SOCIAL CONTAGION

AS A MEANS TO TRANSITIONS

Activating residents towards the energy transition through social influence

Master thesis by:
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Social contagion as a means to transitions

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*This project is carried under the ENRGISED (Engaging Residents in green energy investments through social networks, complexity and design) project.

Preface

Paradoxically, as the world went into physical distancing to prevent the contagion of the corona virus, I started my master thesis ‘Social contagion as a means to transitions’. On one side I was reading theory on contagions, while on the other hand we were all experiencing one of the most rapidly spread pandemics. Although behavioural contagion (social influence) and disease contagion are different, the pandemic does accentuate the power of contagions in bringing about change. Solely, from a social (societal) perspective, we saw how social norms, trends, beliefs and behaviours changed overnight, and spread throughout the world. Even amid physical distancing, people were influenced by their peers groups and networks; which is exemplified by the large scale participation in protests against discrimination, or the spread of trends like drinking Dalgona coffee, baking sourdough bread, or even people influencing their peers to wear masks and follow protocols. This reiterates my belief in the strength of social contagion (social influence) as a means to shape a sustainable future.

Being an unexplored path towards designing for transitions, I have tried to capture both, theoretical (know-what) and practical (know-how) aspects in this thesis. I hope it brings forth a new perspective, and inspires you. Have fun reading it!

This thesis marks the end of my graduation project, as well as my Masters journey. While I imagined it to be much more active and in-field, I am glad with the outcomes of this thesis and the learnings it has provided. This would not have been possible without the support of my supervisory team – Rebecca, Jotte and Jacco. I would like to thank all of you for your enthusiasm and the motivation you provided even in these unusual times. Each conversation with all of you has been inspiring and enriching, pushing me beyond my limits. Thank you, Rebecca and Jotte for giving me the freedom to shape the project as I like, while ensuring I think about each and every nitty-gritty. Jacco, I would like to thank you for providing me all the support I needed in accessing the case and connecting me to the right people. I have thoroughly enjoyed working with each of you, and look forward to future collaborations.

Apart from the supervisory team, I would like to thank all the municipality officials and other stakeholders for lending me their time and giving me the input necessary to shape this thesis.
I would also like to take this opportunity to thank all my friends who have supported me and inspired me in this journey, making it worthwhile. A special thanks to Nayantara, Sonali, Preeti, Shreya, Chiara, Maria, Gal, James, Vinodha, Joseph, Veerle, Shweta and fellow PAN-labers, for helping me during the project. Your insights have been really useful. At last, I would like to thank my family for always having my back and helping me pursue my dreams.

Executive summary

Faced with increased pressure due to the earthquakes in Groningen and global warming, the Netherlands government has decided to discontinue the production of and completely transition away from natural gas by 2050. This requires the transformation of the 95% of houses that are currently heated using natural gas into ones that are heated using greener energy alternatives- such as solar power, wind, residual heat etc. To affect the requisite change, the government's top-down, policy-driven efforts need to be complemented with bottom-up, socially-driven interventions that lead to the institutionalisation and large-scale adoption of the greener energy alternatives. This project aims to stimulate this bottom-up institutionalisation and activate residents towards the energy transition using the phenomena of social influence and social contagion. This focus on social influence and social contagion follows from the extensive literature that highlights the significant role of social norms, social proof, social context and social networks on an individual's decision-making and attitude formation; as well as in changing behaviours.

Since gas discontinuation is costly and currently entails high uncertainty and risks, it requires reinforcement from multiple others to trigger behaviour change amongst residents – a complex contagion. Thus, this project draws on complex contagion theory to activate residents. 3 elements (the What, How and Strategy) and a 6-step process (relating to the How element) of visualising how the contagion can unfold are derived from examples in literature; to give the theory on contagions a practical form. These act as a guideline for the project.

Reyeroord (a pilot neighbourhood in Rotterdam) is used as a case study to understand the municipality's efforts and residents' motivations & apprehensions towards the energy transition; as well as to understand people's social identities and networks – the building blocks of social influence. The insights derived are used to define the What and How of the contagion in Reyeroord. Analysis reveals the prevalence of different barriers under the key themes of trust, loss/ risk perceptions, understanding & awareness which lead to procrastination of decision-making. Thus, overcoming procrastination by mitigating the underlying barriers of these themes forms the key goal for Reyeroord. A specific design question is formulated based on these underlying factors to guide the ideation process – to see how social contagion and social influence can be used to overcome these barriers. While this design question is specific to the Reyeroord context and this project, the overall design direction is to design a toolkit that can help the municipality (officials) in designing interventions to overcome any other barriers or apprehensions through social contagion.

Upon brainstorming ideas towards the specific design question and analyzing these ideas, the (generalized) anatomy of an intervention aimed at using social contagion as a means to activate residents towards gas discontinuation, is identified. This consists of 2 design criteria, 4 design principles and 4 design components that an intervention should fulfill, follow and consist of, respectively. This anatomy of an intervention, and the different persuasive strategies derived from the brainstorm are translated into the 'Design for social contagion' toolkit.

The toolkit consists of a deck of inspiration cards (that capture the anatomy and persuasive strategies), a set of canvases (that guide the design process- from problem definition, brainstorming ideas, generating concept lines, evaluation & selection, and detailing) and a handbook (which outlines how to use to the toolkit); to be used through a creative session. Validation of the toolkit with municipality officials after 3 rounds of iterations, shows that the toolkit meets both its aims – to help the municipality in designing interventions, as well as to inspire a new thought process by familiarizing municipality officials with behavioural and social constructs of decision-making.

In order to motivate future use and research, the 3 elements of contagion and the 6-step process for contagion identified (and used as a guideline) through the project, are translated into a consolidated framework – the 'Design for social contagion' framework. Having actionable components and steps, the framework is aimed at bridging the gap between academia and practice. The 'Design for social contagion' toolkit complements this framework and both should be used together to devise persuasive and tactical ways of inducing social contagion of the target behaviour.

The project, its outcomes and the underlying principle of social contagion provide a new perspective and leverage point to untangle (loosen) the complex knot between the interconnected social, technical, financial and political lock-ins and steer systemic change- a new means to transitions.

Contents

01

Project introduction

Chapter 01 - Project Introduction

This chapter provides an overview of the upcoming energy transition in the Netherlands, which helps to define the relevance of the project. Subsequently, the aim of the project and the key research questions identified are outlined, followed by the chosen design approach and the structure of the thesis.

1.1 - Project Context

1.1.1 The energy transition in the Netherlands

Owing to the increased urgency stemming from global warming and earthquakes in the gas-producing region of Groningen, the Dutch government put forth the National climate agreement in June 2019. The key goal being the reduction of green-house gas emissions in the Netherlands by 49% in 2030 as compared to 1990 levels (Klimaatakkoord, 2019a). Further, the aim is to carry out complete phase-out of natural gas by 2050 (Beckman & van den Beukel, 2019). This requires the energy transition to greener[1] alternatives such as solar power, wind energy, district heating using residual energy, biogas etc., within all domains. The agreement outlines the visions, targets and commitments (mainly from a policy perspective) to achieve the stated goals under five sectors - 1) Built Environment, 2) Mobility, 3) Industry, 4) Agriculture & Land Use, and 5) Electricity. Alongside the within-sector goals, the agreement also emphasizes the importance of cohesion between these sectors (cross-sector interactions) and outlines commitments under 10 key themes to support the energy transition – Integrated knowledge and innovation agenda, Creating support in society, Systems Integration, Spatial planning amongst others.

The agreement further states that it is a social transition since it affects all spheres of life and routines; and hence, the participation of all stakeholders, specifically citizens in the planning and implementation of the transition is a pre-requisite. However, being in the nascent stage, there is quite some anomaly and uncertainty about how to achieve the transition and whether these goals will be met; amongst citizens, government officials and other stakeholders alike (Beckman & van den Beukel, 2019). The difficulty to realise the transition can also be attributed to the magnitude of change required and the interconnectedness of utility systems (energy system) with other technological, political and economic systems. This gives rise to stubborn lock-ins pertaining to the current natural gas regime - a self-reinforcing system that has developed over the years. (Appendix B outlines how the transition to natural gas came about, the natural gas socio-technical system and its lock-ins).

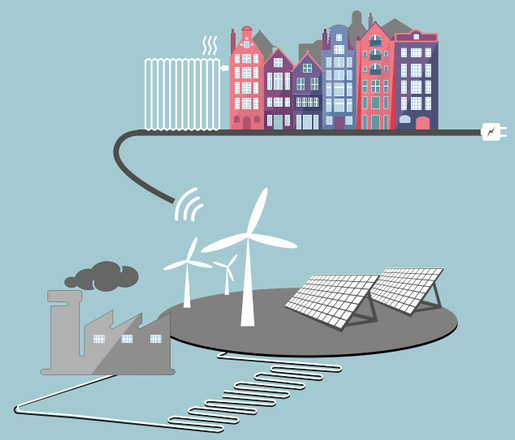
1 Green in terms of production and (post)consumption

It is key to note that the efforts towards the energy transition in the Netherlands have shaped since the early 2000's due to concerns about the depletion of fossil fuels, dependency on foreign suppliers, and climate change (Kemp, 2010; Beckman & van den Beukel, 2019). Ever since, there have been several efforts (and rounds of iterations) in selecting platforms, defining platform specific activities and goals, setting up task forces and coalitions, funding of experiments with sustainable energy etc., all part of the transition approach (Kemp, 2010). These efforts towards transitions go beyond supporting technology, and are oriented towards building capabilities, institutions and networks through the formation of new partnerships, agendas, policies, and instruments (Ibid). The Dutch transition approach builds on several different domains such as socio-technical transition approach, the Transition Management approach and evolutionary economics; and is focused on transformative change and system innovation, relies on bottom-up processes and includes business (is corporatist) and other non-state actors in the transformation process (Ibid).

The uncertainty regarding the transition prevails even though the efforts towards the transition have been shaping for two decades. However, technological alternatives have matured and are viable and widely available. Thus, the key bottlenecks in achieving the transition can be attributed to social acceptance /adoption and institutionalisation of these technological alternatives (both aspects are interconnected). This project focuses on using social contagion as a means to motivate the adoption of greener energy alternatives amongst citizens (stimulate social acceptance), in the context of the built environment.

1.1.2 Energy Transition in the Built Environment

The vision for the built environment sector includes



Transformation of 7 million homes & 1 million buildings, which are poor/moderately insulated and heated by natural gas, into well insulated homes and buildings that are heated using renewable sources by 2050.

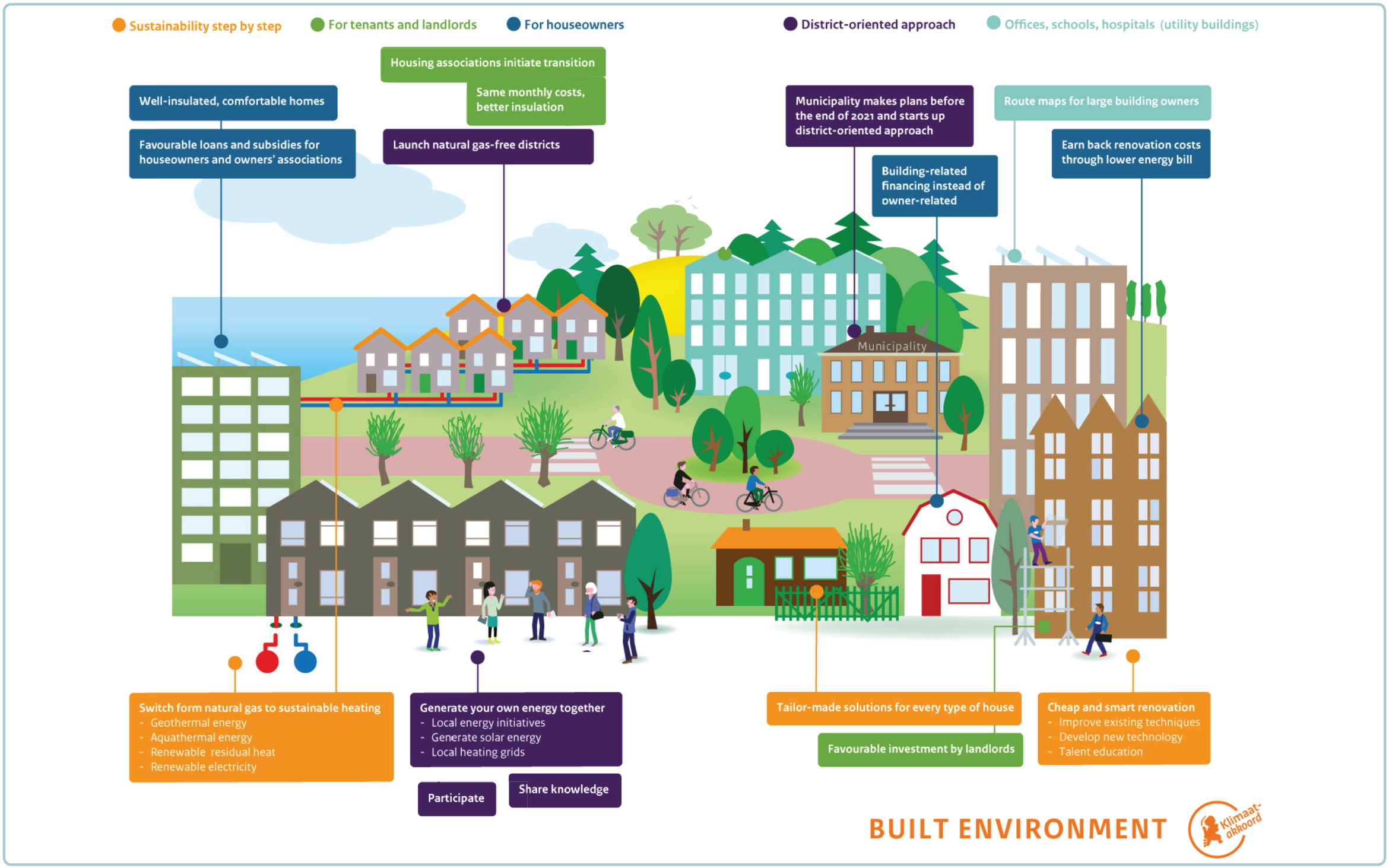


Figure 1: Built Environment specific goals. Source: Klimaatakkoord (2019)

Figure 1 outlines the built environment specific goals and targets defined by the climate agreement (Klimaatakakkoord, 2019a). The government recognises this mammoth task as a social challenge (a social transition, owing to the changes it entails at the micro levels -touching all aspects of everyday life) rather than a financial, technical or administrative one. The agreement states that acceptance by citizens is a key condition to achieve the transition. Thus, it aims to employ a district-oriented approach, wherein local residents, businesses, civic bodies and other relevant stakeholders will be involved in planning as well as executing the transition (Klimaatakkoord, 2019b). Under this district-oriented approach, each municipality has to develop a customised transition vision (and plan) by 2021.

Additionally, the agreement highlights the importance of the energy transition being affordable by all – net neutral housing costs being the key factor (Klimaatakkoord, 2019a). This means that the investment (by residents) in the energy transition must be less than or equal to the subsequent gains. Since alternate technologies (all-electric, heat pumps, residual heat, geothermal systems) are already available in the market, the government plans to adopt (to begin with) pricing and subsidising measures to enable the transformation – (financial) incentivisation being the key strategy. The challenge here is that large scale adoption is a necessary condition to regulate the prices, even if the technology is economically viable. Moreover, the provision of subsidies & funding, and the presence of technological alternatives does not imply that households will opt for gas discontinuation. Lock-ins in ways of thinking, doing and being (entrenched routines and beliefs) need to be overcome to enable the opt-it (Lachman, 2013). From the above context it is clear that solely top-down technological and financial solutions will not be enough to motivate a critical mass. The need for socially-driven, bottom-up interventions is apparent.

Further, from a societal perspective, the transition from coal to natural gas in the 1960's, was widely accepted (even when it was government -induced / managed) since it was seen as a rise in comfort. At present, there is no drastic change in comfort levels associated with the transition, and thus, lacks incentive for the masses who value immediate gratification. At the micro level, the transition involves (financial) investments in terms of infrastructural changes, time and energy by the residents in order to upgrade the wiring, insulation as well as heating sources. Further, the return on this investment is not visible in the immediate future and poses uncertainty in financial savings in the long-term. It also entails short-term inconveniences in routines. Last, there is anomaly as to who will make the decision -the tenants, house-owners, housing associations, housing corporation or the community as a whole, each waiting for the other to take action. Thus, even if residents have a positive attitude towards the energy transition, given this perception of inconvenience and uncertainty, it does not reflect in their choices (behaviour / decisions) towards transitioning away from natural gas – an attitude-behaviour gap. The project aims to explore how to mitigate this attitude-behaviour gap through social influence.

This thesis is carried out under the ENRGISED project and uses the Reyeroord neighbourhood in Rotterdam as a case study. As shown in Figure 2, the Rotterdam municipality's efforts are shaped by the built environment specific goals of the National climate agreement, whereas the ENRGISED project falls under the cross-sector alignment theme 'Integrated knowledge and innovation agenda' of the national climate agreement. The next sections (1.1.3 & 1.1.4) outline how both these efforts inform this project and shape its context. Thereafter, the project brief (why social contagion is used) and specific research questions are presented in section 1.2.

1.1.3 Energy transition in Rotterdam | Reyeroord

In line with the national climate agreement, Rotterdam has developed its own climate agenda. Amongst other goals, it aims to become a front-runner in achieving the energy transition. In order to devise its transition vision, the Rotterdam municipality has chosen five pilot neighbourhoods to experiment with and learn from. These neighbourhoods are strategically chosen, such that each neighbourhood is different from the others in the types of houses, the socio-economic backgrounds of the residents or the type of alternate energy chosen. Reyeroord is one such pilot neighbourhood; chosen for its characteristic of having a majority of privately owned, individual houses wherein the household incomes lie below average. Getting opt-in from each and every house owner is a tedious task (as compared to convincing a corporate housing company) and thus, needs a well-devised strategy (plan). The municipality would like to learn how to overcome this challenge of motivating individual house owners in such a context. Further, since the neighbourhood already has a part of the heat network present, district heating is chosen as the way forward here.

The municipality is in the initial stages of planning and is faced with the over-arching question –How to motivate residents (a heterogenous mix of households in terms of demographics, income groups, type & ownership of house) to actively participate in the upcoming transition to make Reyeroord natural-gas free. This makes it an apt case study for this project.

1.1.4 ENRGISED- Engaging Residents in green energy investments through social networks, complexity and design.

The ENRGISED consortium has received an NWO grant to develop a replicable strategy for municipalities (that stimulates households to transition away from natural gas towards greener energy alternatives). This project draws on the phenomenon of social contagion, and aims at exploring how the interdependency of decision-making among neighbours can be used to enthuse residents to opt for green alternatives. The consortium includes stakeholders from various backgrounds – Universities, Financial advisors, Energy expert organisations, Bio expertise centers and design agencies. This thesis lies under the ENRGISED project, and aims to contribute to its research and outcomes.

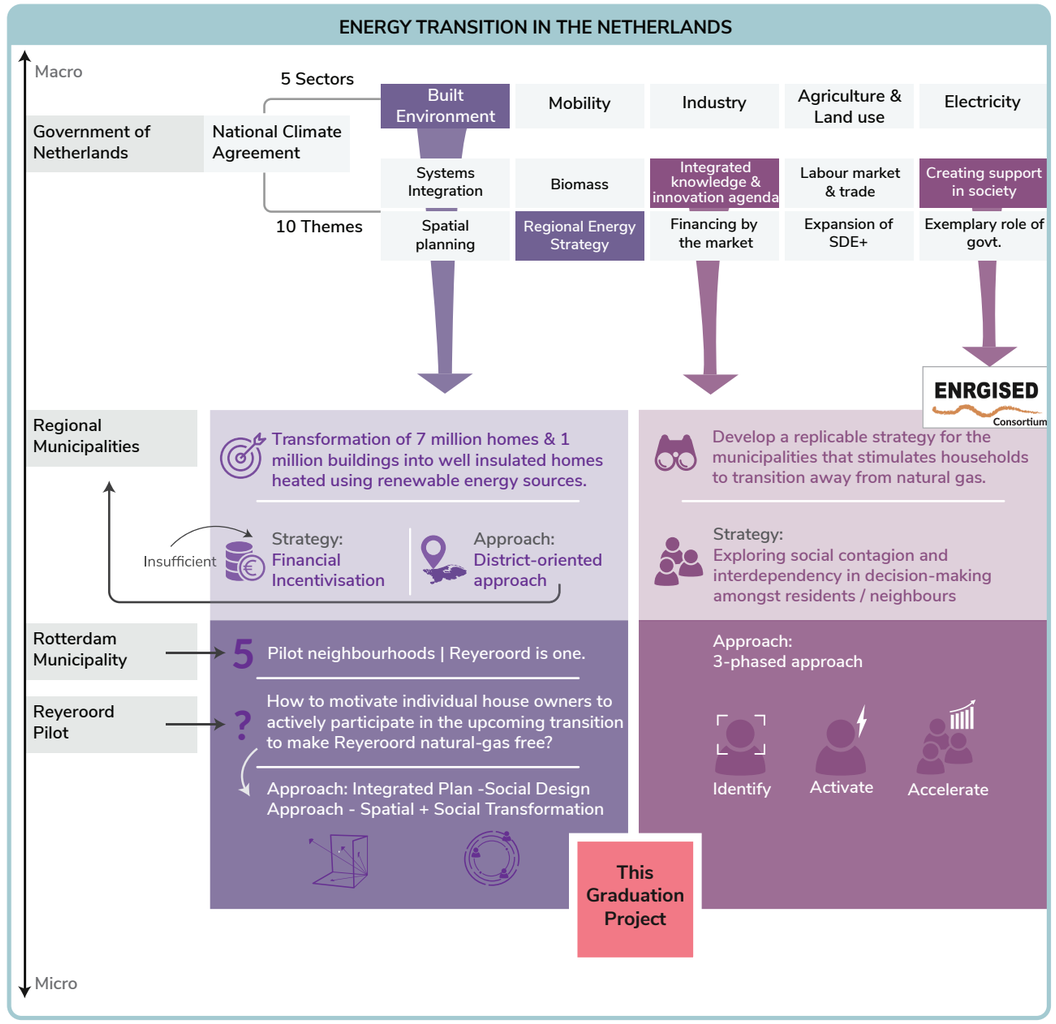


Figure 2: Positioning the project within the context of energy transition in the Netherlands. The project lies at the intersection of two efforts (projects) – 1) Pilot project in Reyeroord by the Rotterdam municipality 2) ENRGISED

Lying at the intersection of both the above-mentioned efforts (Figure 2), this graduation project aims to explore the role of social influence (social contagion; inspired by the ENRGISED project) in motivating residents to adopt greener energy alternatives (in the Reyeroord neighbourhood). The next section outlines the project brief and specific research questions.

1.2 Project Scope and Project Brief

1.2.1. Social contagion as a means to Transitions

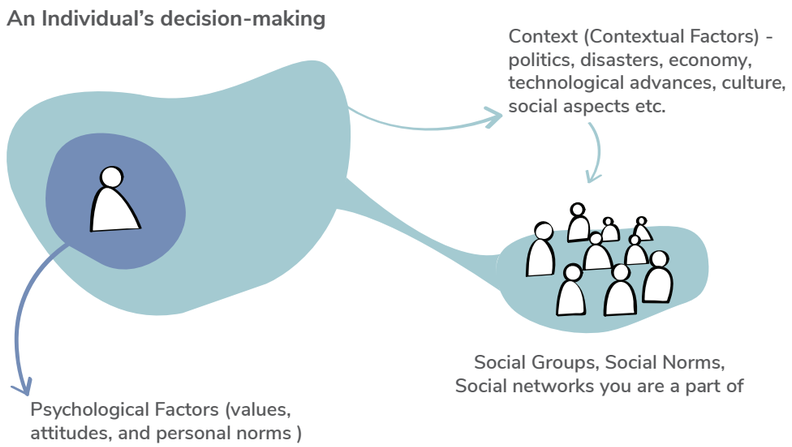
Literature on socio-technical systems advocates the co-evolution of technology and society; wherein institutions and rules enable the cultural appropriation of technology within society. Here, for a transition from one system to the other, these three elements, namely -technology, rules / institutions and human actors (and their practices) need to co-evolve and reinforce each other (Geels, 2004). While production and distribution of technology is important, consumption / user practices shape how these enable one to fulfill needs. Technological systems do not function autonomously – they are an outcome of societal actors and their activities (Ibid).

