in the past week, to celebratory moments such as the opening of an information centre for homeowners. This is a form of cross-reporting of actions that are taking place in the neighbourhood (Allcott, 2011; Harland et al., 1999; Nolan et al., 2008) and leads to higher acceptance for sustainability measures.

Different media are being used in order to reach the homeowners, including homeowners who talk to other homeowners about the energy transition in their village. Information sharing is perceived to be a key step in getting residents to

become aware of sustainability challenges and also lead to positive spillover effects in other parts of the homeowners' lives (Schuitema & Steg, 2005; Whitmarsh & O'Neill, 2010).

4.4 Comparative analysis of the municipal plans

All three municipal plans lack an explicit programme theory. Due to the absence of detailed plans of interaction with homeowners, it is also a somewhat impossible task to be able to puzzle all the pieces together, a proverbial comparison of completing a puzzle with hands tied behind the back and eyes blinded.

Compared to the plans for Eindhoven, the plan for Noordoostpolder has significantly more and clearer assumptions stated. The assumptions seem to be logical even though they are not backed up by theory. One such an assumption is to make no distinction in communication between private homeowners and social housing tenants. It is understandable through simple logic that communicating differently towards residents might lead to the residents believing that they are observed to be of different classes or priorities. It would nevertheless be advised to cater the message depending on its recipient. For example, tenants who do not need to pay for renovation measures can be reached better by focusing on the increased comfort level of good insulated homes, while homeowners might be more interested in knowing what the measures will end up costing. Compared to the other two pilot plans that have been analysed in this report, Garyp seems to have provided most of the theory, interaction plan and organisational plan. The assumption that have been made implicitly in the report seem to make sense. Some examples of these assumptions are model homes prove natural gas-free living is possible and enthusiasm for activities leads to increased participation in the transition. These assumptions and statements however are not backed up by any scientific theory.

The selected pilot plans have attempted to incorporate homeowner participation but upon further analysis, all three plans are lacking a comprehensive interaction plan. None of the plans managed to encapsulate how the theory of becoming natural gas-free was going to be interwoven with the actions of the homeowners and how the resources available would be used to meet the aim of the programme. In general, the pilot plans lacked critical aspects such as causal links, interdependency between the planned activities, and contingencies of interaction plans.

Several stakeholders were mentioned in the plans. The accountabilities of these stakeholders are not clear, neither are indicators to measure the services provided or the resources that are associated to each stakeholder. For example, all pilot plans mention the use of object-bound financing. This form of financing is still not available due to complex regulations surrounding it. Therefore, if object-bound financing is a critical part of the pilot plans, the fulfilment of these pilots might take longer than anticipated and consume more resources than are available per recipient.

There is an interesting observation between the pilot plans and the interviews with the responsible parties at the municipalities. Even though all plans were lacking in their interaction plan, from the interviews it is evident for two of the municipalities that there is a lot going on at the homeowner level. If the strength of the interactions

between the residents and the municipalities was only measured from the written pilot plans, they would give a very distorted image of the reality. In order to compare the pilot plans well, it is therefore incumbent that additional information is sought.

According to the governmental criteria for the pilot plans as presented in Chapter 1, it seems that technological possibilities and diversity have a preference over the acceptance of the discussion about natural gas-free living and the perception of the transition by the homeowners. Even though all homeowners will need alternative technologies to heat their homes, it is the homeowners who own these homes and, in the end, decide whether or not to invest in the measures available. Therefore, a diversity of pilot plans with different ways of involving residents in the energy transition should also be given priority, just as the variation in technology and locations. Otherwise, a risk arises that technically superior plans are made and do not get any acceptance due to homeowners feeling being uninvolved, especially in a movement that is already top-down and obligatory by nature. As the driving force behind the energy transition, the government should assist the municipalities by providing scientifically based guidelines that can be used for pilot plan proposals. An example of these guidelines could be the operationalisation of programme theory that municipalities can tailor to their specific cases, together with homeowners.

Currently, much effort is being put into renovating the first homes so that these can be used as flagships for the homeowners (Eindhoven, 2018; Noordoostpolder, 2018; Tytsjerksteradiel, 2018). Even though leading by example can be perceived as a great way to lead, literature suggests that residents should be engaged from early on, (Dietz & Stern, 2008; Wolsink, 2007, 2010) especially if the transformation has implications for their homes. It is therefore incumbent that municipalities that are planning to involve residents in pilot plans start working on the engagement with the residents as soon as possible.