As a first step, for an innovation (or new technology) to become a dominant regime, public acceptance is key. Here, public acceptance can take three forms (based on three roles played by the public)- 1) Socio-political acceptance, 2) Market acceptance and 3) Community acceptance (Van Rijnsoever, Van Mossel, & Broecks, 2015). Socio-political acceptance involves the role of the public as citizens and it manifests through general support for a technology or for policies that support its development. Market acceptance ensues with the role of the public (or organisations) as adopters; and adoption mainly ensures the technology makes its way into the market (it does not entail that the technology is used by a critical mass). If the technology can gain enough demand, it stays on the market and diffuses, else it loses its market share and is discarded. Last and most important, for a technology to become a dominant paradigm and gain a critical mass, community acceptance (based on the role of the public as users/ consumers) is key. Community acceptance is driven by social norms and institutions which are in turn influenced by the script and the affordances of technology (Geels, 2004). This further accentuates the interconnectedness of the three aspects and their requisite co-evolution.

Acknowledging that alternative green energy technologies are already available (and have gained socio-political and market acceptance) in the Dutch context, the need of the hour is the community acceptance of these technologies by a critical mass, for the energy transition to occur. There are several local energy initiatives (co-operatives) and front-runners who are switching to greener alternatives; however, these are not sufficient for the requisite large-scale change. Although community acceptance can be steered through policy measures (top-down institutionalisation), it often faces resistance and rejection when enforced through top-down mechanisms. Further, there is uncertainty whether policy mechanisms or local councils have the right to force people towards gas discontinuation, as exemplified by the recent motion passed by the House of representatives (Hoving, 2020). Thus, the need for bottom-up initiatives aimed at normalising the use of greener energy technologies is apparent.

From the perspective of individual decision-making, several models within psychology, sociology and anthropology consider an individual's actions to be influenced by social norms and social groups they belong to. They argue that "individual decisions are 'constructed' or determined by social and technological systems. Needs, attitudes, and expectations are not individual in nature but are part of a complex relationship between social norms and relations, technologies, infrastructures, and institutions" (Wilson & Dowlatabadi, 2007; p.186). These discuss the "'embeddedness' of action in ongoing relations and networks of relations, showing that embeddedness crucially affects behaviour of rational actors in social dilemmas" (Buskens & Raub, 2013). Additionally, theories of conformity and compliance (Cialdini & Trost, 1998) elucidate that residents are strongly influenced by the (in)action of others, which implies that one would act only if several others have chosen to act (Buskens & Raub, 2013). On the downside, it gives rise to an impasse wherein everyone waits for the others to act first, with no ultimate action. While this interdependency in decision-making is a hurdle, it is also an opportunity to gain traction towards a critical mass. Social influence through social norms, and social networks constitutes an interesting and important leverage point in shaping cultural appropriation of greener energy alternatives.

Several studies on pro-environmental behaviours and habits, energy use and consumption as well as technology adoption accentuate the role of culture (Lutzenhiser, 1992), social influence (Goldsmith & Goldsmith, 2011) and social diffusion (Rogers, 1983; Costanzo, Archer, Aronson, & Pettigrew, 1986) in positively affecting behaviours. This project takes a similar stance and explores the role of social influence (social contagion) in motivating citizens to opt for greener alternatives.



1.2.2 Research Questions

Motivated by the above line of thought, the key research question for the project is:

How can the municipality use social contagion / social influence processes to activate residents (in Reyerood) to switch to green energy alternatives (district heating for Reyeroord)?

Three sub-questions are defined to further elaborate how the project is shaped:

1. What are the motivations & / or apprehensions of the residents towards gas discontinuation?
2. What do the social networks of the residents look like?
3. How can the social networks of residents be used to influence their decision-making, such that they actively adopt greener energy alternatives?

The aim of the project is to explore how the principle of social contagion can support the municipality's efforts in gaining opt-in from a critical mass towards the energy transition in the built environment. Further, it also aims at inspiring municipality officials to incorporate bottom-up, socially driven interventions and processes in their approach; familiarizing them with behavioural and social constructs of decision-making, that can help them in designing apt interventions. The project follows the Double-diamond design approach, as discussed in the next section.

1.3 Project Approach

The project approach is inspired by the Double-diamond design process by Design Council (2005). It involves divergent phases wherein the context or issue at hand are explored in depth, as well as convergent phases which include focused actions and narrowing down to the essentials (as shown in Figure 3). The 4 phases, their goals and the methods used within each phase are outlined below.

Discover

This phase involved exploring the context of energy transition as well as the Reyeroord neighbourhood. It also included understanding the theoretical underpinnings of social contagion processes which form the underlying principle for this thesis. The Discover phase was guided by the first two sub-questions -RQ1 and RQ2 as outlined in the project brief. Three key design methods were used to dive deep into the context – 1) Desk Research, 2) Literature review and 3) Interviews. 11 semi-structured interviews (refer to Appendix C for the interview guides) were carried out with municipality officials, as well as with few other stakeholders involved in the energy transition in Reyeroord. Additionally, 2 interviews were carried out with experts involved in designing interventions for the energy transition. A set of sensitising templates (Appendix C) were used during the interviews. These helped to guide the interview, to trigger the interviewees' thoughts as well as to aid them in formulating their answers. It helped to overcome the language barrier, since some interviewees found it difficult to articulate their thoughts in English - Dutch being their native language. All the interviews were transcribed for further analysis. System-mapping techniques were used throughout the project to understand interrelationships between different aspects and to visualise the complexity the transition entails.

Define

The Define phase was driven by the aim of converging to a design direction. At first, the literature review on social contagion and social influence processes was used to identify a step-wise process for complex contagions. This was used as the guiding principle for the subsequent analysis and design phases. Thematic analysis (complemented by SWOT analysis and relationship mapping techniques) was used to analyse the interview transcripts. This served two purposes – 1) it gave insights into the municipality's current efforts and key themes that need to be kept in mind for the energy transition in general; 2) it was used to answer the sub-questions 1 and 2. Further, specific models from the domains of psychology, innovation diffusion literature and marketing communication were used to analyse specific data. Personas were developed to understand the different types of residents and their decision-making process. The phase concluded with design questions and design criteria, which informed the Develop phase.

Develop

The develop phase broadly involved ideation and concept development activities. Several (digital) brainstorming sessions were organised with design students to generate ideas related to the specific design question. The ideas generated were analysed to identify key patterns, themes and strategies, which informed the concept (toolkit) development. The toolkit underwent 4 rounds of iterations upon (digital) validation with different teams constituting of design experts, design students and municipality officials.

Deliver

The Deliver phase was driven by the aim of consolidating all the work into key deliverables. It included the refinement and finalisation of the toolkit, along with this thesis report and other deliverables.

Double-Diamond design approach

	DISCOVER	DEFINE	DEVELOP	DELIVER
Research / Design Question	1 What are the motivations &/or apprehensions for gas discontinuation amongst the residents? 2 What do the social networks of the residents look like?		3 How can the social networks of residents be used to influence their decision-making, such that they actively adopt green energy alternatives?	
Key Activities	Understand context Literature Review With municipality officials, energy providers, technology providers Field Research Phase 1	Analysis of transcripts Define design criteria	Ideation Concept Development Validation Concept detailing, refinement	Validation with municipality Concept finalisation Finalise Deliverables
Tentative Methods	Literature Review Interviews Secondary Research System Mapping	(Re)framing -Thematic Analysis + based on framework from literature review -SWOT Analysis -Relationship mapping -Personas	Brainstorm sessions with experts, designers (Braindrawing, brainwriting)	
Deliverables / Milestones / Output	Define analysis framework Project Brief Interview transcripts	A list of key insights Specific design question, Design direction	First version of the concept (tool /framework) Iterations (5 rounds)	Final Output Report Presentation Finalised Toolkit & framework

Thesis Structure

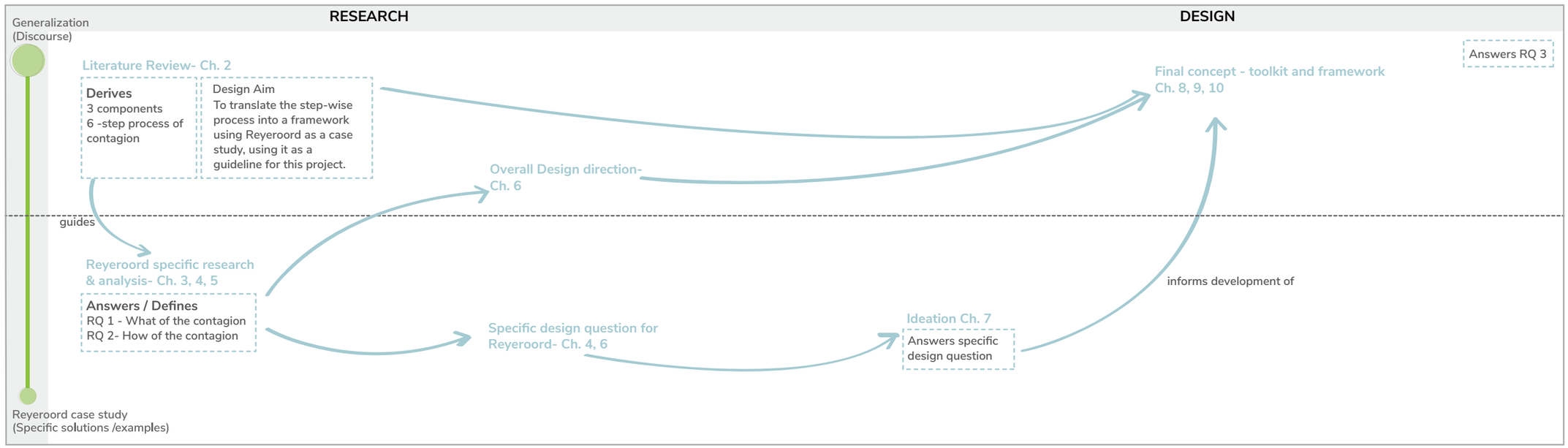


Figure 3: Project approach inspired by the double-diamond design methodology;
Thesis structure – highlighting the co-evolution of discourse (generalisation) and solutions (application).

1.4 Thesis structure

Within this thesis report, the 4-phased approach is presented in two parts, wherein each part constitutes of one diamond from the double-diamond approach (Figure 3). The first two phases – Discover and Define are presented in Part A -Research; the Develop and Deliver phases are presented in Part B– Design.

As shown in Figure 3, the project worked at two levels – Generalisation (Discourse) and Specific Reyeroord case study. Stappers and Sleeswijk Visser (2014) suggest that generalization (discourse) and application (solutions) go hand-in hand; the actor (designer/ researcher) selects and applies existing knowledge to develop solutions as well as reflects on solutions / the creative act and generalises it to develop new knowledge (Figure 4). Similarly, in this project, both discourse (generalisation) and solutions (application) co-evolve.

Part A: Research

- At the discourse scale, Chapter 2 draws on literature about social influence and social contagion and concludes with a list of 3 elements of a contagion and a 6-step process devised using the examples from literature. These are used to guide the project.
- Zooming in at the Reyeroord scale, Chapter 3, 4 and 5 answer the sub-research questions 1 & 2, which relate to the What and How elements of contagion identified in chapter 2. Chapter 6 outlines the specific design question (identified for the Reyeroord case study), as well as an overall design direction, which guide the Design phase.

Part B: Design

The Design phase answers the sub-question 3.

- Chapter 7 presents ideas and concepts generated to answer the specific design question for the Reyeroord Context.
- Building on the ideas and concepts from chapter 7, Chapter 8, 9 and 10 outline the toolkit (and its validation) and the framework developed through the project. The thesis concludes with a discussion in Chapter 10.

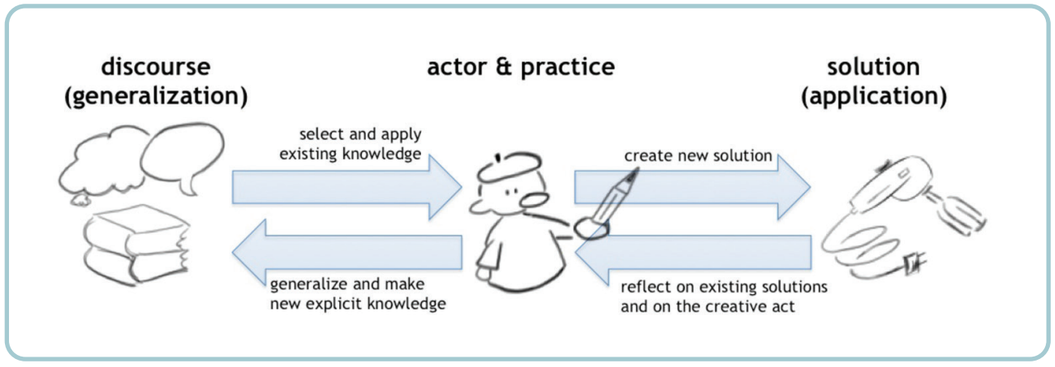


Figure 4: Research and design between generalization and application.
Source: Stappers and Sleeswijk Visser (2014)

A

Part A: Research

02

Understanding Social contagion

Chapter 02 - Understanding Social contagion

Witnessing one of the most quickly spread pandemics first-hand, it is clear now more than ever, the power of contagions. Today, a trend that starts in one part of the world (be it a disease, clothing fashion or viral content like online social media challenges) gains traction in the opposite side of the world, in less than a few days (sometimes even few hours). It is mega trends such as globalisation as well as the technological advances (e.g. ICT technologies, aviation tech) which make our world so interconnected, and enable such fast rates of diffusion. The strength of social networks and social influence in shaping our attitudes and behaviours, in turn driving the adoption / diffusion of different phenomenon is apparent. However, this strength of social networks and social influence can be seen both as a boon and bane. While it brings the world closer and facilitates exchange of information, cultures and resources, expedites mobilization for social movements as well as provides opportunities and access to any part of the world, it can be easily misused to spread misinformation, pressure people into wrong behaviours and practices (e.g. smoking, violence etc.). This project aims to utilise social influence and social contagion[1] to create positive impact towards sustainable lifestyles.

Given the strength of social influence, there are several examples wherein innovations, social movements, technologies, and public-health initiatives which could benefit society (or specific communities), fail to diffuse – e.g. PrEP medication to stop the spread of AIDs in the sub-Saharan region of Africa (Centola, 2018). In his book, *How behaviour spreads*, Centola (2018) argues that this failure of diffusion of particular behaviours can be attributed to the relative costs[2], risks or controversies that they entail. These factors dampen the diffusion or adoption of behaviours. These behaviours need, what Centola (2018) terms as '*Complex contagions*' in order to spread successfully. 'Complex contagions' can be distinguished from 'simple contagions' based on the number of sources of exposures required for activation. In the case of simple contagions, contact (exposure to) with a single source is sufficient for the target to become activated (infected / informed). However, in the case of complex contagions, successful transmission depends upon interaction with multiple carriers i.e. independent affirmation or reinforcement of the behaviour from multiple sources is a pre-requisite (Ibid).

Whether the contagion required is simple or complex depends upon the content or what is being transmitted. Information such as scores of a particular tennis match, or news about a specific incident as well as infectious diseases, usually fall under simple contagions - since they spread easily from person to person. One doesn't need to be coerced or persuaded to adopt or

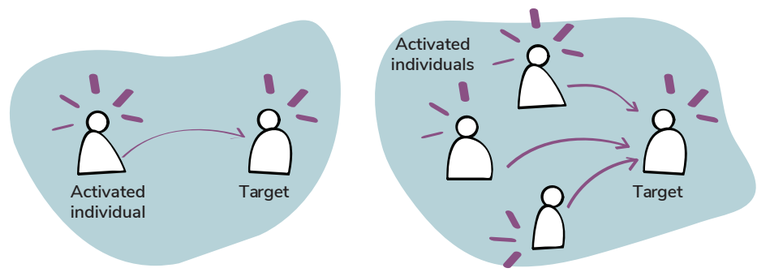
1 Behavioral contagion or social contagion is a type of social influence. It refers to the propensity for a person to copy certain behaviour(s) of others who are either in their vicinity (belong to same social groups) or whom they have been exposed to.

2 Here, costs refer to financial, psychological, reputational costs – for e.g. that arise from (non)adherence of specific social norms

spread the information. On the other hand, adoption of a new, expensive software or inculcating sustainable habits (e.g.. shifting to veganism), constitute complex contagions - since one needs to first believe the source of information, and subsequently form a favourable attitude in order to adopt the behaviour. Moreover, reinforcement from multiple peers (since peer pressure is a strong social force) is necessary to truly believe the advantages of adopting the behaviours, which makes them more complex. In the case of this project, the adoption of greener energy alternatives is a complex behaviour, since it entails high financial costs, as well as changes in routines. Thus, the focus of this thesis and its underlying premise is based on complex contagions.

It is good to note, that when people are forced to do something (especially, through top-down, government driven interventions), they tend to generally resist (at first). This comes from our need to have behavioural freedom. When someone or something (offers, persons, rules or regulations) threatens or eliminates specific behavioural freedom / autonomy (limits range of alternatives), the phenomenon of 'Reactance' comes to play; which can cause people to adopt or strengthen a view or attitude that is contrary to what is intended, increasing resistance to persuasion (Steindl, Jonas, Sittenthaler, Traut-Mattausch, & Greenberg, 2015). It motivates people to restore their freedom. Thus, overcoming this phenomenon of Reactance by proving that the behaviour is socially accepted (by multiple peers) is a must to enable complex contagion. As we will see subsequently, the Reactance needs to be balanced out by triggering social comparison, which can make the behaviour more desirable. Imitation of (peer's) behaviours rather than coercion tactics need to be stimulated in order to bring about social contagion.

Before delving into how complex contagions spread, the next section (2.1) outlines basic aspects related to social influence to understand the underlying factors of social contagion. Literature on social ties and network characteristics is referred to, in order to build the foundation of complex contagions (2.2). Subsequently, the characteristics and process of how complex contagions spread are highlighted (2.3, 2.4). Last, how this theory of complex contagions is used in this thesis is described (2.5).



Simple contagion
Exposure to a single activated individual is enough to activate / influence the target

Complex contagion
Needs independent reinforcement from multiple activated individuals to influence the target

2.1 Social Influence at the individual scale

Several psychological models (such as the Theory of planned behaviour) suggest that the 'subjective norm' or 'social norms' play a crucial role in shaping one's attitude, behaviour or decision-making. Cialdini and Trost (1998) describe these social norms as constructs that are used to describe and explain (social) behaviours; and these arise out of cultures (societal-value perspective) or instincts of survival (of individuals or groups; functional perspective).

> ***"Social norms are rules and standards that are understood by members of a group that guide and/or constrain social behaviour without the force of laws"…. "…[they] include general societal expectations for our behaviour, the expectations of valued others for our behaviour, our own expectations of our behaviours and standards that develop from our observations of others' behaviours"*** (Ibid, pg. 152).

Cialdini and Trost (1998) argue that all behaviours are purposive (not necessarily conscious) and goal-oriented. Conformity to and compliance with these social norms help us achieve specific self-goals, namely:

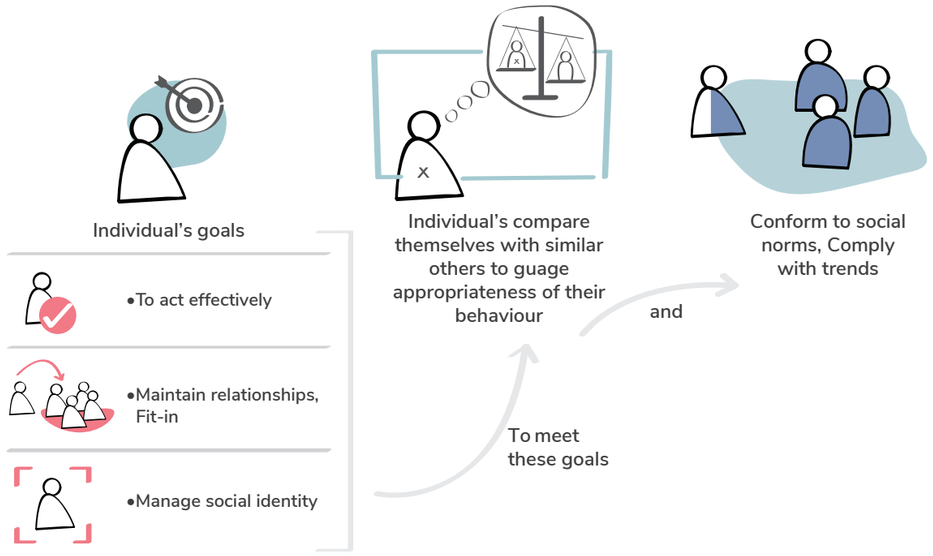
- to act effectively
- to build and maintain social relationships and
- to manage the self-concept.

It is important to note that, although listed as three different goals, these have causal relationships amongst themselves. Further, the role of social norms, conformity and compliance in decision-making /attitude formation processes can be explained by Festinger's (1954) Social Comparison Theory. It states that people tend to constantly evaluate themselves in terms of the appropriateness of their abilities, behaviours and beliefs. They prefer to rely on objective cues in order to make these evaluations. However, in the absence of objective cues, people rely on social comparison evidence, specifically, with similar others (reference groups). People seek normative guidance (i.e through social norms) to compare and form attitudes. When the attitudes are shared with the comparison group, they are further reinforced. If there is a discrepancy, the attitudes are altered (Marsden & Friedkin, 1993). While this is a universal phenomenon, there are several studies that show that specific demographic factors such as age, socio-economic backgrounds, cultures etc., affect one's susceptibility to social influence. Cascio, O'Donnell, Simons-Morton, Bingham, & Falk (2017) show that people from lower socio-economic backgrounds tend towards greater interdependence (on social cues, norms, conformity) as compared to their higher economic-background counterparts (who tend towards independence). In sum, "*the resolution of intra- and interpersonal conflict is the driving force of social influence processes*" (Marsden & Friedkin, 1993; p129.), and social norms help to guide this process.

The phenomenon of social comparison engenders the concept of social identity or the self-concept. This self-concept is formed by the person's affiliations / membership in different social groups, interactions in social networks as well by personal attributes (Harshaw & Tindall, 2005). As seen above, managing or maintaining one's self-concept is influenced by social norms (of the relevant social groups). Moreover, group membership brings together similar people, and the association with like-minded individuals in a social group further reinforces a person's social identity (Ibid). Group membership leads to the adoption of particular values, which further strengthen the social norms pertaining to that group.

This is also true for sustainable values or behaviours, as exemplified by Trudel (2019), where he highlights that the 'self – personal and social identities' and 'social influence – through social norms' are two of the key factors that "powerfully, predictably, and pervasively influence sustainable behaviours". Thus, the concepts of social norms and social identity[1] go hand-in-hand, both being the cause and consequence of the other; and both form the basis for social influence. The need to elucidate one's social identities, and identify the values and social norms relevant to the content of contagion is apparent. It forms the first step of social contagion.