Literature suggests that a critical step in building awareness is to inform residents (Devine-Wright, 2011; Schuitema & Steg, 2005; Whitmarsh & O'Neill, 2010). Public information campaigns can be used for this purpose in order to broadcast a uniform, informative and educational message throughout the country. The campaigns will raise awareness and reduce uncertainty within residents on what the energy transition is. Furthermore, when homeowners are informed, it could lead to them feeling involved in the transition, especially if municipalities will at later stages encourage the homeowners to participate in making natural gas-free plans for their neighbourhood. Such information campaigns should start as soon as possible with informing homeowners since most of them would have to be mobilised into participation by the time every municipality needs to have a clear plan of action per neighbourhood in 2021 (RVO, 2018b).

Additionally, the government needs to work on making the benefits of the energy transition outweigh the costs hereof for the residents (Steg et al., 2015) especially benefits that can be enjoyed by the whole society. This can be achieved by for example facilitating residents with most common frustrations such as providing free sound insulation to minimise noise nuisance from heat pumps (Benjamin J. A. Walker et al., 2014). Pleasure from the measures that are linked to the energy

transition should be highlighted (Carrus et al., 2008; Gatersleben & Steg, 2012; Pelletier et al., 1998; Smith et al., 1994; Steg, 2005). An example of highlighting pleasures is to accentuate how living comfort will increase when the homes have undergone better insulated. A second pleasure is linked to an increase in financial status since property values tend to increase after they have had sustainability measures (Gneezy et al., 2012; Griskevicius et al., 2010). Another pleasure is the energy independence that comes with the energy transition. This not only leads to energy security for the household, but also shows that one cares for the environment (Noppers et al., 2014).

For the municipalities, knowing their residents well should be the first and most crucial step towards creating an energy transition plan. The more the plans fit with the preferences and values of the local residents, the more acceptance there will be for the programme (Bolderdijk et al., 2013). Residents should be approached and involved in every step of the way, in a fair and respective manner, and their interests considered (Huijts et al., 2012; Perlaviciute & Steg, 2014). They should be actively involved and included in decision-making processes (Dietz & Stern, 2008; Wolsink, 2007, 2010). Furthermore, residents should be provided with consistent and scientific information about the energy transition and the steps that need to be taken. This information should be conveyed to the residents in such a way that they understand it. Informing is the first step to creating awareness.

Municipalities can use various communication channels to achieve this such as setting up multiple information centres for residents in their neighbourhoods, use local newspaper, local events etc. in all communication, face to face interaction should be used as much as possible (Sussman & Gifford, 2013)

The benefits for the energy transition should also outweigh the costs on a local level (Steg et al., 2015). For example, if a certain neighbourhood can only use more expensive technology due to the location not allowing for other technologies, the residents of such a neighbourhood should be assisted in such a way that they too can afford the transition. Small milestones should be celebrated. This is a form of cross-reporting of actions that are taking place in the neighbourhood (Allcott, 2011; Harland et al., 1999; Nolan et al., 2008).

Municipalities should focus on making the distance between the pilot programme and the residents as short as possible, both for physical distance as well as psychological distance. This is a form of using non-financial incentives that increases acceptance of a programme (Carrico et al., 2011; Steg et al., 2015)

In order to minimise the repercussions of an obligated energy transition, residents should be offered as much freedom as possible in decision making and choices for certain techniques and systems (Steg et al., 2015), the more freedom of choice they have, the better (Poortinga et al., 2003).

Public commitments and intentions should be encouraged as much as possible. Public commitments lead to perseverance in completion of promises (Abrahamse et al., 2005). Therefore, if the municipality is able to commit itself to certain appointments, such as providing every homeowner with free energy advice within a certain time period, it should do so in public.

Finally, partners whose integrity and competence cannot be doubted should be used in the energy transition at every possible point so that trust is built and maintained in the programme (Earle & Siegrist, 2006; Siegrist & Cvetkovich, 2000). Trusted partners are for example universities and NGOs (ibid.). Municipalities can also employ the use of models and block leaders. These are persons who residents can relate to and respect. They are an inspiration for building certain behaviour, such as sustainability-centric living (Sussman & Gifford, 2013). In block leading, volunteers from the neighbourhood are used as contact persons for their neighbourhood. This works the best when there is cohesion amongst the residents of a neighbourhood (Weenig & Midden, 1991).

5. Discussion

5.1 Limitations to this research

Data used for this research stems mainly from the documents that have been used in order to apply for governmental funding. There is a possibility that it might be outdated at the time of writing this report. There was a short timespan between BZK inviting the municipalities to apply for the funding and the deadline. Parties who undersigned the pilot plans were not always the parties who would put the plans into action for the energy transition. This was the case for two municipalities. There is therefore due to the short time plan that was given, a possibility that the priority was to secure the funding and improve the plans later. It is therefore possible that municipalities have reviewed their plan of action for the heating transition and employed external parties for support. If this was the case, it would explain the discrepancy for two of the three pilot plans between the thriving homeowner participation and the incompleteness of plans to involve the residents in the pilot plans.