While at the individual level (micro; from a psychological perspective), one's social identity (and social norms based on the reference groups) drives the social influence process, it is the individual's ties and the social networks they ensue, that affects social influence at the community / network scale. Hence, in the next section, concepts related to social ties and social networks are explored to further understand social influence processes.



1 The concepts of social identity, social norms, social ties and social networks are all interlinked to each other in several different (complex) ways, having many constructs. In this section, this complex relationship between all the aspects is simplified to build an argument relevant for the purpose of this thesis.

2.2 Social Influence at the network scale

This section zooms out to the network / community scale to understand how social influence processes unfold at this level. At first, it outlines theory on social tie (link) formation based on one's social identities. Next, literature on how different types of ties enable diffusion processes is referred to.

To explain their case study approach, Harshaw & Tindall (2005) argue that network-based processes lead to the development of social identity. Conversely, social identities also give rise to specific social networks (dynamics). The sociological approach to networks assumes that link (social tie) formation is related to the characteristics of individuals and their context (Hidalgo, 2016). Here, three key concepts (logics) or hypothesis of social tie formation can be identified:

- **Social Foci:** argues that links are more likely formed between individuals that share a social foci, e.g.. when people are classmates, go to same gym, are colleagues.
- **Triadic Closure:** predicts that links are more likely to form amongst individuals that have common friends.
- **Homophily:** states that links are more likely to form amongst individuals who share social characteristics, such as cultural background, physical appearance, tastes etc.

From an economic perspective, links /ties are formed by strategic decision-making processes, wherein one evaluates the cost and benefits of interaction with another.

All the above concepts rely on different social identities as a starting point for the formation of social ties. Moreover, social norms pertaining to each of these social identities further influence the individual's tie formation and the subsequent networks that arise. This is in line with Harshaw & Tindall (2005), where they highlight that communication about (conveying) social norms and beliefs is a key mediating process between identity (formation) and network structure.

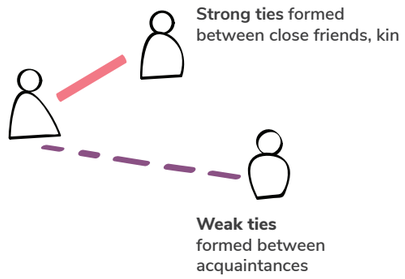
Having identified the basis of tie /link formation, next we move to describing the types of ties that these concepts give rise to. Granovetter (in Centola, 2007) describes two types of ties – Strong ties and Weak ties. In his work, both these types of ties have a dual meaning –
A) Relational meaning (at the dyadic level) and
B) Structural meaning (at the network /population level).

The relational perspective points to the strength of the tie wherein weak ties form between acquaintances who interact less frequently, are less invested in the relationship and hence, have less influence on one another. Strong ties form between kin or close friends with whom interactions are more frequent, intimate and affective in nature, further entailing higher levels of influence as compared to weak ties. On the other hand, the structural meaning of these ties relates to the ability of a tie to facilitate diffusion, cohesion and integration of a social network by linking otherwise distant nodes (Ibid).

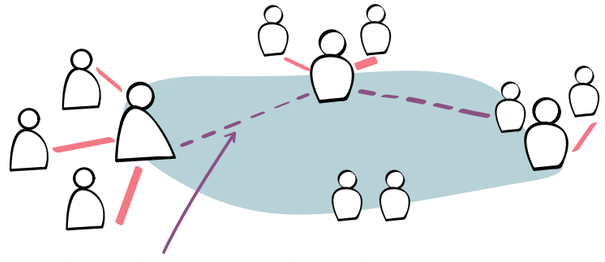
Through his work, Granovetter (in Centola, 2007) concludes that ties that are weak in the relational sense prove to be strong in the structural sense. Although relationships with acquaintances are weak, they are formed between socially distant nodes, which have very few common neighbours. These long-range ties between distant actors, provide access to new information increasing the rate of diffusion (transfer) through the network. Further he describes, that when two people are strongly connected to a third person, they are most likely to have a connection with each other – i.e. strong ties are located within closed triads; strong ties are clustered. Thus, although strong ties are relationally proximate and are key to influencing processes at the individual scale, they prove to be weak structurally (for diffusion), since several redundant clusters need to be passed in order to spread the contagion. The structural strength of long (weak) ties, further gives rise to the concept of small world, or degrees of separation. This shows how random, long ties can connect diverse members of a network with just a few links in between (the concept of 6 degrees of separation).

Although proven to be quite accurate to model the diffusion of diseases, or the spread of information, say about job opportunities, the strength of weak ties hypothesis does not provide explanation for several other cases of contagion (Centola, 2018). Centola explains this is lack of generalizability through the heterogeneity in the kinds of contagions that propagate across social networks. Here, he distinguishes between simple and complex contagions, as discussed in the beginning of the chapter. The next section focuses on understanding the theory of complex contagions – the relevant ties and network structure.

A - Relational meaning



B - Structural meaning (useful for simple contagion only)



Relationally Weaker ties are Structurally strong, since they enable the spread of contagion across distant groups (of relationally strong ties) quickly

Useful for spread of simple contagion (when behaviour is not costly, risky) not complex contagion.

2.3 The theory of complex contagions

As described above, behaviours that are costly, risky or controversial are difficult to spread and hence, constitute complex contagions. These require reinforcement from multiple sources to activate the behaviour – the minimum threshold varies for different types of behaviours. Centola (2007) explains this requirement of exposure to multiple sources through 4 key social mechanisms – 1) Strategic Complementarity, 2) Credibility, 3) Legitimacy and 4) Emotional Contagion. All these four mechanisms point to the need for a critical mass to adopt the behaviour, such that the additional efforts of investing in the behaviour become worthwhile. Moreover, the importance of close friends or similar others in making the behaviours more credible and legitimate is highlighted- accentuating the role of relationally strong ties.

Centola (2018) suggests, that clustered networks (as compared to random networks) prove to be more useful for the spread of complex contagions (Figure 5). Here, clustered networks include a high concentration of relationally strong ties. When a clustered network is activated, the otherwise redundant ties (from the point of view of simple contagions) within triads (or closed clusters) prove useful in providing the reinforcement needed for complex contagions. These redundant ties create spatial concentration- which generates fewer initial exposures, however translates to greater adoption rates in the long run. The introduction of random weak ties in this network reduces the reinforcing ties, thus making it more difficult (time-consuming) to spread the complex contagion (Ibid, pg. 41-42, 77). Moreover, homophilous network clusters further ensure higher adoption rates, since the reinforcement of behaviour comes from relevant peers / similar others (Ibid, pg.153).

From the seeding of behaviour perspective, clustered seeding (as compared to random seeding) in neighbourhoods (Figure 6), leads to higher levels of adoption (Ibid, pg. 102, 103), especially when there is resistance towards the behaviour. In sum, (homophilous) clustered networks of strong relational ties and clustered seeding strategies prove to be more useful for the spread of complex contagions.

Zooming out further provides an overview of the dynamics / spread of behaviour across different clusters. Through his experiments, Centola (2018) shows that wider bridges between clusters are more effective in filling structural holes and spreading the behaviours in complex contagions, as compared to longer weak ties or singular information brokers. The width of bridges between two clusters refers to the number of overlapping ties between them (Figure 6). Thus, theoretically, in the case of minimally complex contagions (threshold: 2; requires exposure to 2 sources of reinforcement), 3 overlapping ties can form a wide bridge enough for a complex contagion to spread.

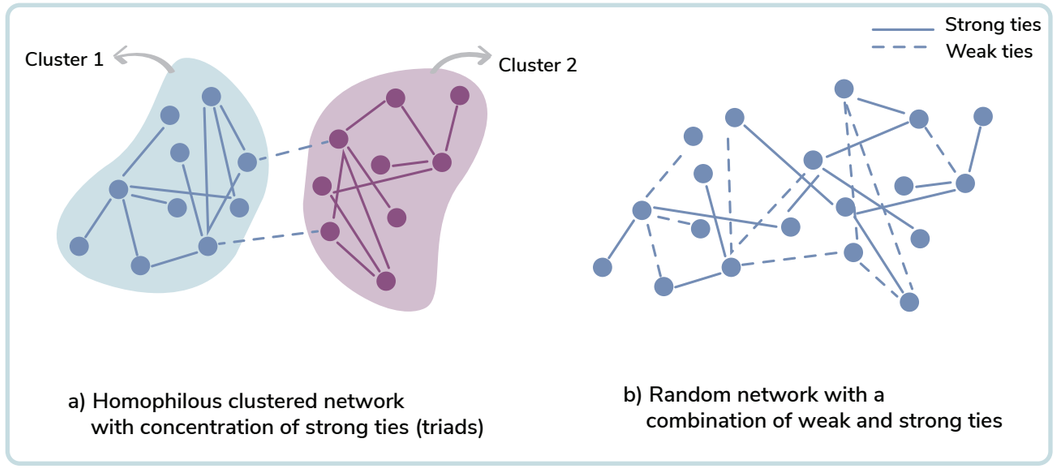


Figure 5: Visualisation of clustered and random networks. Homophilous clustered networks prove to be more useful to seed complex contagions.

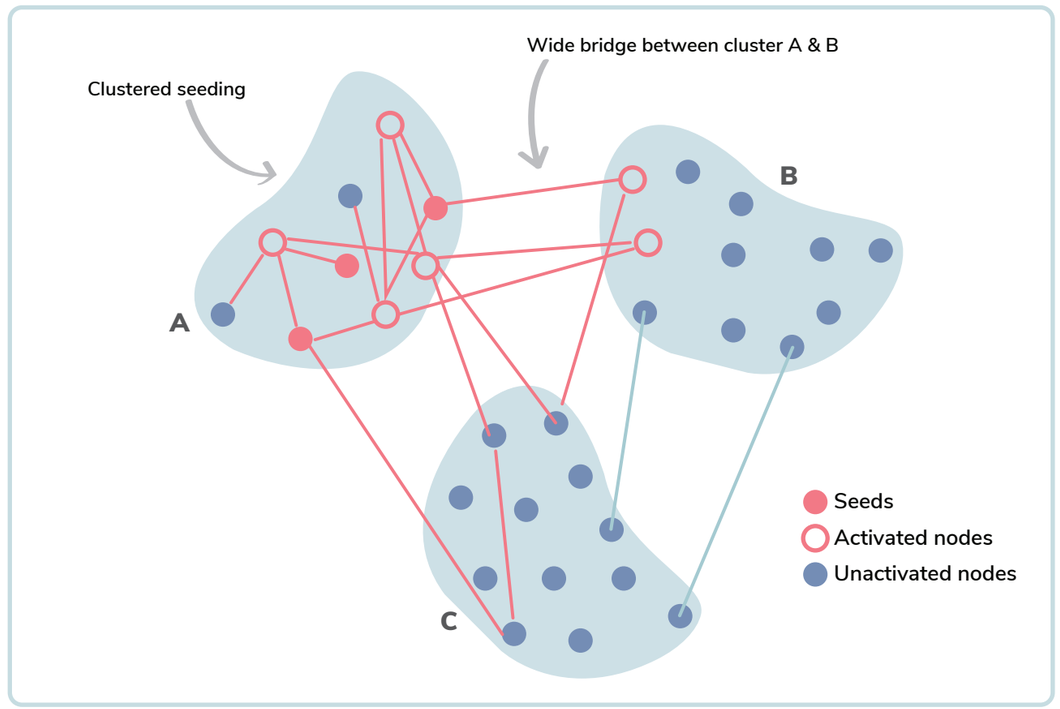


Figure 6: Visualisaton of complex contagion processes across different clusters. Once a cluster of seeds are activated within a neighbourhood, they spread the contagion within the cluster. The reinforcement from multiple sources within the cluster can lead to greater adoption. Once activated, a few nodes which have ties with other clusters can activate those clusters. Here, the presence of wide bridges (higher number of overlapping ties; as between cluster A & B) is a must to induce the contagion (provide the requisite reinforcement from multiple sources).

Having outlined the key phenomenon crucial to the spread of complex contagions, the next step is to capture these in the form of an actionable process. Using this theoretical base of social influence processes at the individual as well as network scale from a complex contagion perspective, the next section outlines a step-wise process that will be further used / explored in this thesis.

2.4 The author's recipe for complex contagion

The theoretical insights about social influence and complex contagions from the literature review above are translated into actionable elements and steps (derived by the author; as shown in Figure 7) that can be used to seed contagions in practice. These guide the research and design phases of this project.

Three key elements of a contagion are identified that need to be thought about and designed in detail to give shape to the contagion. These elements are:

E1) The WHAT of the contagion – this includes defining the content or the behaviour that needs to be spread amongst a population. In the case of the gas discontinuation in the built environment, this relates to the contagion of a positive attitude or decision towards shifting to greener energy alternatives. As discussed in Chapter 4, the WHAT can also be determined by understanding the resident's motivations and apprehensions towards gas discontinuation.

E2) The HOW of the contagion – this refers to the means or mode of contagion (how it will unfold in a network). This element includes visualising and designing the network dynamics of the contagion – the seed nodes, seeding strategy, clusters, bridges etc.

E3) The STRATEGY of the contagion – while the HOW element refers to identifying the who's and visualizing the process of how the contagion will unfold, the strategy component involves devising persuasive and tactical ways of inducing the behaviour. This component goes hand-in-hand with the step 3, 4 and 5 of the process of inducing contagion described below.

In order to spread behaviours successfully, it is necessary to visualise and design how the contagion process will unfold. To visualise and design these network dynamics (how the contagion will unfold; HOW element), a 6-step process is derived from the examples given by Centola (2018) in his book *How behaviour spreads*. Note that this 6-step process (as shown in Figure 7), is not explicitly prescribed / listed by Centola (2018). It is specifically derived by the author for the context of energy transition inspired by both, online and offline examples (such as diffusing change in organisations, social influence within online health communities, promoting fitness through online social interactions) provided by Centola (2018).

promoting fitness through online social interactions) provided by Centola (2018).

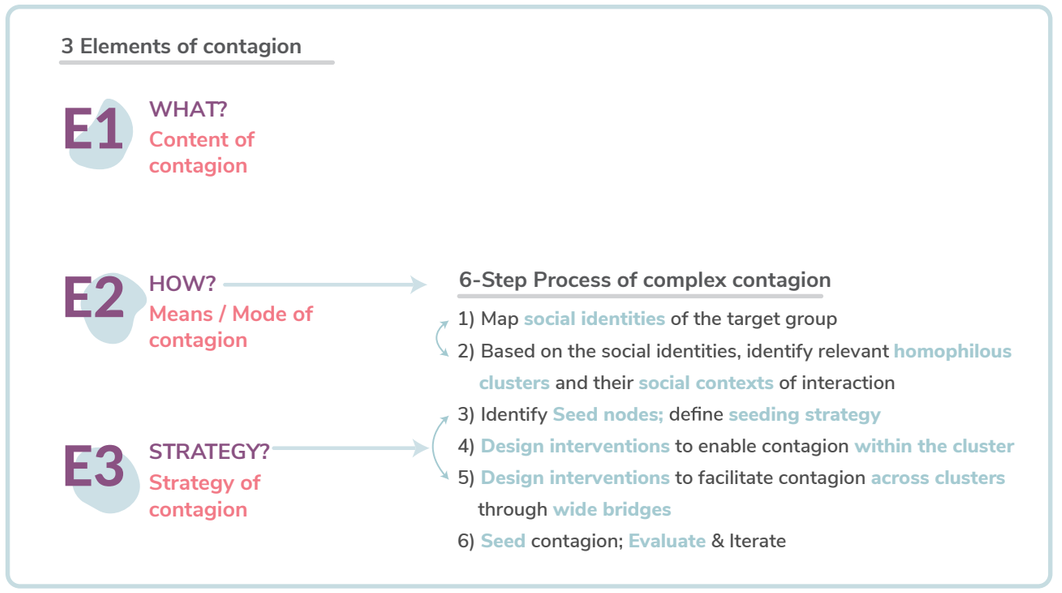


Figure 7: The elements of a contagion and the process to seed a complex contagion derived by the author.

The aim of deriving this process is to develop actionable steps that help in shaping contagions. The 6 steps are:

1) Map social identities of the target group: As discussed earlier, social identities form the nucleus of social influence processes at the micro level. Thus, mapping social identities (or social networks; based on social contexts that people inhabit) can prove to be a fruitful first step in understanding both, people's values (susceptibility to influence) as well as overall network clusters. This is in line with Centola (2018), wherein he suggests that "aligning relationships based on social identity may increase the participant's susceptibility to behaviour change" -p.153.

2) Based on the social identities, identify relevant homophilous clusters and their social contexts of interaction: Social contagion inherently requires social interactions (direct or indirect) between people. In order to seed successful contagion, social interactions need to be well-curated. As a first step, the social

context of these interactions needs to be defined (based on the social identities and social networks of people). In order to determine network clusters, Centola (2018; p129) suggests balancing between focused identities -70% (that give rise to tightly clustered cliques- which are easy to predict) and expansive identities -30% (wherein knowing one part of a person's profile does not give insight into their other memberships). This balance between focused and expansive identities can help to devise a network with close-knit clusters, while enabling co-ordination across clusters through the moderate fraction of reinforcing ties that individuals have to other groups (wide bridges) – both the requisite characteristics of complex contagions. Based on the context, at times the participants can themselves be told to choose the relevant social contexts.

3) Identify seed nodes, define seeding strategy: Once the clusters and contexts to facilitate the contagion are identified, one needs to define the seed nodes (people who can initiate the contagion) and seeding strategy. Here, clustered seeding (multiple seeds in homophilous clusters of relationally strong ties) is essential for complex contagion (Centola, 2018).

4) Design interventions to enable contagion within the cluster: Once the seeds within a cluster are identified, favourable social interactions (between the seeds and others) need to be designed, such that they enable the spread of behaviour within the cluster. Reinforcement from multiple sources (based on the required threshold) is a pre-requisite to increase the adoption rate.

5) Design interventions to facilitate contagion across different clusters through wide bridges: The next step after enabling social contagion within the clusters is to design contexts for nodes from two different clusters to interact / influence each other. This requires wide bridges (bridges are the overlapping ties between two clusters). Facilitating these wide bridges can help to diffuse the behaviour beyond one cluster to the entire population.

6) Seed contagion; Evaluate and Iterate: The last step includes seeding the contagion through the interventions. Next, the spread of the contagion should be evaluated (after waiting for a while and observing). Based on the evaluation, the interventions (or different elements of the process) can be iterated upon, until the defined goals are achieved.

As mentioned earlier, step 3, 4 and 5 relate to the Strategy component. The next section (2.5) describes how these elements and steps are used within this project.

2.5 Application of the recipe in the project

The relevance of the 'recipe of complex contagions' – the 3 elements and 6-step process identified above is two-fold. First, the overall (meta-level; discourse) aim is to translate these elements and the 6-step process into a framework which can serve as a stepping stone in using social contagion theory to realise energy transitions qualitatively (This forms the first design aim of this project). It can be used, validated and built upon by different designers or municipalities keen on applying social contagion processes to motivate residents towards the energy transition (or sustainable lifestyles, in general) in their respective contexts.

Second, it is used as a guiding principle for this project (for both, the research and design phase) - to understand how social contagion can unfold in Reyeroord to activate residents towards greener energy alternatives. This application of the process to the Reyeroord case study can be seen as an example of how the process can be used, as well as a means to develop it into a framework. As described in section 1.4, it is the co-evolution of the discourse and solution.

In the research phase, the What (E1)- content of contagion (based on the resident's motivations and apprehensions towards the transition; Chapter 4) and How (E2) it will spread (based on social identities and contexts of interactions – step 1, 2 & 3; Chapter 5) are defined specific to the Reyeroord context.

The design phase focuses on developing strategies (E3) that can help the municipality in designing interventions (step 4 & 5) that facilitate the contagion of positive attitudes (based on findings from the research phase) – Chapter 7 & 8.

Before identifying the WHAT and HOW of the contagion, the next chapter paints a picture of the context of Reyeroord in general – the community, social structure and spatial attributes. It also outlines the Gemeente's current efforts and goals in the neighbourhood related to the Energy Transition. This builds the context for subsequent chapters, which are focused on the different aspects of contagion.

Chapter 02 in sum...

- Social Influence is an important factor that drives people's values, beliefs, behaviours and decisions

- At the individual's scale, this social influence is triggered by comparison of self with similar others. People tend to conform to social norms in order to maintain their social identity(s) (manage their self-concept). Compliance is also stimulated by the goals of acting effectively and to build and maintain social relationships.

- Alternately, group membership (and the social identities it ensues) leads to the adoption of particular values, which strengthen the social norms pertaining to the group. Thus, social identity and social norms go hand-in-hand, and are the building blocks for triggering social contagion of a behaviour.

- At the network scale, social ties are formed through three key logics (from a sociological perspective)- 1) Shared social foci, 2) Triadic closure & 3) Homophily.

- There are two types of ties - weak ties and strong ties (Granovetter (in Centola, 2007)). These have a dual meaning - a) Relational meaning & b) Structural meaning. He suggests relationally weak ties are structurally strong since they enable the diffusion between distant nodes, unlike relationally strong ties. Thus, he argues that relationally weak ties are more effective in shaping contagions.

- Although proven to be quite accurate to model the diffusion of diseases, or the spread of information (e.g.. about job opportunities), the strength of weak ties hypothesis does not provide explanation for several other cases of contagion (Centola, 2018). Centola explains this is lack of generalizability through the heterogeneity in the kinds of contagions that propagate across social networks. Here, he distinguishes between simple and complex contagions.

- Complex contagions require reinforcement from multiple sources to activate the behaviour and are apt for behaviours that are costly, risky or controversial and hence, difficult to spread. Gas discontinuation entails high costs and thus, favourable attitudes need to be activated amongst residents. This constitutes a complex contagion; hence complex contagion theory is used as a guiding principle for this project.

- Complex contagions spread more successfully when seeded in homophilous clusters of relationally strong ties (with clustered seeding strategies). Further, wide bridges (The width of bridges between two clusters refers to the number of overlapping ties between them) are more effective in spreading complex contagions across different clusters.

- The author has identified 3 elements (What, How and Strategy of contagion) that need to be defined when one wants to seed a contagion. Further, a 6-step process is identified for the How element of the contagion. This process is derived by the author from examples given by Centola (2018); it is not explicitly outlined in the book. The steps include:
  1) Map social identities of the target group
  2) Identify relevant homophilous clusters as well as social contexts of interaction
  3) Identify seed nodes, define seeding strategy
  4) Design interventions to enable contagion within the cluster
  5) Design interventions to enable contagion across the clusters
  6) Seed the contagion; Evaluate and Iterate

- The relevance of these elements and the process is two-fold:
- First, the overall (meta-level) aim of the project is to translate the 3 elements and the 6-step process into a framework.

- Second, it is used as a guide for this project (for both, the research and design phase) - to understand how social contagion can unfold in Reyeroord to activate residents towards greener energy alternatives. This application of the process to the Reyeroord case study can be seen as an example of how the process can be used, as well as a means to develop it into a framework. It is the co-evolution of the discourse and solution.

03

The Reyeroord Context

Chapter 03 - The Reyeroord context

This chapter aims to give an impression of Reyeroord – the neighbourhood and specific efforts towards the energy transition here. The first section describes the neighbourhood in terms of its spatial attributes and the social composition of the community (as shown in the infographic in Figure 8). Later, the chapter moves to describing the municipality's goals and efforts towards the energy transition in Reyeroord. Both these aspects help to build context for the subsequent chapters, which focus on the different components of contagion.

3.1 Reyeroord neighbourhood snapshot

Reyeroord is a neighbourhood in the Groot-Ijsselmonde region of south Rotterdam, which was developed rapidly after the second world war, owing to the housing shortage. It is predominantly a residential area with a few utility facilities and fairly big green spaces (park areas). However, attributes such a 'dull', 'old', 'neglected' are used to describe its outer spaces. Moreover, there are very few social spaces, which include a church, few schools, Pameijer (an activity centre for the differently abled / elderly), a gym, and Speeltuinvereniging (a recreation centre). People frequently visit Rotterdam centre or Winkelcentrum in Keizerswaard, Ijsselmonde to meet their shopping and entertainment requirements. Most people observe that there is not much to do in the neighbourhood, and hence call it a 'boring', 'sleepy' neighbourhood. Residents do not identify with the neighbourhood, and there is a general lack of sense of belonging (and responsibility) towards the neighbourhood. The spatial boundaries between surrounding neighbourhoods are not very distinct, and most people associate with the greater Ijsselmonde region.

The neighbourhood has several different types of houses – from individual bungalows, to three-storey flats and large apartment buildings - three-storey flats being more predominant. There is almost an equal percentage of rented properties, as owner-occupied homes. Most properties are privately owned by big or small landlords. Thus, to achieve the energy transition or attain a critical mass, convincing these individual owners is a pre-requisite. This is also one of the reasons why Reyeroord is chosen as a pilot neighbourhood- to learn about how neighbourhoods with a majority of private owners can be motivated for the energy transition.

From a social structure perspective, the Reyeroord community is diverse in terms of demographic attributes such as age groups and ethnic backgrounds. 17% of the population comprises of children between the age groups of 0-14 (it is considered a 'Children's Kingdom'), and 20% consists of the elderly (Borgman, 2019). This age-wise composition also reflects in the social interaction spaces in the neighbourhood, which are mostly directed towards the children or the elderly. The ethnic background of the community is quite diverse. There is a mix of native Dutch

residents, immigrants from eastern European countries – Poland, Romanian, Bulgaria; and Non-western immigrants from Suriname, Turkish, Morocco etc. The new generation (young families) in the neighbourhood also has mixed backgrounds, as a result of the diverse community in the Netherlands in general. From a socio-economic perspective, most households in the neighbourhood have a disposable income of 30,000 euros per annum (Borgman, 2019); considered to be below average as compared to other regions. This forms the second constraint for the energy transition, due to which this neighbourhood is chosen as a pilot[1].

The diverse population gives rise to several clashes between different groups – generation gaps, clashes between cultures (values and beliefs), clashes between temporary and permanent residents. However, people co-exist and lead parallel lives without confronting each other. There is hardly any social interaction between the residents – people tend to know only a few neighbours who live around them. This is exemplified by the inactive nature of the community, where people do not take any initiative or mingle. Although, there is unanimous concern about the safety in the neighbourhood (Gemeente Rotterdam, 2018; Borgman, 2019; Interview insights). Due to incidents of crimes by the youth (who are members of gangs; influenced by social media), people are afraid to go out in the nights. Along with safety concerns, there is also nuisance created by the youth, for example by throwing illegal parties. These unwarranted activities of the youth are further explained by the lack of activities / social spaces in the neighbourhood, specifically to engage the youth.

Given this background (of having lower incomes or concerns about safety), most people want these problems / issues to be resolved before they consider participating in the energy transition or any other activities. Majority of the population finds the concept of sustainability vague. Since their actions are focused on the short-term, they find it inconsequential to their lives (Borgman, 2019). People consider it the government's responsibility to fund and realise the energy transition. This further accentuates the lack of a sense of responsibility (ownership) amongst residents, where they are seen throwing around blame (a common tendency in lower socio-economic settings (Daganzo & Bernardo, 2018)). Moreover, affordability plays a major role in all their decisions. Frugal living is a part of their ethos, which is also exemplified by their attraction to discounts, coupons, or offers. Majority of the population is traditional in their ways of thinking and living - focused on the status quo and holding onto traditions and material possessions (Borgman, 2019). For example, this reflects in their preference for physical mediums of communication/ information like hard copies of mail, advertisements and pamphlets in their mailbox since these are perceived as being more trustworthy rather than their digital counterparts. The above description paints a picture of the neighbourhood and the community. The next section focuses specifically on the energy transition- the municipalities goals and current efforts.

1 As discussed in section 2.1, lower socio-economic groups are most susceptible to social influence; making the context of Reyeroord apt for this project.

Figure 8

Reyeroord neighbourhood snapshot

Has big, anonymous spaces and a lot of wild, not maintained greenery

Perceptions of the neighbourhood:

Dull, boring, unkempt, dead, sleepy, not vibrant or active neighbourhood

- No sense of ownership/ responsibility amongst residents
- No sense of belonging
- People dont identify with the neighbourhood
- Lack of sense of togetherness
- Very few active people in the neighbourhood

(lot of) Temporary residents

Total residents : 5805
Diverse population

	25%	12%	63%	17%	26%	37%	20%
Ethnicities:	Non-western immigrants from Suriname Antilles Turkey	Other immigrants from Poland Romania Bulgaria	Natives	Age: 0-4	5-14	15-34	35-64	>65

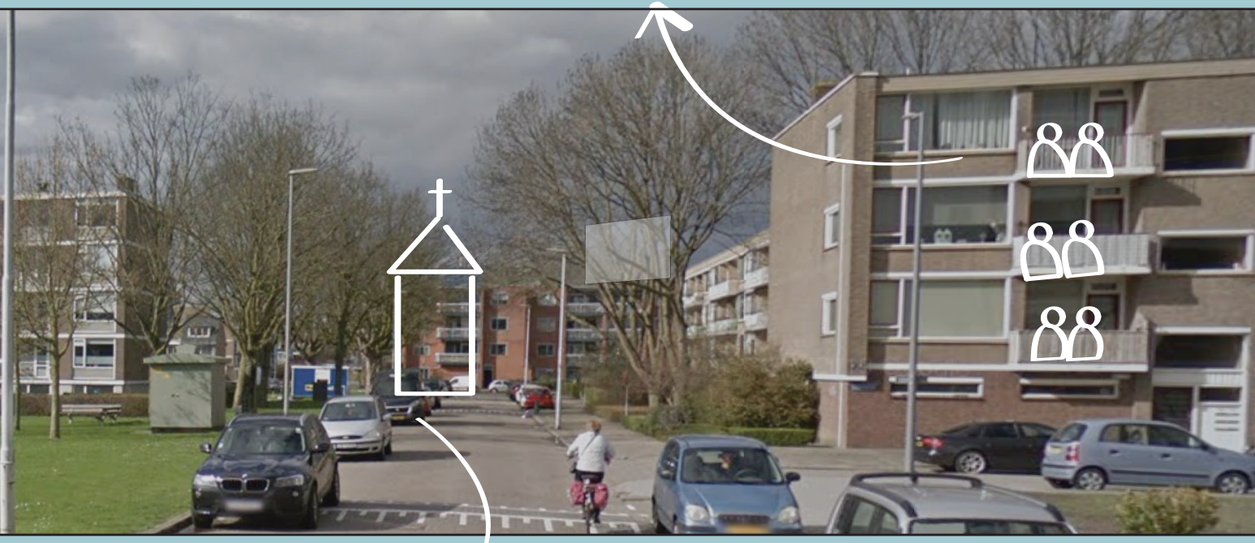
Permanent residents

Minimal social interactions; only between few neighbours

Clashes in values beliefs - generation gap, between cultures

average income: EUR 30,000 per annum

majority Right-wing political ideology



3 types of houses:

Total homes : 3442
Owned by private owners: 1482
Owned by housing corps.: 445
Equal rental houses and owner-occupied houses

All data derived from Borgman, 2019

Not much to do in the neighbourhood especially for the youth

Key social spaces:
Church
Gym
Oeverloos
Schools
Pameijer
Speeltuinvereniging Reijeroord
Jump XL Rottterdam

Very oriented to kids and the elderly.

Youth engage in crime; create nuisance

Adds to safety concerns
People feel unsafe

3.2 Energy transition in Reyeroord

This section is specific to the energy transition in Reyeroord. First, the Municipality's goals towards the energy transition are presented, followed by the key stakeholders involved, the chosen alternative energy source and the process they aim to follow. Subsequently, the discussion outlines several themes that surface upon carrying out a thematic analysis of the context. These include paradoxes in perspectives, dilemmas faced by the municipality, areas of opportunity – based on what is missing in current interventions as well as general aspects that need to be kept in mind while devising interventions (both, in this project or in general for the municipality). These further help in building the context of energy transition in Reyeroord.

3.2.1 Municipality's goals and approach towards the energy transition

Solely from an energy transition perspective, gas discontinuation in all households and utility buildings by 2030 is the key goal of the municipality. However, the project is in the nascent stage, and is exploratory in nature. The aim of the Rotterdam municipality is to learn from the different pilot projects, and hence no hard, quantitative goals are set. This leads to uncertainty amongst municipal officials and in the municipality's process, in general.

Owing to the potential of the neighbourhood (since it seems unkempt and needs to be upgraded), it has been the attraction of several urban development projects of the municipality (e.g.. initiatives under Reyeroord+). Moreover, since both, the sewage system and water system need to be replaced (maintained) shortly, the municipality aims to employ an integrated plan such that it causes less inconvenience to residents as well as is financially beneficial for the municipality. This is also motivated by the constraints of the law wherein streets can be dug open only once in 6 years, and the energy transition in households can happen only during summer time.

As shown in Figure 9, the municipality aims to achieve several spatial and social goals as a by-product of the energy transition. Apart from the physical transformation of the neighbourhood, the municipality sees the energy transition as a moment to promote a sustainable lifestyle in general, and also build social cohesion in the neighbourhood. Through their research, Borgman (2019) and MV Design (2019) show that the residents of Reyeroord have several other concerns (personal and neighbourhood specific), which they want resolved before investing in the energy transition. The goals of the municipality and the subsequent process envisioned are informed by these concerns. A social design approach is chosen by the municipality, wherein resolving / designing for social aspects takes predominance, and the energy transition is then promoted subsequently[1] .

1 Note: The key focus for this project is the energy transition. The aim is to use social networks (social influence) to motivate people for gas discontinuation. Building social cohesion (or resolving social issues) is not the key goal. Although, the design interventions may result in enabling social cohesion as a side effect.

Main goal

GAS DISCONTINUATION IN THE NEIGHBOURHOOD BY 2030

Other goals

PHYSICAL TRANSFORMATION /SPATIAL GOALS

- Develop an integrated plan (for sewage replacement, water harvesting, telephone lines and heat network)
- Urban development in area
  - Make neighbourhood attractive (add ponds, canals, redesign public spaces, parks)
  - Utilise unused (outdoor) spaces
- Make buildings and outer spaces sustainable (use principles of circular economy)
- Make the neighbourhood future-proof, resilient

SOCIAL GOALS

- Affordable by all - prevent (energy) poverty arising from the transition
- Social inclusivity (in the process and as an outcome)
- People feel more safe
- People feel more connected to the neighbourhood, feel a sense of belonging, ownership & responsibility
- Provide employment opportunities
- Build social cohesion in the neighbourhood
- Enable reflection. Opportunity for people to inculcate sustainable habits, lead a green lifestyle, become more conscious
- Make houses more comfortable
- Bridge generation and culture gap

Figure 9: The municipality's goals and vision for the energy transition in Reyeroord

3.2.2 Stakeholders involved

Figure 10 outlines some of the key stakeholders involved in the energy transition in Reyeroord. The big three – Municipality, Vattenfall and the residents are the primary stakeholders, currently part of the process. The City council (the Mayor and alderman) is also a primary stakeholder since all the ultimate decisions lie in its court.

The department 'Stadsontwikkeling -Duurzaamheid' (Urban development – sustainability) of the municipality, is the key stakeholder managing the energy transition in Reyeroord. The role of this department is to plan and execute the energy transition and facilitate the relationship between the energy provider (Vattenfall) and the residents. Several other departments of the municipality such as City management (maintenance; Stadsbeheer), Social dept. (Maatschappelijke Ontwikkeling) etc. are involved in the process to develop an integrated plan, or to help with the social design approach, and fall under the category of secondary stakeholders.

In Reyeroord, district heating (heat network; refer section 3.2.3 for more details) is chosen as the alternative to gas since a part of the heat grid infrastructure is already present in the neighbourhood and it works out to be the cheapest amongst other alternatives. The Swedish company, Vattenfall, is the concessionaire for the heat network in the region. Being the energy provider, it is another key stakeholder.

The residents, housing corporations and housing associations are the third pillar of the primary stakeholders, since without their consent the project cannot move forward. Other secondary and tertiary stakeholders are outlined in Figure 10. Further, Figure 13 shows the different relationships, dependencies and issues (points of contact) between the three key stakeholders (Residents, Municipality - Stadsontwikkeling -Duurzaamheid and Vattenfall). These are further described as themes in the subsequent sections.

3.2.3 District heating – the selected energy alternative

District heating (also known as heat network or teleheating) is a system wherein multiple buildings are heated from a central remote source, rather than each building / house having their own in-house boiler. As shown in Figure 11, a centralised location uses either residual heat from industries (industrial processes) or geothermal heat, heat through cogeneration plants, heat from nuclear power generation etc. to heat the water. This warm water is distributed (pumped) through insulated pipe networks to residences and commercial buildings for their space and water heating requirements. Based on the generation of district heating used, the underground insulated pipes either carry warm water or steam (the specifications and heat losses vary within each). The layout of the network of pipelines (primary, secondary delivery points) can vary based on the context. The hot supply water enters the house through a delivery set in the meter cabinet.

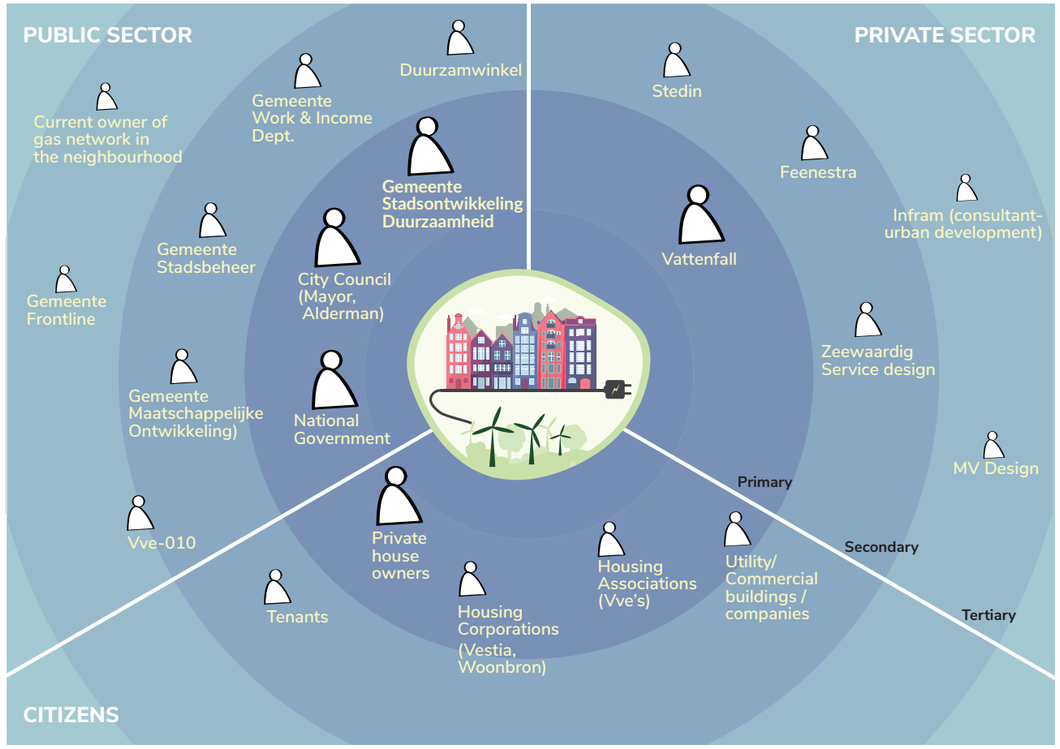


Figure 10: Stakeholder map for the energy transition in Reyeroord. Only the most important stakeholders currently involved in process are outlined.

The delivery set usually consists of a heat exchanger in which the heated supply water transfers its heat to the water coming out of the taps. For space heating, the supply water may be used directly. Alternatively, the heat exchanger could also transfer the heat to an internal circulation. The supply water – which is now cold because the heat has been transferred to domestic hot water and space heating – then returns to the district heating plant. The district heating supply water circulates endlessly in a closed pipeline. The delivery set also consists of a heating meter (used to check how much heat one is using), and a Warmetelink (with a secured connection to the internet which periodically sends out the meter reading to the heat provider). The users can control the temperature in each room in the same way as with a flow-through heater or a central heating boiler – through either thermostatic radiator valves, combination of thermostatic radiator valves and a central switch or a room thermostat. This is the basic principle of how district heating works. The details may vary based on the context. Since it utilises residual heat and is centralised, it significantly reduces the emission of greenhouse gases – Is greener. Additionally, the industries will soon start using greener energy sources for their processes, reducing the carbon footprint considerably.

In Reyeroord, since a part of the heat network is already present, district heating is the chosen way forward (for space and water heating requirements of houses; heat for cooking will be provided through all-electric alternatives). Proximity to the Rotterdam port (the residual heat from the industries in the port will be used for heating the water), is another reason for the choice of district heating. Vattenfall (formerly Nuon) is the concessionaire of the heat network in the neighbourhood and is responsible for its development and the subsequent heat supply.

As per the current discussions, Vattenfall will build the requisite underground heat network in the neighbourhood, and connect each household with a delivery set. However, the residents themselves have to figure out the internal piping connections from the delivery set to the taps and space heating points. Who will help with these internal connections, how much does this internal piping cost, will that be included in the overall subsidy provided, what are the technical differences in internal piping per house and how do these affect the costs – are some of the key questions the municipality is faced with. It is a point of uncertainty within the overall transition process, which needs to be resolved in the coming months along with the business case as described in the next section.

3.2.4 The envisioned process

Based on the insights and recommendations from Borgman (2019), and the experiences from the neighbouring area of Heindijk (which is further ahead in planning the energy transition), the municipality along with Vattenfall envisions a basic process with key activities of how the transition will unfold. This envisioned process is shown in the form of a timeline in Figure 12. Here, the three lines relate to the three key stakeholders – the Municipality, Vattenfall and Residents. Along with key activities, the timeline aims to capture the involvement of the stakeholders in these different activities.

For the coming one and half year (i.e. between 2020-21), the municipality aims to carry out two simultaneous activities. On one hand, the municipality is working closely with Vattenfall to develop a business case for the whole project. This involves understanding the financial viability while keeping in mind the technical feasibility of the heat network. Officials from the municipality and Vattenfall are visiting households to check technical aspects of installing the heat network, which are major determinants of the financial costs. Another key aspect that drives the business plan is related to the subsidy and financial aid that the local council plans to offer to the residents. The energy transition being affordable for all (and costs being neutral – i.e, costs of renovation/ investment should be less than or equal to the gains in the energy bills) is one of the key goals mentioned in the National climate agreement. Hence, this is a central aspect considered while developing the business plan.

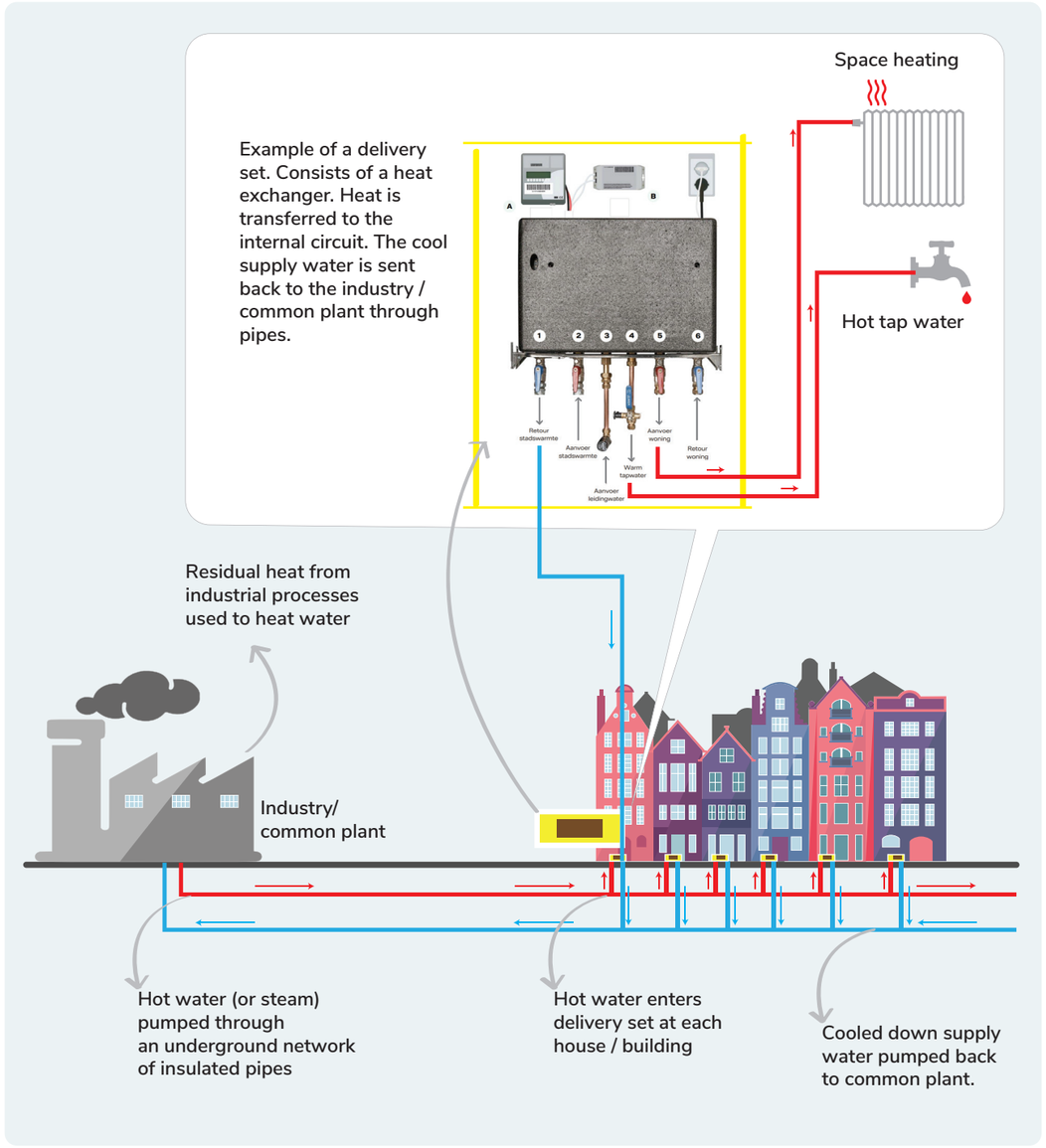


Figure 11: Schematic representation of how district heating works.

On the other hand, the municipality aims to employ a social design approach to connect with the residents in the first 1.5 years. Here, the key goal is to spread awareness about the energy transition and to inspire residents, in order to get a higher consensus towards gas discontinuation.

By the end of the one and half year, upon finalisation of the business case, the municipality shall send out offer letters to each household. In Heindijk, this offer letter was given along with an information package, delivered door-to-door by the municipality officials (the cost per house was around 15,000 Euros, however after deducting the subsidy provided by the municipality, the households have to pay 1500 Euros – one-time costs). During these visits, the officials explained the options available, overall process and financial details to the residents, while solving any doubts and answering any questions they may have. The residents were given about one month to decide whether they will join the transition or not. They had to decide how they would fund themselves. Upon arriving at a decision, the residents were told to fill a form (provided along with the information package) and send it to the municipality before the cut-off date.

Post the cut-off date, the Municipality and Vattenfall tally the number of positive responses and verify if they still have a viable business case. If yes, Vattenfall would go ahead with the engineering of the grid. Simultaneously, Vattenfall would initiate contracts with the individual owners. A phase-wise approach is to be followed, wherein the 5 areas (phases) would undergo the transition one after the other, by the end of 2028-30. The construction / renovation in each household could take between a few days to around two weeks, depending on the type of house and its architecture. In case the business case is not viable (sufficient number of residents do not consent), Vattenfall, municipality and the local council will re-draft the business case.