In this research, a framework was used that had not been used before for the energy transition. In order to use the framework, the author had to invent a question system that would bridge the gap between the theory and the practical steps. There is a possibility that a more fitting framework exists that could be used to analyse the pilot plans better. The framework was for example not able to catch the time sensitivity of the actions that take place in the energy transition. And had to be adjusted to account for this aspect. This however did not have much effect in the current pilot plans since they lacked details such as time spans of the activities. The programme theory framework however was useful in determining that the pilot plans missed critical links between actions that have to be done for the energy transition and how the residents were to be involved in each component of the transition.

There are many students and other parties who are very interested in the heating transition according to some municipalities. Due to this, municipalities were hesitant to make appointments. Some have even made it their policy to not hold interviews anymore due to the amount of time that interviews take and the distracting effect they have on the progress of the pilots. This time constraint made it very difficult to secure interviews in the first place and meant that there was no liberty to eventually plan additional interviews with the municipal employees. The author of this report is aware that the amount of information could be much more if municipalities had the freedom to offer follow up interviews and provide additional materials to the publicly available pilot plans.

Three cases were analysed in this report, selected at random. This is a small number and cannot be used to represent the whole of the Netherlands. Nevertheless, the lessons learned in this report can be used for all pilot plans in order to increase the involvement of residents in the neighbourhoods. There is a possibility of some of the non-analysed pilot plans might have more complete interaction plans with residents than was found in the three cases.

During this research, the approach has been top-down. A way needs to be defined in order to facilitate homeowners who start with their own initiatives before

the municipality has done so. This aspect of the energy transition has not been accounted for by the theory framework used.

5.2 Contribution to literature

The energy transition field is quite new and there is therefore not much literature available on the involvement of residents during the energy transition. This report is an endeavour to contribute to the body of knowledge on the practicality of how to engage and motivate residents in an obligatory energy transition by applying a programme theory framework to see what lessons can be learned from this new field. As an addition, a timeline has been added to the framework in order to catch the time sensitivity of the transition. This timeline did not have an effect on the analysis of the current pilot plans because the time span of the activities was not taken into account. It will however be useful when applied during making of plans as it will help define the succession of the actions to be taken.

In this report, it has been found that municipalities that used approaches that were in line with literature on resident involvement were also municipalities where homeowners were cohesive and showed initiatives towards sustainable measures. Cohesiveness was found where a lot of the communication was face to face, where non-financial incentives were being deployed, and where homeowners would undertake actions which they knew other members of the community would approve.

5.3 Recommendations for further research

In line with the research done in this report, there are several suggestions for future research. A better understanding is needed of which sustainable heating technologies residents are willing to adopt and why, in relation to the energy transition. An understanding of how residents make choices pertaining to interaction with municipalities in an obligatory energy transition is vital for future municipal plans. It is important to know how to systematically motivate residents to work towards most energy efficient behaviours in daily life, instead of choosing for the cheapest option or most well-known option. The body of science will also benefit from research on how to motivate residents in making longer term investments during renovation and construction of new homes, and how to make energy independent homes that do not need the intervention of energy companies or grid operators in a cost-effective manner.

6. Conclusion & Policy Recommendations

Conclusion

The main question of this report was: "How are private homeowners involved in the pilot plans for the transition to natural gas-free heating of Dutch neighbourhoods, and how could they be involved in future pilot plans in order to maximise the likelihood of a successful transition?" In order to answer this main question, an analysis has been done through the perspective of programme theory, for three selected pilot plans on their integrated approach with homeowner involvement.

All chosen plans had explicitly mentioned that they would involve homeowners in the pilot plans. As has been evident in the selection of the pilot plans, there are existing pilot plans that do not consider involving private homeowners at all and ignore these until later stages of the transition. Considering that the analysed plans had intended to involve residents in the pilot plans, they were all lacking detailed plans on how to involve homeowners. Therefore, the involvement of homeowners in the pilot plans for the transition to natural gas-free living is insufficient for all pilot studied. Mentioning that support and awareness will be raised for the homeowners does not qualify as homeowner involvement. In order to involve homeowners, a detailed plan should be made, preferably in cooperation with the homeowners on what will happen when, with what resources and which roles the homeowners and other stakeholders will play. The current level of details, or the lack hereof in the pilot plans suggests that there is much space for improvement with regards to homeowner involvement in the pilot plans. The success of the energy transition is for a large part dependent on homeowner participation.

When the results of the pilot plan interactions with homeowners are supplemented by interviews with the responsible parties at the municipalities, it is evident that there is a lot of interaction that is happening at the residential level. The observed interaction and motivation seem to come from the residents themselves with the municipalities playing a facilitative role. One may wonder how much more the support and interaction at the resident level would be if the municipalities would play an active role in for example educating the residents and actively offer support to facilitate the transition.

Studying the pilot plans in isolation will in this case give an incomplete view of the interaction with homeowners. The author of this report ascribes this phenomenon to two possible causes. The first is the facilitative role of external organisations that are being used in order to raise awareness for homeowners. In the pilot plans, there was no information shared on how these organisations will accomplish their tasks. The second cause is the lack of time that municipalities had between the invitation for applying for the pilot plan funding and the deadline hereof. It could very well be possible that the municipalities decided to prepare the technical side of the transition for their neighbourhood and leave the private homeowners' involvement for later stages.

General recommendations for national government

Involving homeowners in the energy transition should be given priority, just as the variation in technology and locations. Otherwise, a risk arises that technically superior plans are made and do not get any acceptance due to lack of homeowner involvement. As the driving force behind the energy transition, the government should assist the municipalities by providing scientifically based guidelines that can be used for pilot plan proposals. An example of these guidelines could be the operationalisation of programme theory that municipalities can tailor to their specific cases, together with residents.

Public information campaigns should be used to inform homeowners and create awareness in order to broadcast a uniform, informative and educational message throughout the country. The campaigns will raise awareness and reduce uncertainty within residents on what the energy transition is. When homeowners are informed, it could lead to them feeling involved in the transition, especially if municipalities will at later stages encourage the homeowners to participate in making natural gas-free plans for their neighbourhood. Informing the public can also lead to positive spill over into other aspects of life such as sustainable food consumption and purchasing behaviour. Such information campaigns should start as soon as possible with informing residents since most of the residents would have to be mobilised into participation by the time every municipality needs to have a clear plan of action per neighbourhood in 2021.

Additionally, the government needs to work on making the benefits of the energy transition outweigh the costs hereof for the homeowners especially benefits that can be enjoyed by the whole society. This can be achieved by for example facilitating residents with most common frustrations such as providing free sound insulation to minimise noise nuisance from heat pumps. Pleasure from the measures that are linked to the energy transition should be highlighted to increase acceptance. An example of highlighting pleasures is to accentuate how living comfort will increase when the homes have undergone better insulated. A second pleasure is linked to an increase in financial status since property values tend to increase after they have had sustainability measures.

General recommendations for municipalities

Municipalities should know their residents well before taking steps towards creating an energy transition plan. The more the plans fit with the preferences and values of the local residents, the more acceptance there will be for the programme. Further on in this chapter, suggestions are given on how to get to know and involve homeowners. Homeowners should be approached and involved in every step of the way, in a fair and respective manner, and their interests considered. They should be actively involved and included in decision-making processes. Furthermore, residents should be provided with consistent and scientific information about the energy transition and the steps that need to be taken. This information should be conveyed to the homeowners in such a way that they understand it. Municipalities can use various communication channels to achieve this such as setting up multiple

information centres for homeowners in their neighbourhoods, use local newspaper, local events etc. in all communication, face to face interaction should be used as much as possible.

Municipalities should also strive to make the benefits for the energy transition outweigh the costs on a local level. If a certain neighbourhood can only use more expensive technology due to the location not allowing for other technologies for example, the homeowners of such a neighbourhood should be facilitated in such a way that they also can afford the transition. Small milestones should be celebrated.

Municipalities should focus on making the distance between the pilot programme and the residents as short as possible, both for physical distance as well as psychological distance.

In order to minimise the repercussions of an obligated energy transition, residents should be offered as much freedom as possible in decision making and choices for certain techniques and systems, the more freedom of choice they have, the better.

Public commitments and intentions should be encouraged as much as possible. Therefore, if the municipality is able to commit itself to certain appointments, such as providing every homeowner with free energy advice within a certain time period, it should do so in public.

Finally, partners whose integrity and competence cannot be doubted should be used in the energy transition at every possible point. Trusted partners are for example universities and NGOs. Municipalities can also employ the use of models and block leaders. These are persons who residents can relate to and respect. They are an inspiration for building certain behaviour, such as sustainability-centric living. In block leading, volunteers from the neighbourhood are used as contact persons for their neighbourhood. This works the best when there is cohesion amongst the residents of a neighbourhood.