Although this is the overall process the municipality envisions (based on experiences from Heindijk), only time will tell whether it would work well in Reyeroord, or if it needs to be further iterated upon. It is key to note here that citizens are (were) not involved in the process of defining the business case, or deciding the process of how the transition will unfold. Further, the decision that district heating is the cheapest (and best) way forward for Reyeroord, is taken from a technical feasibility perspective by the municipality. Although the residents have a choice in deciding which energy alternative to opt for, the perception that the state is meddling in one's affairs – deciding what is best for them (since the neighbourhood subsidy shall be provided only for district heating in Reyeroord) could prevail. This points to the lack of a truly participatory process, and needs to be taken into account in other neighbourhoods. Playing the WE Energy game (https://www.we-energy.eu/) with all the stakeholders in the beginning of the process (before deciding upon which technology to select) is one example of how residents can be involved. It would help in bringing forth all stakeholders' points of view, making it a more participatory approach of decision-making.

Another concern, specifically related to district-heating, is that there is no subsequent reduce in costs per months as compared to the current natural gas system. This creates apprehensions amongst residents', prompting them to procrastinate the decision.

Having described the municipality's goals, plans and efforts towards the energy transition in Reyeroord, the next section focuses on analyzing these efforts of the municipality.

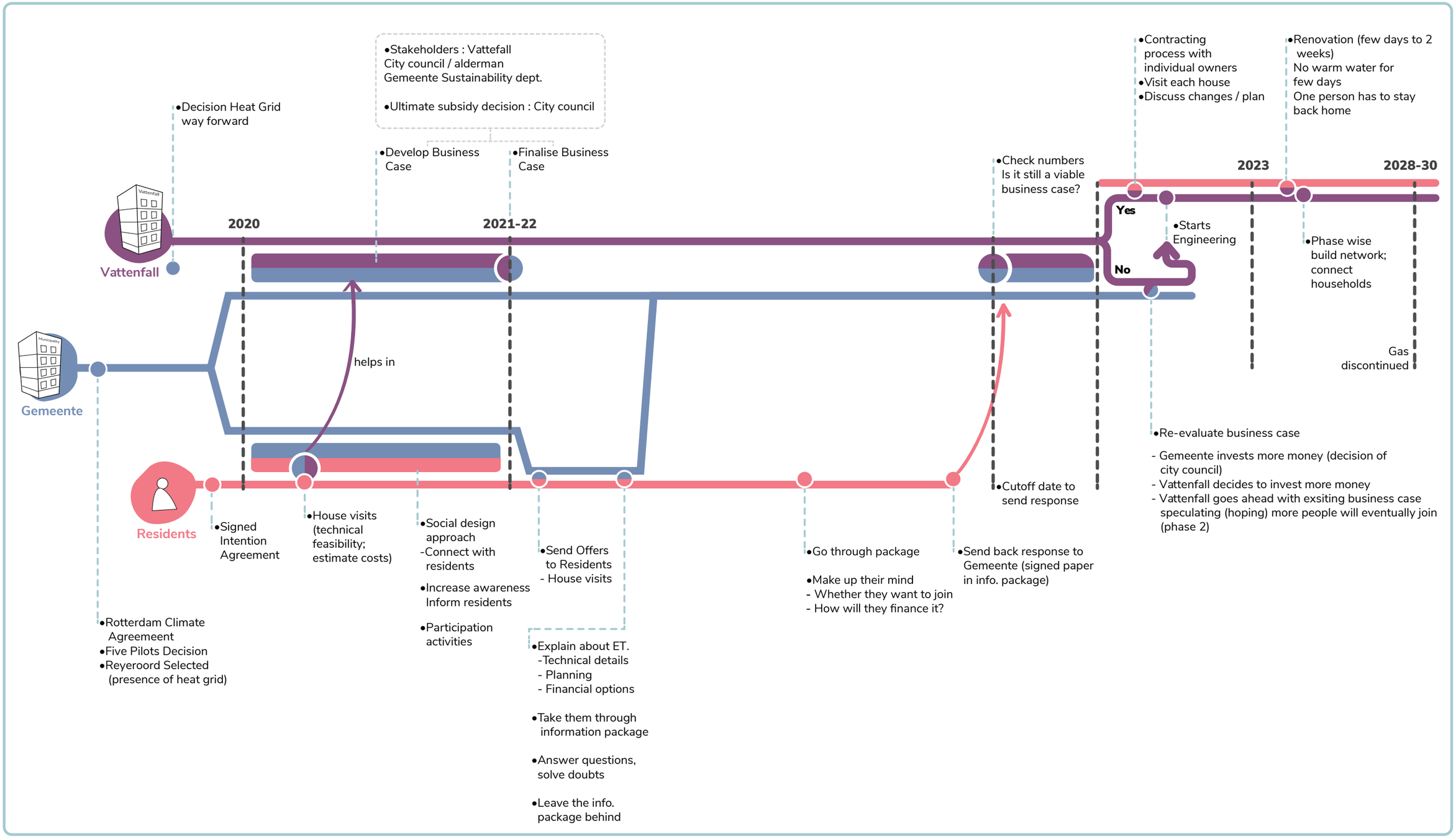


Figure 12: The envisioned transition timeline (developed by the author based on insights from the municipality officials; Shows the involvement of and key activities pursued by the three primary stakeholders.

3.3 Analysis of the Municipality's efforts

This section focuses on analyzing the municipality's efforts thus far. A thematic analysis of the interviews was carried out. The themes that emerged constitute of paradoxes, dilemma's faced by different stakeholders, lessons learnt by the municipality and areas of opportunity – based on what is missing in current interventions (refer Appendix D for detailed overview of the thematic analysis).

To complement the thematic analysis, two other means were used to analyse the data. First, a map (as shown in Figure 13), was created to understand the different phenomenon in play between the three key stakeholders -municipality, residents and Vattenfall. Here, stakeholder specific goals, processes, relationships, dependencies, expectations, channels of communication and perceptions were mapped. This helped to bring together all the different perspectives, interactions and ways of working, which proved helpful to identify key themes. Next, a SWOT analysis (Figure 14) was carried out for the overall process until now, to identify aspects that need to be kept in mind or designed for[1]. The meta-level themes that emerged (from the thematic analysis, SWOT analysis and relationship / perception map) are elaborated next.

'With the people, for the people' approach

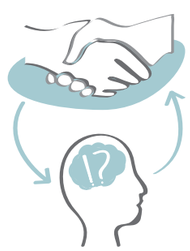
Although the municipality (municipal officials) has (have) several spatial or social goals[2] that it (they) aims to achieve through the energy transition, there remains a gap between the vision and reality (of the residents in the neighbourhood). This gap can be attributed to the lack of a participatory process, wherein citizens are involved through the whole process. The municipality aims to use a social design approach to mitigate this gap. This approach focuses on understanding people's (latent) needs and resolving those, since the assumption is that mitigating social issues and building social cohesion in the neighbourhood, will pave a path to the energy transition and a sustainable way of living. The municipality aims to alleviate people from other problems, hoping that it would stimulate participation amongst residents (the key assumption being – people are hesitant to participate, due to other priorities). Further, the insights generated from the social design approach shall be used to devise interventions towards the energy transition such that they are customised to the Reyeroord context and are more people-oriented.

Additionally, the municipality aims to use (principles of) a participatory process to build awareness about the energy transition in the first one and half year.

1 Note: the project is still in the nascent stage, hence the SWOT analysis doesn't provide conclusive insights about the results of each effort towards the transition. However, it gives insights into how the efforts can be made more effective and efficient in achieving the set goals. Further, the SWOT Analysis is mainly applied to the functioning (way of working) of the Gemeente, keeping in mind all the different efforts /projects; it is not specific to one single effort.

2 Whether these are explicitly outlined remains a question.

However, the process is not truly participatory in nature, since the citizens are not involved in the planning and decision-making process of the municipality. Thus, more clarity needs to be built on the topics of social design, participatory processes and their relationship with the energy transition. Specific goals need to be explicitly outlined.



Trust and Understanding: two preconditions of getting resident's opt-in

For the social design approach to be successful, people need to be able to show their vulnerability to the municipality. In order for people to show their vulnerability and share their latent aspirations (needs) (within the social design approach), they need to trust the municipality and its efforts. On the other hand, the social design approach is a means to build this trust (and a personal relationship) with the residents. The relationship between people's trust and the social design approach has a double loop, where both act as ends and means to the other. Here, trust needs to be built by involving people in the process of decision-making (participatory process), however, trust is a pre-requisite condition for people to participate.

Next, solely from an energy transition perspective, residents need to trust the municipality's process / planning, technology selected as well as the stakeholders involved to participate. This trust is affected by past experiences and pre-conceived notions. Further, in order to trust the process and technology, people need to have a basic understanding of it. Information – source of information, timing of when and how it is provided plays a key role. Providing information is not enough; correct comprehension and evaluation of this information is key. However, in order for one to be open to being informed, they need to have some amount of trust in the source. Thus, both, building trust and spreading awareness are interdependent and necessary to gain residents' opt-in.

The municipality's efforts in Heindijk highlight the need for giving information in an incremental way (step-by-step), in order to ensure its retention. This approach builds a continuous stream of communication, which further helps to establish trust. However, it has been observed that it is not natural for citizens to trust the municipality immediately. Hence, the potential for social influence (through peer-networks or opinion leaders) to build trust is apparent. It is good to note here, that the municipality has organised a couple of group activities – cooking together on induction, discussions over coffee etc. to stimulate people to actively participate and push their neighbours to join as well. The take away for future reference is that these events / collective activities need to be well thought through and encourage participation in small groups, since these can

(Contd. on pg. 68)

- Areas of opportunity / issues with current efforts
- Paradoxes
- Resident's perceptions, expectations, issues faced, needs, dilemmas
- Gemeente's efforts, perceptions, expectations, constraints, issues faced, needs, dilemmas
- Vattenfall's efforts, perceptions, expectations, constraints, issues faced, needs, dilemmas
- City councils role, efforts, influence
- General themes acting as central aspects in different efforts, relationships etc.

determines the success of this

Integrated plan

Can reduce

•Combine the plans / interventions of different clusters
•eg. Sewage replacement, water works, E.T. etc.

Inconvenience (outdoors/indoors)

needs combined efforts

Multiple roles, depts. & faces of Gemeente

See Gemeente as one unit; not as different clusters

Negative impressions (past experiences) because of one dept. affects the image of Gemeente as a whole

Gemeente can't do anything directly; dependent on national govt. and local council

determine

Gemeente's way of working

Determines

Reason for not participating (determined by past experiences)

•Lack of citizen pull
•Change the municipality's way of working
•Introduce truly participatory processes

•Change in mindset required internally and in external dealings
•Balance Push & Pull Factors during the process
•Cohesion between clusters imp. - Breaking silos
•Each cluster has a myopic vision

•Need to develop a planned participation protocol based on intent

•Need to truly listen to people - not namesake

Involving citizens is a must by law

Participatory process

Gas discontinuation in all households by 2050

•Spatial / Physical transformation of neighbourhood
•Social goals - build social cohesion, resolve social issues
•Inspire people to be more sustainable

Residents

Policies / Law enforcement as the ultimate means to achieve transition

Influences

Municipality

Gemeente

Dont participate

Residents preoccupied with other issues / priorities

But people dont participate

Leads to

Exploratory nature of project

Explains/ contributes to

•Learning is key
•Initial phase - uncertainty
•No hard goals

Paradox

"Will participate when it becomes a law"

However, Top-down, enforced (forced upon) decisions face resistance / rejection

People trust process / outcomes if they are involved in the process.

City Council

LOCAL COUNCIL

Inconsistency between vision and people's reality

Trying to mitigate using social design approach

Connect people to correct help channels eg. Frontline Platform to resolve personal issues

People hesitant to show their vulnerability, talk about problems

While this might help to connect to residents, and motivate people (build trust) attitude formation, might not be enough for behaviour change.

Social Design approach

Paradox

Gemeente is itself unclear about details; uncertain
Difficult to give clarity to citizens

•Linking energy transition to people's daily routines, aspirations
•Empathic research - understand latent needs
•Try to solve their problems - free their mind, so they can think about E.T.

Can help this

Need to be trusting to show vunerability

Need to have trust in stakeholders, process, technology to participate in ET

Can explore smaller other social networks as channels to build trust

Needs to be succedeed by concrete tools/ interventions

•Evoke sense of Reciprocity
•Means to build trust
•Indirect Persuasion technique

Political decisions

Electoral cycles

Centralised decisionmaking

Needs to be more defined -what will they do, and how?

One of the strategies of the municipality

Frontrunners approach

contributes to

Door to door communication -
House visits to build a personal relationship /trust

Trust

•Depend on each other
•Reinforce each other
Transparency is imp.

Important to build trust

Communication Channels

•Newsletters
•Door-to-door, home visits
•Information Package
•Energy coaches

•Online website
•Sustainability Store (events org. by sustainability store)

•Group meetings
•Group activities -Cooking class
-De Nacht Club
-Ik Blijf

Understanding /Awareness

Other channels of information (not regulated through Rotterdam Gemeente)
•National media channels (TV, ads, newspaper)
•Advertisements of Private sector companies
•Social Media

Touchpoints to get info.

Lessons learnt :

Shapes

Misunderstanding / Misinformation / Pre-conceived notions

Influence perceptions/ notions

Information package has information of alternatives, but more focus on Heating Grid

Is a good first step to provide relevant information; there is a lack of one source of all relevant (personalised) information

Only provided upon finalisation of business case.

•Need to provide information in an incremental way (don't overwhelm or give shocks) Helps in comprehension + retention + builds trust
•Need to prioritise information to be given
•Need to show complete picture (future scenarios, all options available)
•Personal visits help to clarify doubts at spot; ensure correct comprehension; reduce misunderstandings
•Framing of information is important.

•Triability is important
•Well-curated, small, informal, personal events work
•Important to involve key active people in the community - act as catalysts
•Should target entrepreneurial and professional people first

Depends on

Depends on

Past experiences

Perceptions of stakeholders, process, technology, outcomes

Decision-making process

Motivations and Apprehensions

Social Cohesion, Social structure of Reyeroord

Determines investments and subsidies; invests in

•Perception:
inconsistency in Vattenfall's projected brand image/ values of 'sustainablity' and their way of working (only commercially driven)

Depends on Gemeente to plan the process, and motivate the residents.

Vattenfall

•Negative perceptions of Vattenfall being a profit-oriented, private company
•Perception of Vattenfall having all the power - monopoly -not a competitive market
•Inability to choose provider -loss of freedom of choice / autonomy

•Shift from B2B -->B2C

•Difficult for Vattenfall to deal with so many individual owners - each having their own opinion

•Need to build capacity, capabilities to deal with residents (social skills)

drives

•Apprehensions of Vattenfall
- after investing so much, not many people will opt for district heating
- dealing with each house owner is a hassle - more effort
- profit on new building projects is higher than existing houses
- commercially not interesting

•Motivation of Vattenfall
- new B2C model is a source of continuous cash flow,
- security in number of customers, will get more clients (earlier distributed between competition)

Vattenfall

is important for Vattenfall because

Determines investment required

Depends on number of people who consent

Lack of vital collaboration between public and private sector (other companies). These can take the responsibility (invest) and help reduce burden on residents

Business Case
is the backbone of the project

Citizens' consent is key

Depends on (subsidy provision, funding options, financial incentives)

determines costs

Depends on (infrastructure changes required, architectural constraints)-

Technical Feasibility (indoors and outdoors)

Figure 13: Mapping the efforts and perspectives of the key stakeholders towards the energy transition. Causal relationships (action-reaction loops) are highlighted to understand which aspects need to be given a priority, or can be refined further.

STRENGTHS

- Social Design Approach - good to have a people-oriented approach.
- Use of multiple communication channels (in general, by the Gemeente)
- The door-to-door channel used in Heindijk was good to understand the citizens perspective, building personal connection and ensuring accurate comprehension of the information package.
- Integrated planning of different projects in the neighbourhood. Different clusters within the municipality trying to work together.

WEAKNESSES

- Assuming that the social design approach may culminate in a successful energy transition. Freeing people's mind of other issues is good for community development and catering to social issues; However, it does not ensure favourable outcomes for the energy transition. Link between the social design approach and energy transition needs to be well-defined.
- Multiple channels arise from different efforts/ projects of different sub-groups within the Stadsontwikkeling Duurzaamheid dept.; These need to build a coherent story and be used to reinforce each other - else it can create confusion and misunderstandings.
- Although trying to work together, each cluster has own methodology, goals and constraints. Thus, siloed thinking still prevails.
- All efforts are top-down driven by 'Push' mechanisms. Lack of community initiatives, and 'Pull' from the citizens. Lack of a truly participatory approach - wherein residents are included in the planning and decision-making process.
- Lack of one source of personalised, relevant information - leads to misconceptions. People build stories, favourable mental models to avoid cognitive dissonance. This also arises from the exploratory nature of the project; wherein the municipality is itself uncertain.
- Ultimately the project and all its decisions are driven politically (by electoral cycles).

OPPORTUNITIES

- Using persuasive techniques to spread awareness, get rid of pre-conceptions and instil positive attitudes (buy-in) amongst residents
- Build the scope for community-led initiatives; Trigger 'Pull' mechanisms amongst citizens. (balance between push and pull). Involve residents in decision-making.
- Build coherence between all the efforts, projects, channels used by the municipality.
- Develop platforms / means for providing personalised, relevant information (in a persuasive manner, such that it enables retention and accurate comprehension)
- Provide easy comparison of all alternatives available
- Design / define protocols for specific situations such as when people are planning to move from the house and do not find it worthy to invest in the energy transition.
- Communicate the benefits of the E.T and the urgency to act.
  - Communicate that there is enough time for people to save money to invest in the E.T.
  - Since it is a 'childrens kingdom', children can be harbingers of change (change catalysts)
  - Since people are attracted to offers (discounts / coupons), these can be used as a means to spark interest. Moreover, the 'framing' of the information can be used to persuade people.
  - Communicate that the prices offered are the least - it is truly a good deal
- Build trust by leveraging social influence processes and making it a social norm. Reduce people's dependence on policy frameworks to make decisions.
- Leverage current efforts to build social cohesion (eg. the current effort of De Nacht Club) to trigger social contagion
- Build certainty through small, incremental actions / steps

THREATS

- Social design approach may build social cohesion in the community (resolve social issues); but might not culminate in the energy transition
- Not enough people might consent, knowing they have an opportunity to join later - procrastination in decision-making.
- Since there is a time gap between when one signs the intention letter and the actual signing of contract, people's (financial) situation might change and they would decide against joining.
- Several different approaches being used (eg. Frontrunner approach, Social design approach, The energy store) might create confusion /chaos. Each needs to be well-defined in terms of intent, planned and executed in coherence with all the other efforts in the neighbourhood. Narrative of each needs to be coherent - e.g. one project is focussing on district heating (since all other alternatives have hidden costs, are not technically feasible); while another project is still promoting solar alternatives to the same residents citing lower costs, subsequently.
- People might not opt for heat network.
- Distrust towards Vattenfall amongst residents - since it is the only provider (has a monopoly) No freedom to choose provider (as is the case with the current gas system).
- Vattenfall might find it difficult to deal with a large number of individual owners. Capacity and capability building efforts may take sometime - delaying the process.

Figure 14: SWOT Analysis of the Gemeente's efforts towards the energy transition.

hone (and multiply) resistance towards the energy transition as well. This theme of trust and understanding recurs in Chapter 4, and is discussed in detail there.

The Policy paradox

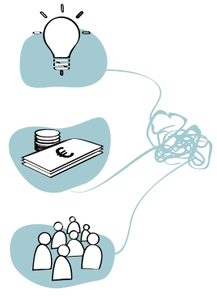
Most residents procrastinate their decision-making towards gas discontinuation citing the reason that it is still not a law- “I will participate (change my energy source) when it becomes a law”. On the contrary, policy-driven, top-down efforts are usually faced with resistance and rejection (due to the phenomenon of reactance as described in Chapter 2). This highlights two key aspects. First, there is a need to draw people’s attention to the urgency to act towards reducing their carbon footprint. Accentuating the need and making people realise this urgency can help to reduce their reliance (dependency) on policy-driven interventions.

Second, the municipality needs to inspire more bottom-up initiative amongst the residents; striking a balance between ‘push’ and ‘pull’ aspects. This also relates to the first theme pertaining to participatory processes and the social design approach.

Certainly Uncertain

Another paradox that comes to light relates to ‘uncertainty’. For resident’s to be able to trust, understand and act towards gas discontinuation, they need certainty -concrete / tangible points of action and predictable outcomes. However, the municipality as well as the national government itself is uncertain about how the energy transition will unfold. Since the project is in the nascent stage (exploratory in nature) as well as constitutes a complex interaction between several systems (aspects), it is difficult to lay down hard facts, goals and actionable components. This further makes it difficult for people to understand the urgency to act. They tend to wait for policy-driven measures to build certainty.

The uncertainty also arises from the prevalence of multiple narratives. Each stakeholder – be it energy providing companies like Shell, the national government, the municipalities and their departments, smaller retailers selling the technologies etc., has its own agenda or perception of the energy transition which is portrayed through their marketing and communication. While some have contradictory notions, others give rise to different hopes and fears (e.g.. some companies claim that the residents can use the existing gas infrastructure to avail green hydrogen gas for heating); which in turn lead to uncertainty and anomalies. To counter the cognitive dissonance that arises from these multiple narratives, people turn a blind eye towards the transition. Thus, developing a coherent plan / story with all the stakeholders and having a single point of information / communication as well as building certainty through other channels, and making the energy transition relevant, tangible and actionable are the need of the hour.



The complex knot of financial viability, technical feasibility and social desirability

Currently, the business case forms the backbone of the project, since the business case determines the subsidy that would be provided to residents. Subsidy provided and the subsequent costs entailed are key factors that influence the resident’s decision-making. However, for the business case to be viable, the consent of a minimum number of residents is necessary. The subsidy provided will depend on the number of people joining - economies of scale being the key underlying principle. This forms a vicious circle between financial viability and social desirability.

Further, the technical constraints drive the costing structure; while technical (infrastructural) changes required within the house form another key decision-making criteria amongst residents. Thus, technical feasibility affects both financial viability and social desirability. These three aspects form a complex knot which is difficult to untangle. However, all three aspects need to be worked on individually but simultaneously, through different set of leverage points in order to untangle this knot, weakening the dependence of one on the other. For example, if for the business case, the municipality and Vattenfall find different investors – part of a vital coalition, the subsidy provided will not be dependent only on the number of people who consent. Further, if residents are motivated to participate by appealing to their values or through social influence, there incentive to join will not depend only on the subsidy provided. Thus, once the dependency between these interrelated aspects is eased out, it can help catalyse the transition. This line of thought also motivates this project, wherein triggering social desirability is the key focus.

The above-mentioned themes capture key aspects that need to inform the municipality’s efforts. They highlight the complexity and multiplicity of factors that are involved in achieving the energy transition. As mentioned earlier, the aim of this project is to increase the social desirability of the energy transition through social contagion (bottom-up) mechanisms. The first step to understand this social desirability, is to understand the resident’s motivations and apprehensions towards gas discontinuation, which forms the focus of the next chapter.

Chapter 03 in sum...

The chapter gives a glimpse of Reyeroord and its community.

- Reyeroord is a typical residential neighbourhood in Rotterdam, with a diverse population (in terms of age and ethnic background) wherein the average income of a household is 30,000 euros per annum. Three-storey buildings are the most predominant type of housing, while most houses are owned by individual owners.

- Most people are traditional, and frugal living is part of their ethos. Sustainability is a vague concept for them. Their minds are pre-occupied with other issues, and want those resolved before they think about the energy transition.