Suggestions on how to get to know and involve residents

Each neighbourhood in the Netherlands is different due to the combination of its residents, their attitudes, local architecture etc. A fitting pilot plan means a tailor-made programme that takes into account the diversity in homeowners, their housing stock, financial capacity etc. Having a tailor-made programme also means that the residents have to be distinguished into different personas[8] so that these personas can have optimum support. Characteristics that can be used to distinguish the persona are for example age, education, type of employment, financial status, interest, hobbies, affiliation with certain social groups. The more the programme manager knows about a certain persona, the better the service can be catered to that persona. A way to gain

[8] "Personas are fictional characters, which you create based upon your research in order to represent the different user types that might use your service, product, site, or brand in a similar way. Creating personas will help you to understand your users' needs, experiences, behaviours and goals. Creating personas can help you to recognise that different people have different needs and expectations, and it can also help you to identify with the user you're designing for. Personas make the design task at hand less complex, they guide your ideation processes, and they can help you to achieve the goal of creating a good user experience for your target user group."(Interaction Design Foundation, 2019).

information that can be used to make personas is through neighbourhood information gatherings. At these gatherings, residents can be informed on the importance of the municipality in knowing their wishes and needs and then be requested in filling in questionnaires. Another way to gain this information is through one-on -one contact between residents and parties who can gather this information. These parties can be local residents who are trusted by their neighbours, who can visit the neighbours and gather such information in conversations.

From the perspective of personas, an interaction plan can be made. This interaction plan takes into account how the persona/ recipient is to be recruited to participate in the programme. It also takes into account participant engagement, how their needs can be facilitated for the duration of the programme, and how the interaction can be dialled down when the programme has been fulfilled. In order to have a successful programme and the opportunity to efficiently adjust programme components, it is important to have an articulated programme theory (Rossi et al., 2004). A thorough programme theory can identify shortcomings in the programme agenda and can be used to improve action plan. Planning an evaluation can be more beneficial when the thoughts and intentions of the programme have been documented and a roadmap is available on how a neighbourhood can be made natural gas-free (ibid.).

Classifying residents in a neighbourhood in personas can make it easier to understand what motivates and convinces them. For example, if one of the characteristics of the persona has ambitions for sustainable living, the approach towards this resident can be tailored so that sustainability is the central theme. If someone can see the personal benefits of a behaviour or task, it can be assumed that motivating this person to change is easier than someone who doesn't see the personal benefit.

After dividing the target residents into personas, the best fitting solutions for the different personas should be identified. With understanding the different personas one can expect an increased project participation and project success.

When the needs and possibilities of the personas have been defined, attention should be given to fitting technological solutions so that the heat transition can take place per neighbourhood. Henceforth, the interaction per persona can be tailored to fit the required and affordable services.

Suggestions on how use the programme theory framework with timeline

Figure 9 and Figure 10 show a programme theory framework including an active timeline. Figure 9 is a detailed representation for one action that can be done during the pilot programme period. In this case it is a simplified representation of an information campaign that the municipality can organise, including some assumptions. In order to see the information campaign activity together with other actions that can be done, Figure 10 can be used. This is also an oversimplified programme theory framework, this time with only the timelines of three activities that the municipality is responsible for without showing components such as assumptions etc.