- People hardly interact with each other, and just know a few neighbours. There is a general lack of sense of ownership or responsibility towards the neighbourhood amongst residents.

The chapter then moves to analyzing the municipality's current goals and effort towards the energy transition.

- Along with gas discontinuation, the municipality aims to give the neighbourhood an upgrade- a spatial transformation, and achieve social inclusion goals. The municipality considers the energy transition a moment to prompt residents to lead a sustainable life in general.

- District heating (through residual heat) is the chosen energy alternative for Reyeroord.

- The primary stakeholders involved in the transition process include the municipality, Vattenfall (energy provider) and the residents.

- For the next 1.5 years, the municipality will be developing the business case for the transition with Vattenfall. Simultaneously, it aims to adopt a social design approach to stimulate resident participation.

Thematic analysis, SWOT analysis and relationship mapping, further highlights key themes that need to be kept in mind while preparing for the transition –

1) There is a gap in the municipality's goals and the reality of Reyeroord's citizens. This stems from the lack of truly participatory processes of decision-making. Although the municipality has chosen a social design approach to mitigate this gap, the goals and meanings of 'social design approach' and 'participatory processes' and their relationship with the energy transition need to be explicitly outlined.

2) Trust and Understanding (of technology, costs and processes) are two pre-conditions to get residents' opt-in.

3) There is a policy paradox. On one hand residents are waiting for gas discontinuation to become a law, and say that they will act only once it is a policy; while on the other hand, there is resistance towards top-down enforced policies. This policy paradox can be overcome by ensuring people understand the urgency to act, as well as amplifying bottom-up pressures and stimulating participatory decision-making.

4) Further, the residents need certainty in order to make decisions and act. However, due to the nascent stage and exploratory nature of the project, the municipality itself is uncertain on how the transition will unfold. The uncertainty amongst residents also arises from the lack of one source of concrete, personally relevant information.

5) There is a complex knot between social desirability, financial viability and technical feasibility, which needs to be loosened. The dependency of each factor on the other two needs to be reduced in order to expedite the transition process. Here, social contagion and social influence can help in increasing the social desirability of greener energy alternatives.

Having outlined the context of energy transition in Reyeroord, the next chapter zooms into the residents' perceptions of the energy transition.

04

Defining the WHAT for Reyeroord

Chapter 04- Defining the WHAT for Reyeroord

As discussed in Chapter 2, there are three key components of contagion. This chapter focuses on the 'What' aspect of the contagion. The sub-question (RQ1) 'What are the motivations &/or apprehensions amongst residents towards gas discontinuation' is answered in order to define this WHAT (content) for contagion, specifically for the scope of this project and the Reyeroord case study.

4.1 Residents' perceptions

Interviews with municipality officials, gave several insights into the residents' perceptions towards gas discontinuation. These insights also gave a preview of the different type of people residing in the neighbourhood, their thought process, values and specific situations. Analysis of these perceptions and descriptions of residents is used to define the WHAT (and who) of contagion in the subsequent sections.

As shown in Figure 15, the perceptions (motivations and apprehensions) of the residents toward gas discontinuation were grouped together based on the common aspects driving them. The boxes in figure 15, are to highlight aspects that have some relation between them. Further, overarching themes (found through thematic analysis; Appendix D) that explain the relationship, common goal or underlying causes of each of the grouped perceptions, were identified. These eight themes are shown in figure 15.

Simultaneously, all the perceptions were simplified into 'factors' as shown in figure 16. The factors were classified based on Fogg's Behaviour model (Figure 17) into Motivation factors, Ability factors and Trigger factors. Fogg (2009) argues that "for a person to perform a target behaviour, he or she must 1) be sufficiently motivated, 2) have the ability to perform the behaviour and 3) be triggered to perform the behaviour". He suggests that the behaviour results from the concurrence of all these three factors. Thus, classifying the factors into these three categories provides clarity on the presence or absence of motivation or ability. Further, Fogg (2009) describes different types of triggers - sparks, facilitators and signals (based on the levels of motivation or ability), that need to be activated to enable the behaviour. These can be used to design specific interventions upon identifying the gaps in motivations and /or abilities.

Further, as shown in Figure 19, the factors (categorised based on Fogg's behaviour model -Figure 17) and Maslow's (1970) Hierarchy of Needs (Figure 18) were used to define the underlying construction and nuances within each of the overarching theme derived earlier in Figure 15.

Identifying the underlying needs of each theme based on Maslow's model helps to breakdown and understand the basic instincts that contribute to that phenomenon in general, not specific to the energy transition. For example, the theme 'other priorities / problems take precedence' is driven by physiological and safety needs. Both these physiological and safety needs lie under what Maslow terms as 'deficiency needs'. These are basic needs that need to be satisfied before people move onto the higher levels (Maslow, 1970). It is not an absolute 'all or nothing' phenomenon. However, it shows that stemming from physiological aspects, these take precedence in case they are not met. Once fulfilled, the motivation towards these needs decreases.

Another example is the theme 'reducing loss / risk'. The underlying needs for this theme are safety needs, esteem needs and cognitive needs. The safety perspective stems from our need to be in control, have predictability of outcomes and experience order (no chaos) and stability. On the other hand, reducing loss or calculating the risks entailed is a cognitive activity. Further, successful mitigation of risk can fuel our esteem needs, both – for oneself (in terms of it being an achievement) as well as from peers (in terms of a reputation or respect from others for being successfully being able to mitigate risks / losses).

While the Maslow's hierarchy of needs model helps to identify the general underlying phenomenon, the factors identified in figure 16 (classified based on Fogg's model) help to link specific conceptions related to the energy transition with the theme[1]. For example, for the theme 'Awareness and Understanding', the general construction (based on Maslow's needs) includes our cognitive needs. The factors (and the Fogg's model) help to highlight specific aspects such as 'one's (in)ability to visualise the future, or urgency to act' that can inhibit or expedite one's action towards gas discontinuation.

Along with explaining the construct of each theme, this combination of general phenomenon plus specific (de)motivation /(in)ability factors can be used while designing interventions to tackle each theme. Moreover, as shown in section 4.3, it helps to define what kind of interventions – personally driven, socially driven or government driven will be most effective to overcome barriers within each theme.

The themes have common underlying factors and needs, and have several causal relationships amongst each other as outlined in Figure 19. Next, key insights related to the themes and their relationships identified upon in-depth analysis, are presented.

1 There are several overlapping factors between different themes, for example 'past experiences' falls under 'trust', 'awareness / understanding' and 'reduce loss/risk'. These factors are retained under all the themes since it helps to highlight the interconnectedness between all the aspects.

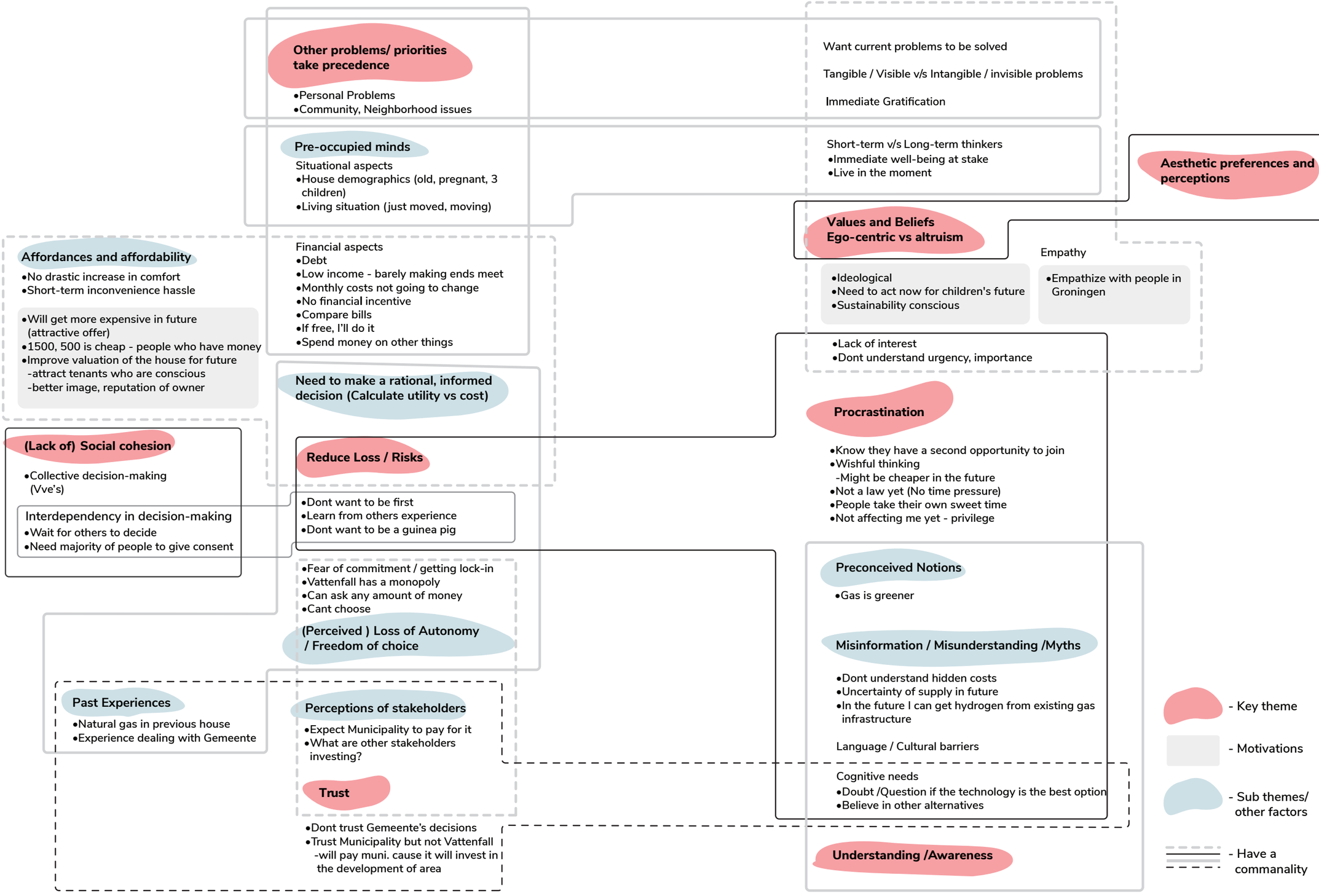


Figure 15: List of motivations and apprehensions derived from interviews with municipality officials. Overarching themes explaining different groups with related / similar motivations and apprehensions are highlighted.

(DE) MOTIVATION FACTORS

- (Other) Priorities
- Affordances /utility of the new technology
- Concern for children
- Current problems
- Empathy /Altruism
- Ego-centric nature
- Trust
- Aesthetic preferences
- Perceptions of stakeholders
- Loss / Risks entailed
- Financial Incentives
- Freedom of choice
- Environmental concern
- Past Experiences
- Timing of Gratification (Immediate vs Delayed)

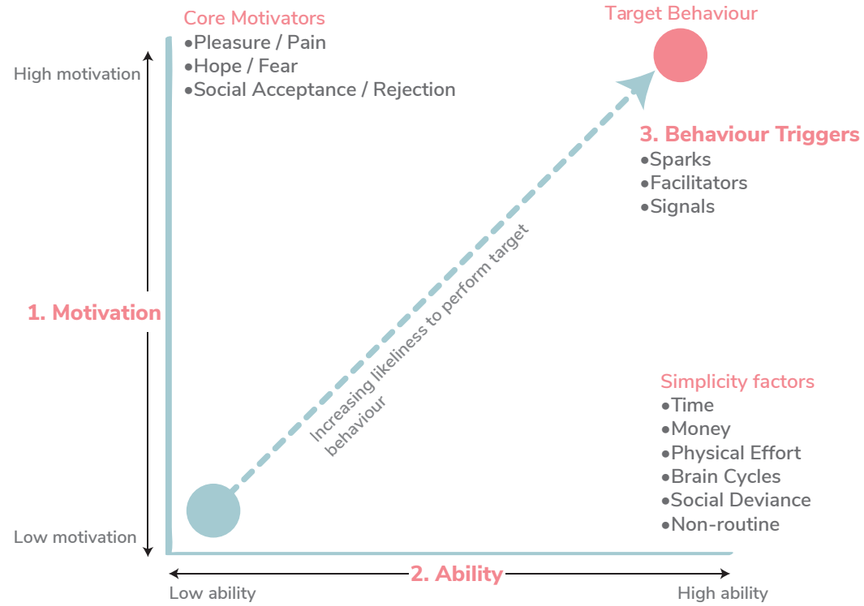
(IN) ABILITY FACTORS

- Costs (Affordability)
- Language / Cultural Barriers
- Social Cohesion
- Understanding of the urgency
- Ability to visualize future (think long-term), intangible aspects
- Brain cycles (preoccupied minds)
- Understanding of the technology (alternatives)
- Understanding of costs (hidden costs)
- Interdependency in decision-making

TRIGGER FACTORS

- Attractive Offer

Figure 16: Motivations and apprehensions simplified into factors. These are classified into Motivation factors, Ability factors and Trigger factors based on Fogg's model for behaviour change.



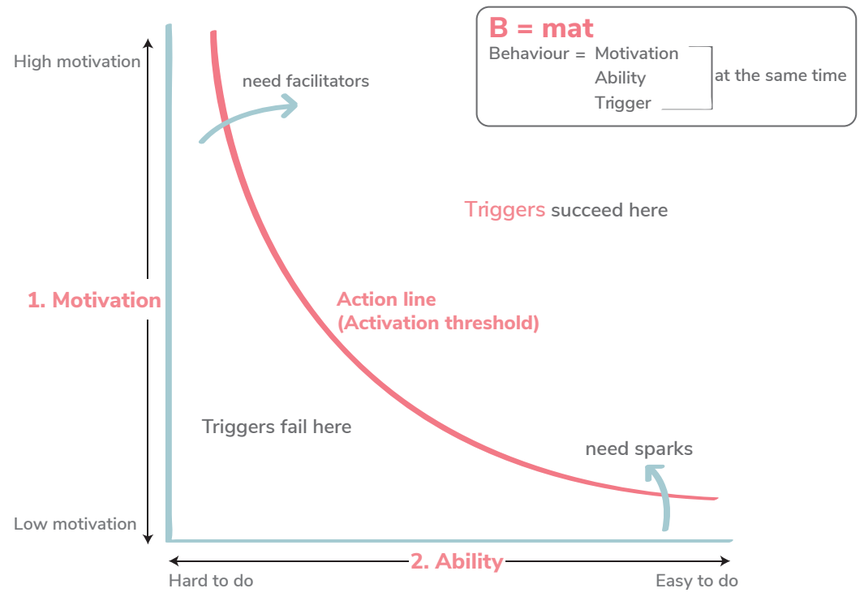


Figure 17: Fogg's model for behaviour change, (Fogg, 2009)

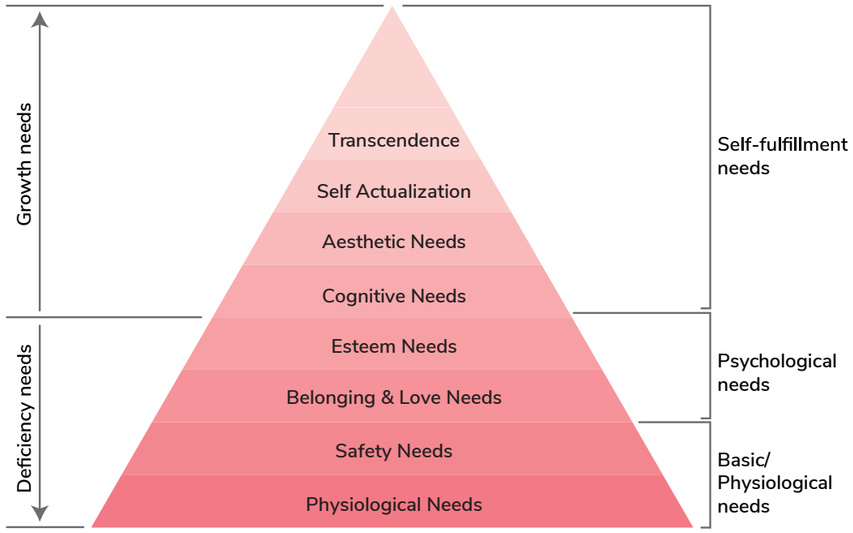


Figure 18: Maslow's Hierarchy of Needs (Expanded model), (Maslow, 1970)

4.1.1 Key insights from the analysis of themes and their relationships

Following are the key insights about different themes and relationships between these themes. These are derived solely from the analysis of the field research.

- The theme 'Other problems/ priorities take precedence' relates to physiological (biological) and safety needs. Most of these priorities relate to either fulfilling basic needs like food, shelter, warmth or the safety in the neighbourhood. Owing to the low-income characteristic of the neighbourhood, several people find it difficult to make ends meet. These people need to have certainty about being able to meet these basic needs now and in the near future, and then they can think about higher levels or the energy transition. Here, this fulfillment of basic needs is driven by money (affordability). The social design approach is apt, since it aims to ensure these basic needs are met.

- Lack of being able to fulfill basic needs, makes people more conscious, skeptical and calculative about the losses / risks entailed.

- Ego-centric values fuel loss / risk perceptions or the need to reduce losses.

- The preoccupied people don't want to make the effort to understand any aspect of the energy transition. Unwillingness to listen / understand or inability to think about the long-term gives rise to misconceptions (e.g. about the timeline - pregnant woman doesn't want to think about it, but does not realise that the energy transition is going to be much after her pregnancy). These misconceptions further reduce people's willingness to participate or lead to procrastination.

- In line with Maslow's hierarchy of the needs, people go up the pyramid while making a decision towards the energy transition. Only once basic needs are met, people would pay attention to knowing more about the energy transition (cognitive needs) or have altruistic values and empathise with others (achieve transcendence). In sum, people can go beyond self and short-term thinking only if basic needs are fulfilled. Once basic needs are fulfilled, they need to have the ability to understand / visualize long term futures and the urgency of acting. If they understand (and trust) the urgency to act (and also technology, costs and the process), they still need to go through self-actualization and transcendence in order to be motivated to work towards the greater cause.

(Contd. on pg. 84)

Key to Figure 19 on pg 82/83:
dM : Demotivation (low motivation)
M : Motivation (high motivation)
iA : Inability (low ability)
A : Ability (high motivation)

Procrastination

Trust can be instilled by ensuring safety, giving certainty about continued fulfillment of biological, physiological needs

Trust is a means to reduce (perceived) losses

Loss / Risk Perceptions - Reduce loss /risk

Cognitive Needs
Need for predictability

Esteem Needs

Safety Needs

dM Fear (of future losses)
No Hope for gains
No significant increase in Pleasure
Past Pains a demotivator

-Financial Incentives
- Monthly costs not going to change
- No financial incentive
- Compare bills
- Might be cheaper in the future
- Lack of Immediate Gratification (Uncertainty --> Risk)

-Affordances of new technology
- No drastic increase in comfort
- Short-term inconvenience hassle

-Interdependency in decision-making
- Learn from others experience
- Dont want to be first
- Dont want to be a guinea pig

-Procrastinate Decision-making
- Know they have a second opportunity to join
- Not a law yet (No time pressure)
- People take their own sweet time

-Past Experiences
- Natural gas in previous house
- Experience dealing with Gemeente

Situational aspects -Other priorities
- Household composition (old, pregnant, 3 children)
- Living situation (just moved, moving)

Freedom of choice
- (Perceived) Loss of Autonomy (Independence) (need to be in control)
- Can choose later
- Can choose any technology

M Hope of future gains

-Financial Incentives
- Will get more expensive in future (attractive offer)
- Improve valuation of the house for future
  -attract tenants who are conscious
  -better image, reputation of owner

A Money

-Financial Incentives / Affordability
- 1500, 500 is cheap - people who have money

-Rational decision-making at the core.
-Comprehension of information plays an important role in developing attitude and subsequent decision-making
-This factor comes in play only when the user knows that they can afford it and B,P,S needs are met.
-Security (Safety needs) mostly in terms on financial aspects considered here.

Trust (in stakeholders, process, technology)

Cognitive Needs

Esteem Needs

Safety Needs

dM Fear (of future losses)
Past Pains a demotivator

-Perceptions of stakeholders
- Dont trust Gemeente's decisions
- Trust Municipality but not Vattenfall -will pay muni. cause it will invest in the development of area)
- Expect Municipality to pay for it
- What are other stakeholders investing

-Past Experiences
- Natural gas in previous house
- Experience dealing with Gemeente

-Trust is a way of determining the risk (loss).
-It can be a means to reduce the perceived loss.

Trust (in source, stakeholders involved) is necessary for people to absorb information, and comprehend it.
Lack of trust would entail people dont want to put effort in understanding (the info.)

(Basic) Understanding
(Or openness to information)
is a precondition
for trust.

Social Cohesion

Belonging, Love needs

dM Social Acceptance/ Rejection

iA Social Deviance

- **Interdependency** in decision-making

-Lack of social cohesion leads dampens the decision-making process (Esp. in vve's)
-Lack of social cohesion could also provide autonomy, and (in the case of a decisive person) lead to faster decision-making
-Individual vs Collective decision-making important factor.

Social cohesion or social relationships also effect ones capability of thinking about others

Ego-centric values stimulate loss/risk calculation

-Understanding (absorption of information) and Trust go hand-in-hand. Both act like ends and means to the other.

Awareness / Understanding

Cognitive Needs

dM Fear (of loss of B,P,S)
(Current) Pains are demotivators

-Doubts / Questions
- Doubt /Question if the technology is the bestoption
- Believe in other alternatives

-Past Experiences
- Natural gas in previous house
- Experience dealing with Gemeente

-Perceptions of stakeholders
- Expect Municipality to pay for it
- Which other stakeholders investing (how much)

iA Brain Cycles

-Misinformation / Misunderstanding /Myths
- Dont understand hidden costs
- Uncertainty of supply in future
- In the future I can use existing infrastructure for hydrogen

-Preconceived Notions
- Gas is greener

-(In)Ability to perceive / visualize intangible, future aspects

-Language / Cultural barriers

Values and Beliefs - Ego-centric vs Altruistic

Transcendence

Self Actualization

Cognitive Needs

Safety Needs

Physiological Needs

dM Lack of Hope

-Ego-centric
- Not affecting me yet -privilege
- I am old, no point of investing now (lack of transcendence)

M Hope for a better future

-Altruism / Empathy
- Ideological
- Need to act now for children's future
- Sustainability conscious
- Empathize with people from Groningen

Other problems/ priorities take precedence

Safety Needs

Physiological Needs

dM Fear (of loss of B,P,S)
(Current) Pains are demotivators

-Want current problems to be solved
- Personal Problems
- Community, Neighborhood issues - safety, order

-Situational aspects / Other priorities
- House demographics (old, pregnant, 3 children)
- Living situation (just moved, moving)

iA Money, Brain Cycles

-Affordability (Financial aspects)
- Debt
- Low income - barely making ends meet
- If free, I'll do it
- Spend money on other things

-Minds are pre-occupied

-Biological, Physiological and Safety (B,P,S) needs not met currently.
-If they invest in E.T in might reduce their ability to fulfill biological, physiological and safety needs (now or in immediate future)
-Need certainty about being able to fulfill B,P,S needs

Aesthetic Preferences

Aesthetic Needs

dM (loss of) Pleasure

- Dont want pipes running through the house

Social norms, social identities (that arise due to social cohesion (or lack of it)) frame peoples aesthetic preferences

Shapes

Is a way to overcome

-Preoccupied people dont even want to make the effort to understand anything
-Unwillingness to listen / understand or Lack of being able to think long-term makes people have misconceptions

Makes people more skeptical, calculative about risks and losses

Ability to fulfill basic needs; determine ones capability (openness to) of thinking about others.