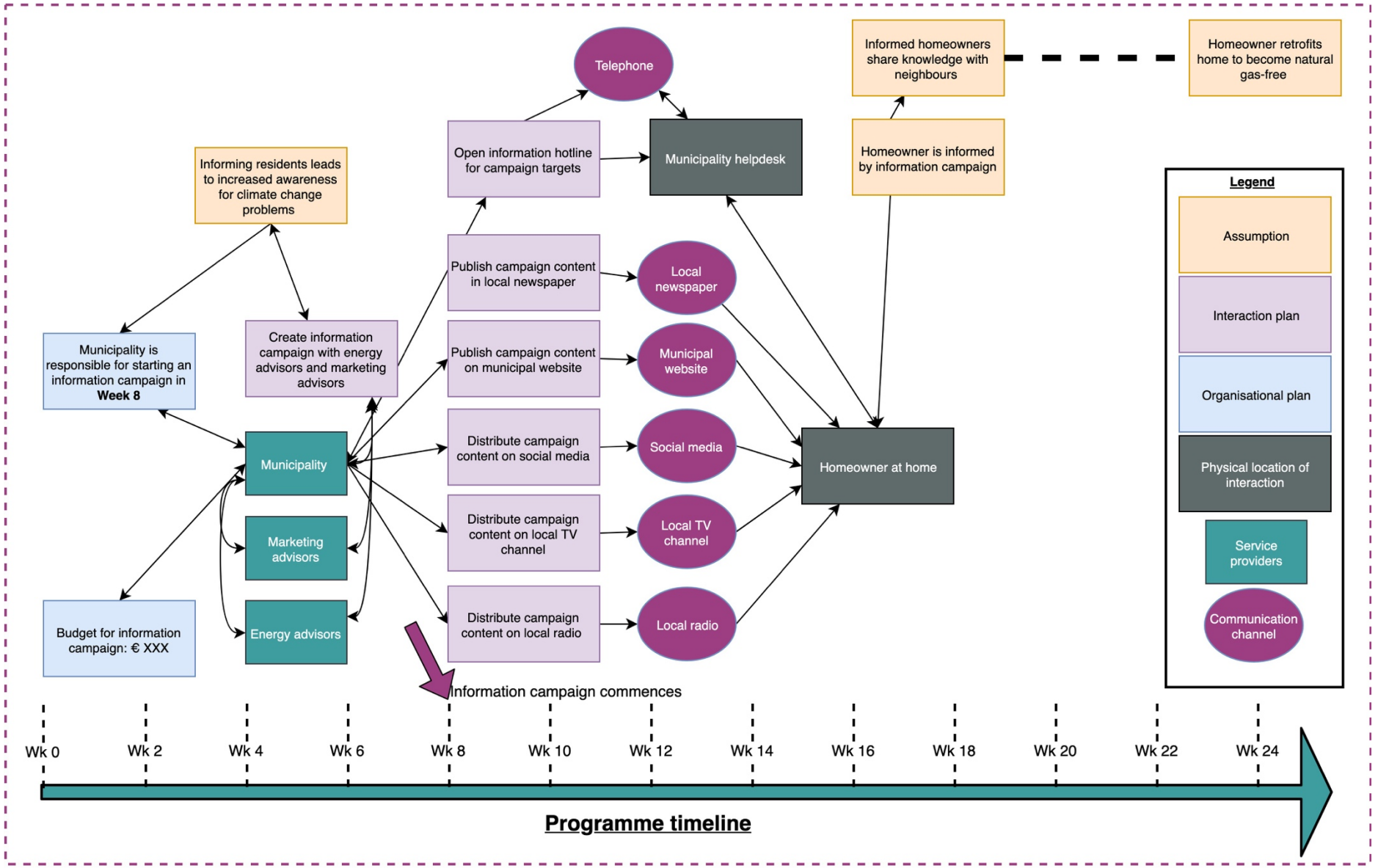

Figure 9: A detailed theory framework visual with an active timeline for a municipal information campaign

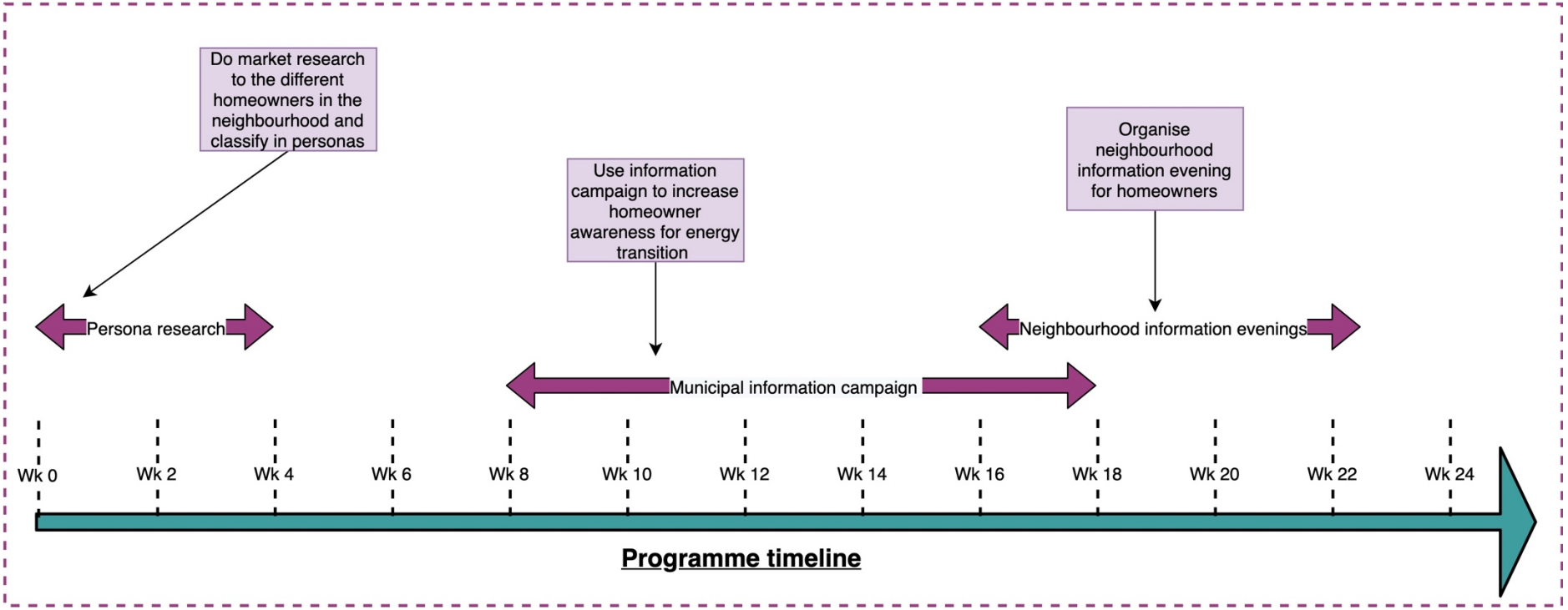

Figure 10: An overview theory framework visual with an active timeline for municipal campaigns and research

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Appendix A: Exclusion and inclusion of pilot plans during selection

Table 4: A list of the 27 pilot plans approved for governmental funding by BZK with an indication on residential participation marked.

Pilot plan #	**Municipality** (Alphabetical order)	**Neighbourhood**	**Inclusion private homeowners.** Green: Yes, Red: no Orange: see comments	**Comments**
1	Amsterdam	Van Der Pekbuurt	Yes	
2	Appingedam	Opwierde-Zuid	Yes	
3	Assen	Lariks West	Yes	
4	Brunssum	Brunssum-noord		Priority is for housing corporations
5	Delfzijl	Delfzijl Noord		Unclear, there is no approach mentioned for the privately-owned homes.
6	Den Haag	Bouwlust/Vrederust		Unclear, privately owned homes constitute 7% of the total homes in the neighbourhood, no plans are mentioned about the approach for them.
7	Drimmelen	Terheijden	Yes	
8	Eindhoven**	't Ven	Yes	
9	Groningen	Paddepoel en Selwerd	Yes	
10	Hengelo	Nijverheid		Priority is for housing corporations
11	Katwijk	Smartpolder		Priority is for housing corporations
12	Loppersum	Loppersum-'t Zandt-Westeremden	Yes	
13	Middelburg	Dauwendaele		Unclear. Privately-owned homes fall under the housing corporations, no approach is mentioned for private homeowners in the neighbourhood.
14	Nijmegen	Dukenburg		Priority is for housing corporations
15	Noordoostpolder**	Nagele	Yes	
16	Oldambt*	Nieuwolda-Wagenborgen	Yes	
17	Pekela	Boven Pekela en de Doorsneebuurt	Yes	
18	Purmerend*	Overwhere-Zuid	Yes	Yes, but priority is on a previous smaller pilot with 95 privately owned homes
19	Rotterdam	Pendrecht	Yes	
20	Sittard-Geleen	Limbrichterveld-Noord	Yes	
21	Sliedrecht	Sliedrecht-Oost	Yes	
22	Tilburg	Quirijnstok	Yes	
23	Tytsjerksteradiel **	Garyp	Yes	
24	Utrecht	Overvecht Noord	Yes	
25	Vlieland	Duinwijck	Yes	
26	Wageningen	Benedenbuurt	Yes	
27	Zoetermeer *	Palenstein	Yes	Priority is for housing corporations. Private homeowners will be initially ignored.

*Randomly selected | **Final selection used in the analysis

The documents that were handed in to the Ministry of Internal Affairs and Kingdom Relations (BZK) in order to secure the governmental funding for the pilot plans can be found on the government's website (Rijksoverheid, 2019)

Appendix B: Interviews with pilot plan authors

B1 Interview with heat director of Eindhoven

Residents approach:

Resident participation is one of the pillars in the process. We are working with an external party on this (Buurkracht). There is also a group of residents who come together at fixed times in the process and think about the progress and the next steps of the project in the neighbourhood. The project leader did this project in the beginning. He himself stood in front of the halls and searched for the best approach. This was ultimately approached in collaboration with Buurkracht.

Involving private homeowners

Involving private homeowners is quite a challenge. It is not easy to determine in the business case how many homeowners should contribute and when they should be involved. Even parties such as heat companies do not dare to easily give an answer to this. The residents are not obliged to cooperate and therefore need stimulation and incentives to volunteer for this. If matters such as connection costs for a heating network were to be demanded for private individuals, while private individuals could also opt to keep their gas boiler, the cheapest choice would be made quickly. We cannot make it more beautiful than it is, so we have to do with what we have to make an acceptable whole for everyone. Even with a grant from the government, the business case is difficult to achieve.

Housing subscription system:

The housing subscription system is still under development. Here, existing funds such as the national energy loan and local energy loans are used. One of the requirements for this system is that a fund is set up that falls under this and is intended for people who do not qualify for other loans, such as a loan where a BKR registration could be an obstacle. The housing subscription system is still under development. The preconditions are now determined.

Heat network in the pilot

Who is connected to what temperature is part of the city's strategy. At the moment, the technical possibilities have priority: where do we have residual heat, where can we use geothermal heat, which neighbourhood has which building density, etc. Only then will the content at home level be examined, such as which house gets what temperature with a heat network for example. The municipality may need to determine who gets what.