Depends on

Determines

Shape each other

Figure 19: Underlying construction of the themes and the relationships between these themes.

- ‘Procrastination’ is a consequence of three different themes plying together – (lack of) Trust, (Mis) Awareness /Understanding and Loss/ risk perceptions.

- The ‘Reduce losses /risks’ theme is driven by the intent to reduce financial risks, along with any other qualitative risks based on the affordances of the new technology. ‘Past experiences’, ‘learning from others’ or simply procrastinating – all help to reduce these losses / risks. While it is always a factor in decision-making, in this context, it gets activated often when the resident knows they can afford the switch to greener alternative and their basic physiological and safety needs are met. Alternately, it also gets activated when the user has extremely high altruistic values (concern for environment / children) but cannot immediately afford the transition.

- Comprehension of information (Awareness / Understanding theme) plays an important role in developing the attitude towards the energy transition and subsequent decision-making. Here, it is not the content of the information, but the timing of when it is provided, how it is provided and through whom that enables comprehension. Aspects such as trust, credibility of source are important factors that drive the attention capture, comprehension and opinions amongst users. Although there is plenty of evidence in literature that suggests that providing information does not translate to behaviour change (Costanzo, Archer, Aronson, & Pettigrew, 1986; Ölander & Thøgersen, 2014), comprehension of the matter at hand is necessary to cultivate positive attitudes.

- Especially in the case of the energy transition, which is a one-time investment where the costs entailed are high, there is rational decision-making involved (it is not an impulsive purchase). Thus, although literature suggests that attitude does not always precede behaviour (Blythe, 2013), in our case it is safe to assume that attitude shall precede the behaviour / decision moment (also because the decision-moment is not in the near-future). Thus, to enable comprehension and the subsequent positive attitudes, the need for persuasive means of providing information, using affect-driven interventions is apparent. For example, using peer network as means of spreading awareness can build more trust, and in turn capture people’s attention. Information coming from homophilous others, delivered in persuasive ways helps to ensure retention. Accurate comprehension can be tested using games, quizzes etc.

- Several misconceptions arise when the information is not correctly comprehended. In order to avoid cognitive dissonance, people develop their own interpretations. These lead to negative attitudes, which in turn delay decision making.

- Comprehension of information also affects the loss / risk perception amongst the residents.

- Understanding (absorption of information) and Trust go hand-in-hand[1]. Both act like ends and means to the other. Trust[2] (in source, stakeholders involved) is necessary for people to absorb information, and comprehend it. Lack of trust entails people do not want to put effort in understanding (the information). (Basic) Understanding (Or openness to information) is a precondition for trust. Trust can be instilled by fulfilling cognitive needs, eliminating barriers to understanding, ensuring people understand the information as intended and giving certainty about continued fulfillment of basic needs

- Past experiences, Perceptions of stakeholders are common factors that affect trust as well as (one’s openness) to understanding (the info.). Trust (in source, stakeholders) forms an important factor determining the loss / risk perception. Hence, it can also be a means to reduce (perceived) losses / risks. However, the lack of trust may lead to biased (negative) risk perceptions.

- Social cohesion and social relationships affect one’s capability of thinking about others (altruistic values). Social cohesion has high importance in the case of collective decision-making (e.g. in Vve’s).

- If (low) ability factors (esp. Understanding factors, Social cohesion) are acted upon to make it a high ability, it will also increase people’s motivation or propensity towards a positive decision. For example, understanding factors (ability) can influence motivation factors such as ‘trust’, ‘loss/ reduce entailed’, ‘freedom of choice’. Thus, interventions driven towards ability factors can influence motivation as well.

- Amongst all themes, most ability factors relate to Money or Brain cycles from Fogg’s behaviour model. Motivation factors relate to Pleasure / Pain, or Hope /Fear. Social Acceptance / Rejection as a motivator is not prevalent. This can be seen as an opportunity - a leverage point, in persuading residents.

- There are two routes of decision-making- 1) ego-centric and 2) altruistic. It is good to note that these are not exclusive, and have quite some overlap. However, they form two distinct starting points to the decision-making process. In both the cases, different themes are activated at different points in the decision-making process, and have variable influence.

1 Understanding of and trust in process, stakeholders, options, costs and affordances.
2 The theme of trust encompasses all, institutional trust, interpersonal trust, trust in technology and political trust.

The insights give a glimpse into the interconnectedness of all the themes. However, different themes get activated at different points of time in the decision-making process based on the resident. The next section presents these different decision routes based on insights about different types of people that reside in the neighbourhood. .

4.2 The decision-making process

Different themes (with underlying motivations and apprehensions) are activated at different times in the decision-making process. The order of the themes and the level of influence depends on the resident's personality traits and situational factors. Thus, based on insights about the different type of people living in the neighbourhood (from the interviews), different decision (or attitude formation) routes are explored. Section 4.2.1 draws on literature to identify a decision-making / attitude formation model, which will be used as the basis of analysis. Next, section 4.2.2 outlines the different decision routes identified based on the personas of different residents residing in the neighbourhood. The personas are then categorised based on Rogers' (1983) types of adopters, drawn on the resident's 'innovativeness' or susceptibility to adopt the innovation.

This link between the themes and decision process is important, since in isolation, the themes do not give insights about which theme is more important, relevant or has higher influence. Mapping them onto the decision process and in relation to personas, builds context for each theme and highlights its relevance. This context surrounding the theme is crucial in deciding the 'WHAT' and 'for WHO' of the contagion.

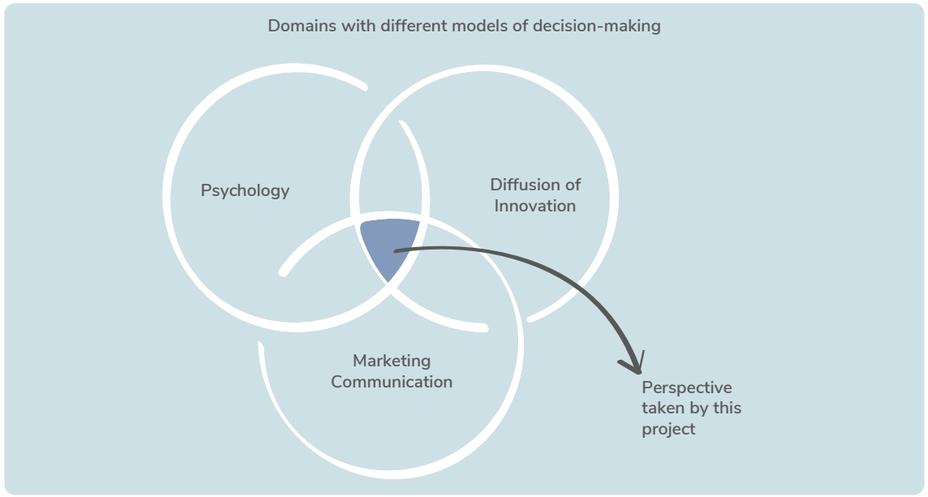
4.2.1 Theory on decision-making

Before delving into the literature of decision-making models, it is necessary to define the intended behaviour and its attributes. The desired behaviour (end goal) for this project is the switch to greener energy alternatives (gas discontinuation) for heating and cooking in households. The attributes of the intended behaviour are:

- It is a one-time decision
- Needs a high investment (one-time); does not reduce subsequent costs drastically
- Includes higher risk as compared to say buying an FMCG product
- In terms of cooking, user might need to adapt to electric alternatives – change a few habits
- From heating the house perspective, there is no change in routine /habits. However, one-time infrastructural changes need to be made. If they opt for district heating, the residents cannot choose between different suppliers, as is the case with the current gas system.

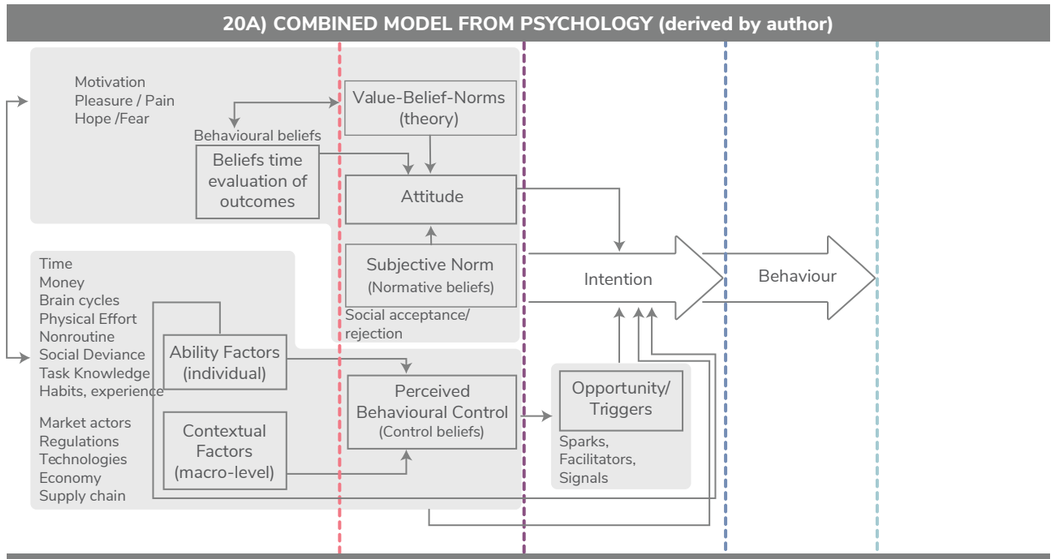
Further, the key target segment for this project is individual house owners.
The section now moves to understanding the decision-making process from a theoretical perspective. In order to derive a comprehensive model, three decision-making models from different domains are used:

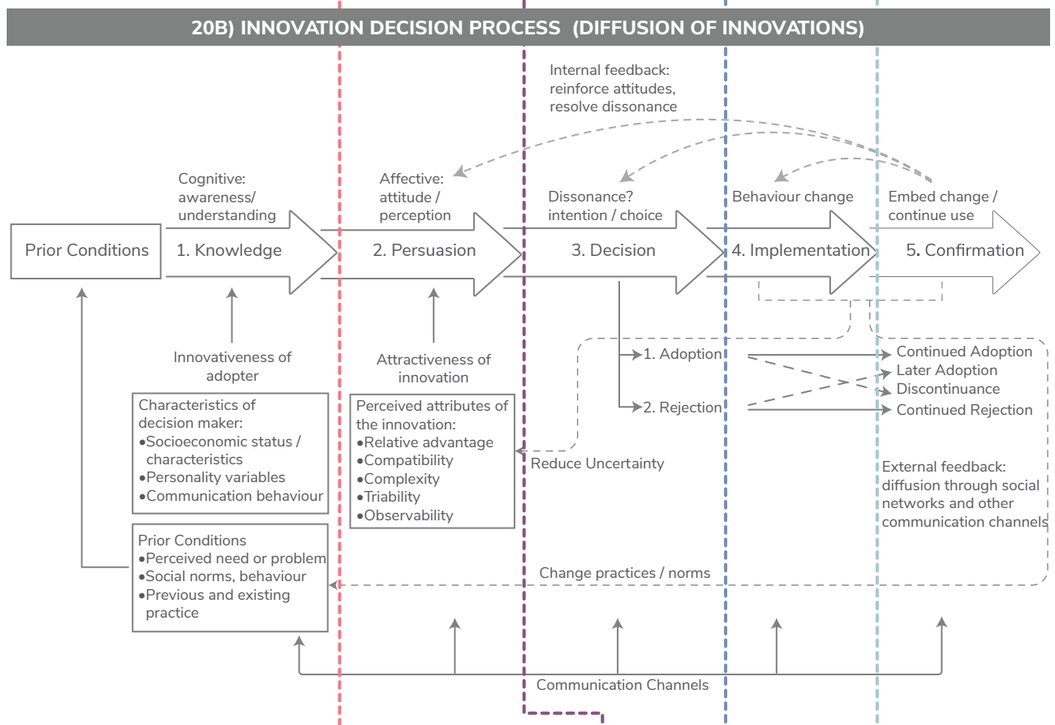
1) Psychology – Attitude formation and Behaviour change
2) (Diffusion of) Innovation
3) Marketing Communication



The psychological models of attitude formation and behaviour change provide insight into how humans perceive information & cues, and use these for decision-making. However, this decision-making journey of an individual (towards a new innovation /behaviour) starts from when they hear about the product. This communication about the innovations part of the marketing efforts of the provider. Thus, it is necessary to include this marketing perspective in understanding the decision-making process. Further, attributes of the innovation are important factors that drive the decision-making process. Diffusion of innovation literature includes these characteristics and hence, is relevant for this project.

All three domains are used to derive a holistic analytical model as shown in Figure 20. It is important to specify that there are overlaps between all the three domains, since all build upon psychological aspects and the end goal of each is the same. However, each domain adds value due to their specific focus, namely, behaviour (attitude), (characteristics of) innovation and channels & effective communication. Refer Appendix E for detailed explanation of the selected models and how the combined psychological model (20a) is derived.





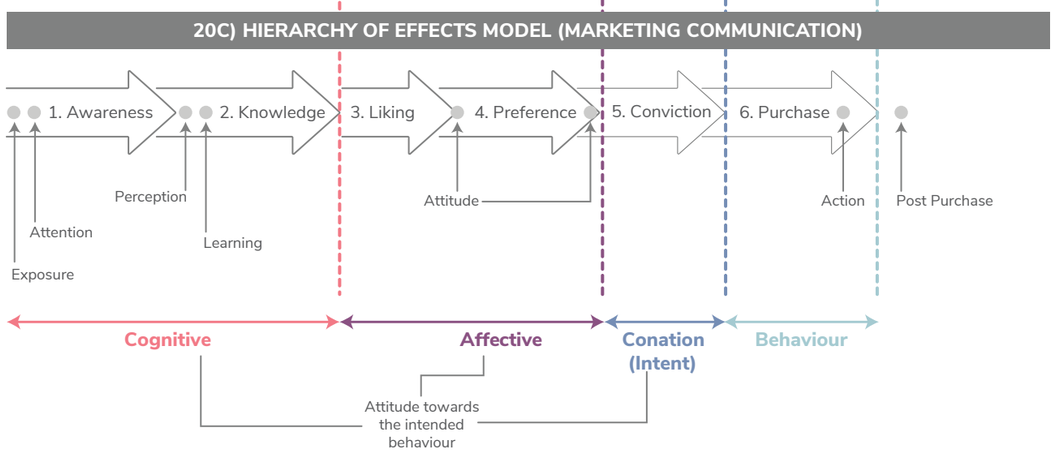


Figure 20 (pg. 88): Decision-making models selected from the three domains to build a comprehensive analysis tool. **Top (20a)** – Combined model from the domain of Psychology (Derived by the author, based on Theory of planned behaviour (Ajzen, 1991), Integrated model of pro-environmental behaviour (Wilson & Dowlatabadi, 2007), MAO model (Ölander & Thøgersen, 1995) and Fogg's behaviour change model (Fogg, 2009);
Middle (20b) – Innovation decision process from Diffusion of Innovation Literature, adapted from Rogers (1983) & Wilson & Dowlatabadi (2007);
Bottom (20c) – Hierarchy of effects model from Marketing Communication- adapted from Evans et al., (2010)

4.2.2 Different routes of decision-making

The decision-making process and the subsequent themes that are activated during this process vary across different residents, owing to the difference in their values, beliefs and situational constraints. This section aims to outline and analyse these different routes based on different personas. Figure 21 (page 90, 91, 92) highlights 10 different personas created based on insights about different type of people who live in the neighbourhood. The personas mostly include house-owners (owners who stay in the house and owners who rent out the house), since they are the key target group for this project. Here, the assumption is that only people above the age of 35 would own a house. Next, a few tenant profiles are included since they can influence the decision towards gas discontinuation, and are also affected by the decision. Aspects such as cultural backgrounds, as well as personality traits (based on Borgman's (2019) report) were kept in mind while building the personas.

Figure 22 outlines the different routes of decision-making based on the different personas. These routes show the order in which different themes (and hence motivations / apprehensions) are activated along the decision process or which themes influence the process[1]. Further, these highlight different starting points of decision-making. The decision routes and the relevant personas are described below[2]. They are analysed based on the three models of decision-making defined earlier[3] .

1 Note: In reality, multiple themes get activated at the same time, it is not as linear as shown in Figure 23. However, in order to develop a typology for better understanding, these are represented in the linear format keeping in mind the weightage of influence. Further, these can be seen as an assumption, and need to be validated in field.

2 Some personas have multiple decision routes possible. However, the most relevant routes are presented here.

3 In the description of the decision routes, the ability factor only constitutes of financial ability.

UNTIRING OPTIMISTS

We need to really do something about global warming for our children's future. I do small things like buying as much less pastic as I can. But I dont have enough money for this energy transition. Maybe I can go to the help centre and see how I can save more money to participate in the E.T.

Judith (41)
- Single mother has three sons- 4, 8, 13 years old
- Husband expired 2 years ago.
- Household Income: 25,000
- Moved to the neighbourhood 7 years ago
- Works as a receptionist at a local company
- Likes to cook. Whenever she has the time she volunteers at the elderly activity centre near her house, or helps her neighbours
- Is very concerned about her children's future.

Decision route: A, A1, A2, A3 or A, A1, B2, B3

THE PREOCCUPIED

I dont have time to think about all this. I need to think about my daughter and her future. I am saving as much as possible for her schooling. I want her to have a good education. Plus I am pregnant. I dont have time and money for this sustainability and all...

Rosa (32)
- Lives with her husband, 3 yr old daughter & mother
- Recently found out she is pregnant
- Household Income: 28,000
- Lives here since 4 years
- Runs a Turkish store of her own. Is still paying off the loan she got from a bank to open her store.
- Barely make their ends meet.
- Hardly has any spare time. Spends all the spare time with her daughter or taking care of her mother.

Decision route: A

CONSERVATIVES (TRADITIONAL NAYSAYYERS)

Well, I dont think global warming is going to affect us soon. And its not even a law yet. I will think about it when it becomes a law. Why should I be the first to change? I also want to see how it works with Vattenfall. Now I can choose who I want gas from and what price I pay. If I change, I can't choose. And then they can ask for whatever money they want. Who has that kind of money...?

John (55)
- Lives with his daughter (21) and son (18) in the neighbourhood since 20 years
- Works as an operator in a factory
- Household Income: 40,000
- Very family-oriented
- Risk averse and frugal living; Lives for today
- Accepts authority and rules
- Believes in traditional values and preserving own culture
- Walks his dog daily in the morning

Decision route: C, C2

Motivaction + report : Traditional or Modern mainstream

RESIGNED

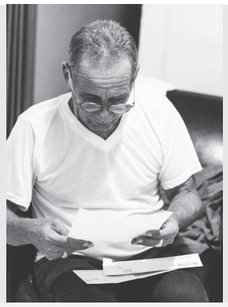
They talk about it, but I dont think this energy transition will happen. Everyone will resist. Its very expensive. Plus its not going to happen in my lifetime. Who knows how long I will live. Let my daughter and son-in-law decide what they want to do with the house after I am gone. There is no reason for me to join and spend so much money..

Karen (72)
- Lives alone. Her daughter and her family visit once in three months.
- Lives in the neighbourhood since the last 30 yrs
- Used to work as an architect
- Household Income: 35,000
- Goes to the church and gym regularly
- Goes with friends to Pameijer to play games and have coffee
- Learns French so that she can converse with her grandchildren

Decision route: C, C2

THE SKEPTIC

I have worked on many such projects... First I want to know a little more about the heat grid - what will be changes? is it better than solar? Does it mean I have to change my internal piping? Maybe in two years we can use hydrogen from this existing set-up?



Jarmo (63)
- Widower has rented out one room in his house
- Used to work on a ship. Now retired and settled.
- Lives in the neighbourhood since 10 years
- Household Income: 37,000
- Reads a lot and keeps himself up-to-date
- Goes to senior citizen club every evening

Decision route: C, C2

STATUS SEEKERS

Yeah, I know about the heat grid and energy transition. Sustainability is important but it is the governments responsibility. I am paying my taxes. Plus if in the future my monthly costs are not going to reduce, why should I spend so much money. Its not giving me any benefits. Also, we are planning to shift somewhere near the centre in the next 2-3 years. So its pointless to invest so much money....

Loek (38)
- Lives with his partner and pet dog since 5 yrs
- Household Income: 33,000
- Originally from Suriname
- Works as an engineer
- Technology geek, likes to buy all the latest gadgets - well-informed about new technology.
- Material things important, social status imp.., his friend's opinion matters the most
- Saving to buy the new Macbook pro. Also, wants to go for a vacation to Iceland.
- Wants to move out of this house and get a bigger house in the next 3 years
- Trying to apply to better paying jobs
- Goes to the gym after work daily. In the morning walks his dog before leaving for work.

Decision route: B, A2, A3

Motivaction + report : Social climber

DAREDEVILS (RISK TAKERS)

I shall join. But I would like the government to build enough charging stations for my electric car before I join this transition. Also, the municipality needs to think about a parking plan when everything is dug up. Last time during the tram construction we had a very bad experience...

Daan (42)
- Lives alone
- Owns a local garage
- Household Income: 32,000
- Lives in the neighbourhood since 15 years - had moved with his parents
- Very talkative. Likes to help whoever he can from the neighborhood.
- Gives young boys temporary jobs so they dont get into criminal activities
- Passionate about exercising and automobiles

Decision route: C, C1

NURTURERS

Yes, I will join. It is important for everyone to join. I will try to convince people if possible. Maybe you can have some group meetings..

Matthijs (60)
- Lives with his wife
- Used to be a manager in an insurance company, now active in the local council
- Household Income: 50,000
- Brought up in the neighbourhood, spent his whole life here
- Likes to help people, go for a walk, watch TV, read; Started few local initiatives like cleaning drives, tree planting & building a open library
- Helps young people find jobs, start their own business through his network.

Decision route: B, B2, B3 or C, C1

Procrastinators

Figure 21: Personas

EXPERIENCE ENTHUSIASTS

I lead quite a sustainable life. I have turned vegan and use less plastic. Even got an electric car last year. We are planning to change our energy system. We are checking whether it is better to put solar panels or join the heat network. We will soon make a decision and let you know.

Marjolein (45)
- Lives with her husband and has a daughter (20)
- Her parents used to stay here since 1980's, and now she lives with her husband
- Works at a bank
- Household Income: 90,000
- Does some charity work.
- Likes adventure and going for hikes; likes to travel
- Very socially active - hosts her friends quite often, goes for movies, fairs, farmers markets etc. - more in the City centre
- Organises a nature walk for the neighborhood
- Occasionally goes to the church

Decision route: B, B1 or B, B2, B3

Motivaction + report : Post modern hedonists

TRANSIENTS

If the owner wants to change, I will cooperate. But I dont have to the time to help him in making the decision. I really need to find a job.

Franciszek (28)
- Tenant in Reyeroord
- From Poland
- Lives with three other men (similar age), all bachelors from Poland, Turkey and Czechia
- Moved to the neighbourhood 5 months ago cause rent is cheap here comparatively.
- Finished a training programme, looking for a job
- No constant income - does some odd jobs to earn money
- Plays football in his spare time
- Believes we need to do something about global warming. But being sustainability is expensive. Doesn't have the money.