'T Ven is a pilot neighbourhood. Other technical combinations may be applicable in other neighbourhoods. There is still no clear solution for residents who do not want to do anything at all, because at some point the gas pipe must close.

B2 Additional information provided by a co-author of the pilot plan in Eindhoven

- The home subscription system is still under development. It can be used in addition to the sustainability loan.
- The building related financing is also being developed nationwide at the moment.
- The plans to make 526 homes natural gas-free until 2021 is globally on track. A slow start was anticipated due to preparation. That appears to be the case in practice. For the time being only homes from housing associations are being made natural gas-free. Residents of housing corporations are being approached in consultation with the municipality.

B3 Interview with author of pilot plan of Noordoostpolder (Nagele)

Resident participation

Resident evenings take place two to three times a year. At the Karwijhof, kitchen table conversations are taking place about residents' financial capacity, energy consumption and wishes. This happens on a case-by-case basis and costs a lot of energy, because everything is done from Energiek Nagele. Residents are involved, the information point is not open every week, but it will be in the future. The information point is in the village itself. Energiek Nagele communicates to residents, there is a contact person per court. Here diversity was looked at, e.g. for the Polish residents in Nagele, a contact person is someone who speaks Polish and acts as the link between the residents and Energiek Nagele. The contact persons are used as a sounding board about what works and what doesn't work. All communication has to be low-profile, therefore it is face to face and one person at a time.

Key associations have just been established. Here, we look at who will be contacted per phase. We do not want to involve too many people when that is not necessary. Also, as the municipality, we want to take as little initiative as possible and watch everything from the side lines. We will intervene and steer where necessary. All residents are approached in the same way. Energiek Nagele must also be well informed. Residents and housing corporations must be informed at the same time. The cooperation Energiek Nagele originated from Dorpsbelang, so it is an initiative of the village itself. You cannot plan the energy between the residents, as the government you cannot interfere. Forcing cooperation does not help. The best thing is that it is an initiative that comes from the society. As the government we can motivate, screen their plans, etc.

Financial arrangements

The pay-back-period for the measures is calculated at 40 years. This is the lifecycle of the measures that we want to apply. Financial arrangements are still ongoing. Decentralization benefit has been requested to cover the unprofitable top, preliminary investigation for the homes etc. The cultural heritage of the village also provides opportunities for financing. The most important point for now is that the energy costs must either remain the same or decrease. All owners want to participate in the pilot, provided that it is financially possible for them. Literally, everyone wants to join. There is a difference though between wanting and being able to. People especially need help with being able to participate because this is very sensitive for people.

Current progress

At the Karwijhof the process has started. Calculations are being done and the technical and legal aspects are being researched. From Stichting Hendrik de Keyser, a number of homes are not going to participate for now. Therefore, a part of the ring and a school will participate immediately so that the project can be kept feasible. You also cannot do certain things in Nagele, such as the limitations that come with monumental buildings.

B4 Interview with author of pilot plan of Tytsjerksteradiel (Garyp)

Resident participation

There are 80 rental homes in Garyp. The rest of the houses are privately owned. The neighbourhood team is formed of volunteers. They use the former Rabobank office as the epicentre and are open every Wednesday and Friday to answer any questions that the residents might have. The manager of the project is also a resident of the village. In the meantime, 11 homes have been made natural gas-free. Activities that are organised are made known in the village through written media such as the village newspaper, newsletter, leaflets and banners or digital media such as Facebook and the neighbourhood page on the Buurkracht site and a screen in the information desk. Residents are also approached by co-residents to participate in the activities. Some of the activities that we organised are the grand opening of the energy house and the information evening for the pilot plan. Once a month we send a paper-based newsflash to all residents. We are developing a website, the village newspaper always something about the pilot plan (weekly), we are organising activities together with companies.

The residents are very motivated. They have managed to design and build a solar park in Garyp. Such projects can only work if they are the initiative of the residents themselves. We also have a communication agency that is doing voluntary work for the village. In the beginning we used a lot of feedback to adjust the plans. Once every six weeks we organise a work group. In the meantime, there is weekly contact.

Financial arrangements

We want to invest the government's contribution to this project as much as possible in the village. We drew up a subsidy scheme for this. It is a subsidy for insulation that has been operational since April. The maximum that a resident can receive is €10 000 and up to 50% of the total costs that are invested. There is also an energy savings loan with low interest. We have made the subsidy regulations as easy as possible. A municipal employee helps the residents with filling in the forms and applying for the subsidy.

Model homes are being made natural gas-free. Two detached and two semi-detached homes. The priority for us is to lower the energy needs of the villagers. Every home is different. The energy scan is leading.