Figure 21: Personas

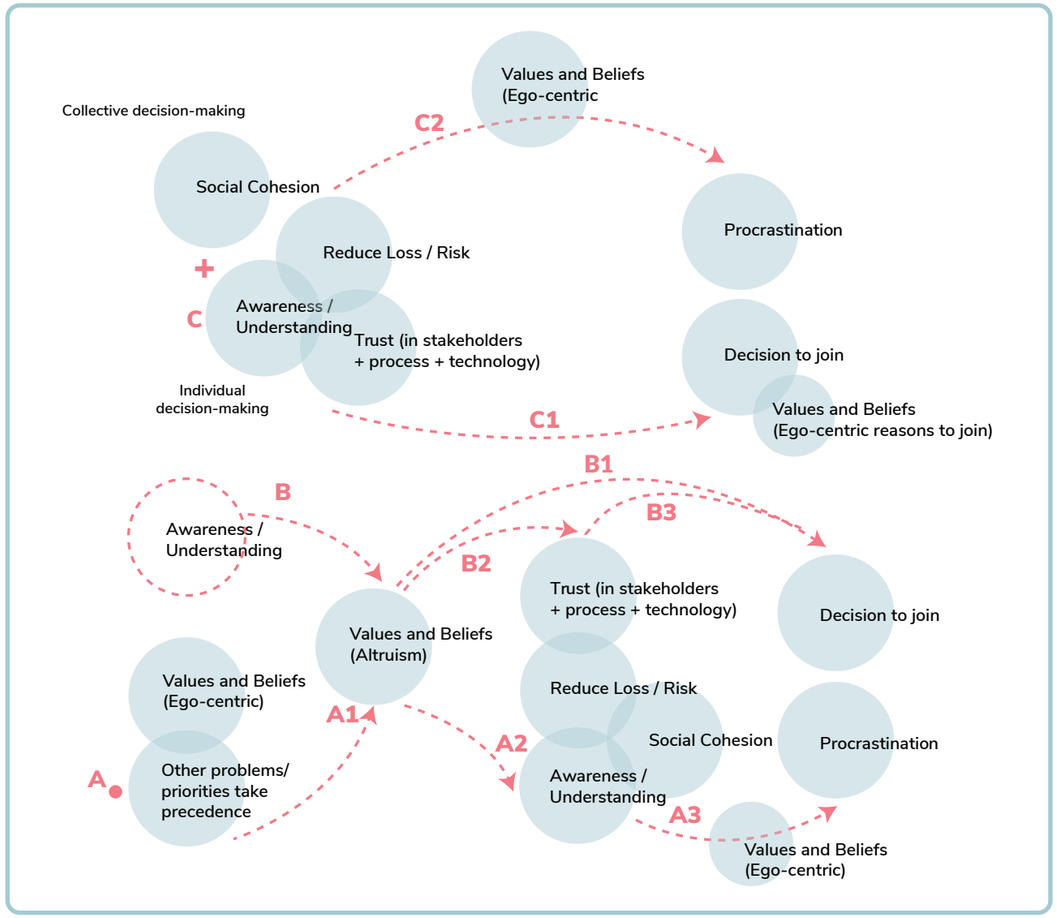


Figure 22: Visualisation of the decision routes – Outlines the order in which different themes get activated based on different type of persona's. Explained on pg. 98 / 99

Route: A **Persona: The Pre-occupied**

The theme 'Other problems/ priorities take precedence' drives this decision route. The Preoccupied have low motivation and low ability. Even when they are exposed to the information, The Preoccupied do not pay attention to this information. If they pay attention, they are not willing to perceive or learn the information since they have a pre-conceived notion that it is not worth their time (since they have more important priorities). Thus, the process of decision-making stops either at the Awareness or Knowledge stage. They either have no attitude or negative attitude towards gas discontinuation. The negative attitude stems from stories, perceptions or explanations they build for themselves (say, that it is not relevant for them) to avoid cognitive dissonance. For example, a lady who is pregnant states that her child is her utmost priority and being pregnant she does not have time to think about the energy transition. However, the transition is much in the future, when she would have already delivered the baby and will still be relevant to her. Thus, as a first step, the interventions aimed at tackling this need to capture The Pre-occupied's attention (making it relevant for them) and ensure appropriate learning (as intended) to convince them to go through the other stages of decision-making.

Route: A-A1-A2-A3 or A-A1-B2-B3 **Persona: Untiring Optimists**

The Untiring optimists are also caught under the grasp of 'Other problems/ priorities take precedence'. However, their values and beliefs (of altruism) overpower their low ability, making them moderately or highly motivated to acts towards the energy transition. With this high motivation, the Untiring Optimists try to convert their low ability to high ability. They are open to learning about the information. Although, they are affectively charged and have a positive value-based attitude, the themes of 'reduce loss / risk', 'trust' and 'understanding /awareness' get activated to evaluate the decision of gas discontinuation. Here, the evaluation criteria are mostly driven by ability (specifically money) aspects. If they can manage a way to save enough money or get funding, they will follow route A-A1-B2-B3, wherein they adopt greener energy alternatives. However, if they do not find a means to finance the transition, their low ability overpowers their motivation and hence, they would procrastinate with the decision (A-A1-A2-A3). Thus, interventions would include means to convert low ability (usually affordability factor) into a high ability. The interventions should also aim at continuously motivating the Untiring Optimists, ensuring they are consistently motivated (do not lose hope).

Route: B-A1-A2-A3 or B-A1-B2-B3 **Persona: Status seekers, Nurturers**

Being oriented towards latest trends, The Status-Seekers are well aware about the energy transition. Their decision-making (and motivations) is highly influenced by the subjective norm. These people mould their personal values according to peer / reference groups. Thus, depending on the reference group, values of altruism will be activated. Their ability (in terms of affordability) is low to moderate. The motivation derived from the subjective norm usually trumps the low/moderate ability, and dominates the attitude and behaviour intention. However, owing to the low ability, themes of loss/risk perception, trust and understanding/awareness are eventually activated to evaluate actual adoption of behaviour. Here, it is observed that most Status-Seeks lack an understanding of the urgency to act., or believe it is not their responsibility to contribute towards the transition. Thus, they procrastinate the decision to make way for their other priorities. Interventions need to accentuate the urgency to act. Further, affordances of the technology need to be made explicit (here, attributes of the innovation outlined by Rogers play an important role). The affective stages of Persuasion, Liking and Preference from the models of decision making need to be focused on. If the offering is made relevant to them, and if it adds to their status, they will opt for it. Wrapping the offering in contemporary (modern) trends will increase their propensity of having a positive attitude (and adoption). Channels which involve peer networks (social influence) will prove to be most fruitful.

Route: A1-B1 or A1-B2-B3 **Persona: Experience Enthusiasts**

Experience enthusiasts have high motivation and moderate to high ability. They have a higher tendency to make their decisions based on values (not always rational decision-making). If they spread these values to others, it could help motivate the masses. However, since experience enthusiasts are usually from a well-to-do background, the perception of the energy transition (or sustainable lifestyle) being associated with the wealthy needs to be curbed. Further, due to the high motivation and moderate-high ability, the evaluative aspects of the decision do not play a very central role. Altruistic values trump ego-centric values. Evaluative themes -trust and understanding/awareness have higher weightage than reduce loss/risk. These are activated mainly to decide which technology to opt for, and not whether to invest in gas discontinuation or not.

Route: C-C1 **Persona: Nurturers, Dare-devils**

Tis route is driven by the cognitive component. It is also the starting point of the process – similar to the models from literature, where awareness and knowledge precede affective components. The evaluative themes – Reduce loss/ risk, Understanding /Awareness and Trust are the starting point of decision making. It is observed that Daredevils and Nurturers fall under this route where decisions are highly driven by rational analysis. They have moderate/ high ability and moderate/ high motivation. The positive decision is driven by an entrepreneurial, risk-seeking mindset. These people usually have a dense network and thus, can act like hubs for social contagion. The Daredevils and Nurturers can prove to be the key 'seeds' for contagion. Further, the image of being entrepreneurial also gives associations of a rational /evaluative mindset (unlike the experience enthusiasts -who are highly value driven) and this is valuable to convince people with a low ability (monetarily; have a frugal lifestyle).

Route: C-C2 **Persona: The Conservative, The Skeptic, Resigned**

This route of decision making / attitude formation starts with evaluative themes. The cognitive aspects of the process are highly relevant. Trust, Loss/risk perceptions and Understanding / Awareness are key themes that get activated – reducing loss/risk being a key factor. People have moderate to high ability, but low motivation. Ego-centric values influence the decision process. Thus, even if people have a positive attitude, it does not translate to behaviour, since people procrastinate decision-making in order to preserve 'ego-centric' values / beliefs. For example, people do not want to be first and learn from others; or earthquakes are not affecting them directly, so they do not see the urgency in acting. Further, misinformation, false hopes and pre-conceived notions are highly prevalent amongst this group. This is either due to misinterpretation of information, or favourable explanations developed by them to avoid cognitive dissonance. Thus, the learning / knowledge stage from the decision-model related to marketing communication is crucial. The misinterpretations further lead to a negative attitude and/ or procrastination of decision-making.

The Skeptics have a high cognitive need. In the search for the most appropriate solution for themselves (also to reduce risk /loss) they question every single aspect of the process. For them clarity needs to be provided about all aspects – process, stakeholders costs, technology. Past experiences form an important part of their decision-making criteria.

The Conservatives lack an understanding of climate change (they are in denial). Even if they understand it, they don't feel the urgency to act. They live a frugal lifestyle and have a risk-averse nature. They are family-oriented and also obedient to laws and rules. The Conservatives shall wait for gas discontinuation to become a law and then only act.

The Resigned mainly constitutes of the elderly. These people have moderate to high ability and low motivation. They are open to information, understand and evaluate it. However, their low motivation which stems from lack of hope, trumps all the aspects. They observe that the energy transition might not happen in their lifetime and hence, do not see the point of investing in it; leading to procrastination of decision-making, or negative decisions. Building affective interventions which increase altruistic values (e.g. involving their grandchildren) can help to motivate the Resigned.

Few general insights are also be derived:

- For most people, the cognitive component has a higher influence on their attitude and subsequent decision towards gas discontinuation.

- The cognitive component leads to evaluation of the decision, which is driven by ego-centric values and hence, leads to procrastination of decision-making.

- Affective means (to trigger affective components) need to be explored to reduce the high dependency on the cognitive component of decision-making.

- The learning (knowledge) stage of the decision-making process is crucial, since it highly influences people's perceptions and attitudes. Misinterpretation of information can dampen the decision-making process. Here, more associationist means of learning and heuristics can be explored to enable learning as intended.

- The subjective norm is not highly utilised by people in their decision-making towards gas discontinuation as yet. This might be due to the nascent stage of the transition in general, or lack of interventions that make use of / promote normative means of building an attitude. This serves as an opportunity.

Along with the insight about the decision process, the above analysis also highlights the susceptibility (and timing) of different personas to adopt greener energy alternatives. These personas can be linked to Rogers' (1983) categorisation of adopters (based on their innovativeness). As shown in Figure 23, Experience Enthusiasts, Nurturers and Daredevil fall under the category of 'Early-adopters', since they have moderate/high motivation and moderate/high ability. The high altruistic values of the Experience Enthusiasts, and entrepreneurial mindset of the Nurturers and Daredevils make them more innovative or susceptible to adoption.

Early majority constitutes of the Status Seekers, since they are highly influenced by current trends. The Skeptic fall under Early majority or Late majority. They would adopt an innovation based on the experience of others and after evaluating all the aspects. The Untiring Optimists would fall under either Early majority, Late majority or Laggards, based on when they can afford the transition, since they are already motivated. The Conservatives constitute either Early Majority or Late Majority, depending on when gas discontinuation becomes a law. They would also want to learn from others experience, and their disbelief in the urgency to act makes them procrastinate and hence, late to the party. Last, the Preoccupied fall under the category of Laggards since they are low on both, motivation and ability, and need to take care of other priorities and problems first.

Here, the goal would be to convert as many personas as possible to either early adopters or early majority. Since the Skeptic, the Status seekers and the Conservative (and the Resigned) have moderate-high ability, if motivated, they have higher potential to become either early adopters or early majority. Thus, they can form the key target group for this project. Further, as shown in the next section, socially-driven interventions can help to mitigate the loss/risk perceptions, affect the theme of trust, and also understanding and awareness. These are key themes that drive the decision-making process of the Skeptic, the Status seekers and the Conservatives, and hence, socially driven interventions (the focus of this project) are apt to target these personas.

As mentioned earlier, the link between the themes, the decision process and the personas (derived in this section), is important to identify the Content of Contagion 'the WHAT' and 'WHO'. The next section narrows down to the content of contagion, and key target group that falls within the scope of this project.

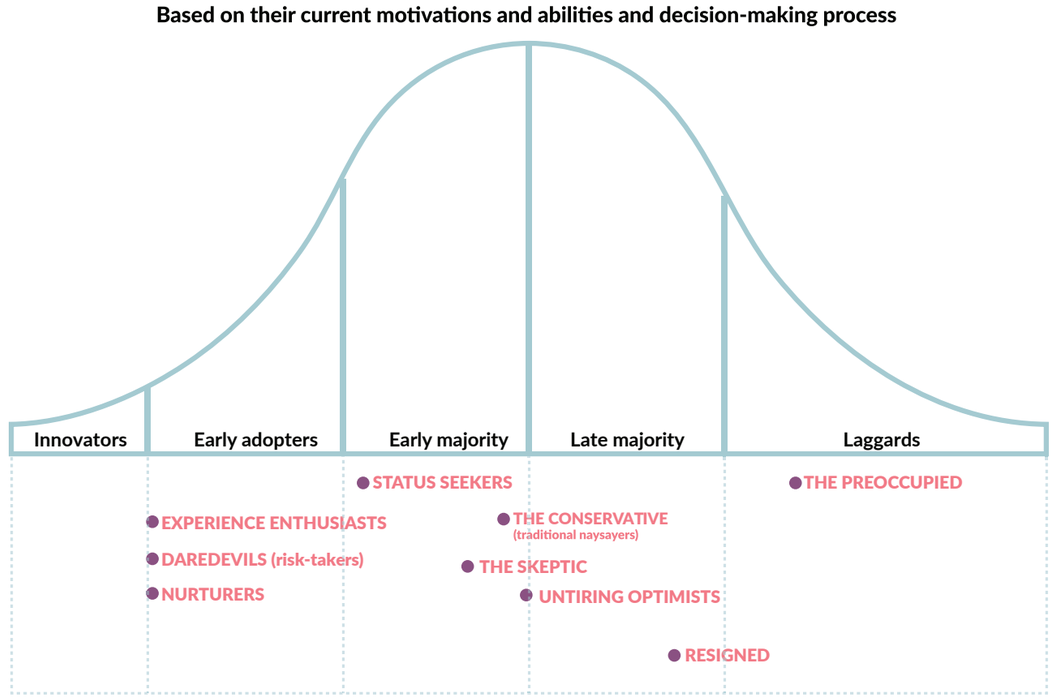


Figure 23: Mapping the personas on Rogers' (1983) categorisation of adopters based on their 'innovativeness' or susceptibility to adopt greener energy alternatives.

4.3 Defining the WHAT and WHO

In order to narrow down to the WHAT of the contagion, the themes were mapped onto the 2X2 matrix (Figure 24), where the x- axis was defined by the type of interventions that are required to resolve apprehensions related to the theme; and y-axis is defined by the urgency of resolving apprehensions within a theme.

The types of intervention include personal (self) intervention, government-driven interventions and socially-driven interventions. The urgency to act includes - most important to resolve and not so important to resolve as the two ends. The underlying construction of the themes (Figure 19; defined in section 4.1) along with decision routes (and personas) are used to define which kind of interventions would help to mitigate apprehensions within a theme. The urgency of attending to a theme is defined by the number of times a theme recurred in the decision routes, when in the decision process a theme surfaces (and impedes the next steps), how the theme

affects other themes and also to what extent an intervention would be able to influence the theme.

As shown in figure 24, the theme of 'Other priorities / problems take precedence' lies high on the urgency to resolve axis and needs personal or government-driven interventions. The construction of the theme highlights that affordability (lack of financial resources) and situational aspects keep the persons mind pre-occupied. Affordability can be tackled through personal or governmental interventions including funding options, no (low) interest loans etc. Further, situational aspects can also be mitigated mainly through personal or government efforts. Although this theme does not recur more than twice in the decision routes, it is a key hurdle in the decision process, since people do not go beyond the 'exposure' state when this theme is active. Additionally, a majority of the population in Reyeroord falls under this category. This elucidates the urgency of resolving this theme.

Trust lies high on urgency since it recurs in different decision routes, although it is more relevant for routes which have dominant evaluative aspects. The underlying safety needs further accentuate the urgency of mitigating apprehensions related to trust, since it is one of the basic needs which need to be met in order for people to think about other aspects. Trust can be inculcated through socially-driven interventions as compared to government driven interventions. Here, the concept of homophily becomes relevant. This is in line with insights from the interviews, where people mention that it is not easy for residents to trust the government; and people are more influenced by their peer groups.

The themes 'Loss/ Risk Perceptions' and 'Understanding /Awareness', can be influenced by both government-driven or socially driven interventions. Both, these themes are important to address (lie on the higher side of the urgency axis), since these have been most commonly cited as reasons for people to delay decision-making or decide against gas discontinuation. Procrastination, resulting from the lack of understanding or negative perceptions of loss / risks, thus lies underneath these in terms of urgency. Both, government driven interventions (e.g.. implementation of a policy) or socially-driven interventions can aid in overcoming procrastination.

Values and Beliefs (Ego-centric and altruism) form the basis of decision-making. However, changing values and beliefs is more difficult, and hence is lower on the urgency list. Further, at times, values and beliefs do not need to be completely altered in order to adopt an innovation. Rather, the values and beliefs of a person can be used to persuade them to adopt an innovation. Socially driven interventions are more apt, to alter / affect the values and beliefs of a person.

The theme of social cohesion is more important when there is collective decision-making. In individual decision-making, social cohesion affects one's values and beliefs (or the ability to think beyond the self). Thus, it is not that important to resolve. Further, social cohesion can be built through both social or government driven interventions, however, socially-driven interventions may be more successful. Aesthetic preferences are shaped through culture & social norms and thus, socially-driven interventions are most apt to tackle apprehensions related to this. However, this theme is not so important to resolve since it was mentioned only once.

Since the aim of the project is to use social influence (socially driven interventions) as a means to motivate residents towards gas discontinuation, it is apparent that the top right corner of the matrix is most relevant for this project. Further, the construction of the themes highlights that Procrastination is a consequence of the three interrelated themes – Trust, Loss / risk perceptions and Understanding / awareness. Thus, the meta-theme of procrastination will be the focus of the project. How this meta-theme and the interrelated themes can be translated into the content of contagion are subsequently explored.

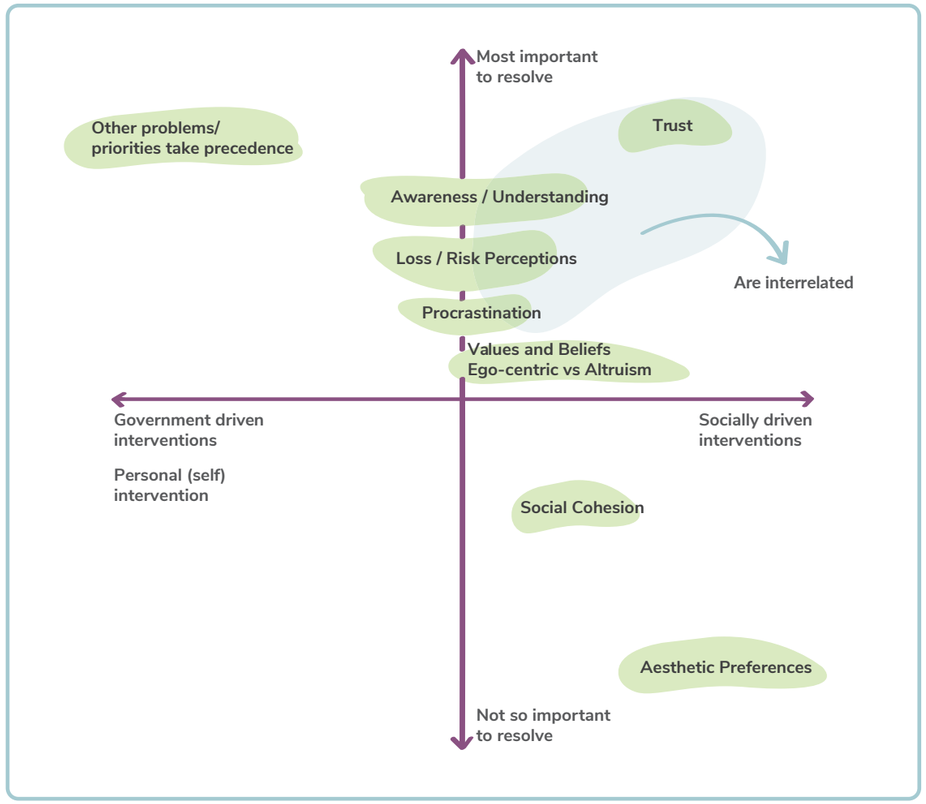


Figure 24: Mapping the themes on the basis of the kind of interventions that can help resolve its underlying issues, and the urgency of resolving these underlying issues.

4.3.1 Deconstructing Procrastination

As Milgram & Tenne (2000) define it, procrastination[1] is “a trait or behavioural disposition to postpone, delay, and thereby avoid performing tasks or making decisions” (p1). In the case of the energy transition, this procrastination is in making the decision to discontinue gas. Analysis of the interview insights highlights that procrastination amongst the residents who have the ability (can afford it) is caused due to ego-centric evaluation. Three key themes ‘reduce loss/ risk’, ‘trust’ and ‘understanding/awareness’ and their underlying construction contribute to this ego-centric evaluation.

This is in line with Milgram & Tenne’s (2000) review of literature, where they highlight different perspectives / theories that lead to procrastination. In their description of the Triple A theory (Appraisal-Anxiety-Avoidance) by Lazarus and Folkman (1984), Milgram & Tenne (2000) argue that cognitive appraisal of the parameters of the stressors (threatening elements in any situation) and of the resources (internal and external) that are available to cope with the stressors, are key factors that drive procrastination. Further they state that “People assess (i) whether a given situation or task poses a threat to them and/or (ii) whether making a particular decision poses a threat to them; in both cases, they assess whether they possess the resources to deal effectively with the threat associated with completing the task or making the decision, respectively. If they perceive their resources to be inadequate, they experience anxiety (and other aversive emotions) and escape from the situation by putting off doing the anxiety-provoking task or making the decision as long as possible. The various kinds of procrastination become established and are sustained as negatively reinforced behavioural tendencies by virtue of their anxiety-reducing consequences.” Further, from a personality perspective, traits such as the fear of failure, non-competitiveness, low self-esteem, and public self-consciousness lead to indecision. Thus, fear of failure and/or cognitive appraisal, both explain the theme of ‘reduce loss / risk’ and its relationship with procrastination.

As shown in figure 25, perceptions of risk / loss are highly related to the themes of trust and understanding/ awareness. Each theme has a causal relationship with the other two themes, which highlights the interconnectedness of all the three themes and the consequent procrastination. Trust is a means to reduce the perception of loss /risk, while lesser the loss / risk perception, more the trust. Trust (in the source) is important for people to believe the information; however, basic understanding (openness to information) is a precondition for trust. Further, more the people have an understanding (of the process, technology, stakeholders, timeline, costs), less the risk perception. On the other hand, higher the perception of loss / risk, more it becomes a barrier to comprehension (willingness to absorb information).

1 In this thesis, the term Procrastination is used broadly and not in terms of its psychological or behavioural definition. The act of delaying the task or decision-making (whether it has rational or irrational reasons behind the delay) is referred to as procrastination

Thus, to tackle procrastination, all the three aspects need to be resolved simultaneously. The need for multiple interventions tackling each of the theme is apparent. Further, as shown in figure 26, the underlying factors identified for each theme (derived from the field research), can be used to devise interventions.

From the perspective of this thesis and its socially driven approach, we can assume that getting information from peers or the social network can instill more trust (as compared to government driven initiatives). Having tackled the trust component to some extent, the focus of this thesis can be on the Understanding / Awareness theme and its motivation factors -since enabling an understanding of the urgency to act as well as the process, technology and costs can further reduce the loss/risk perceptions. Thus, the content of contagion can be defined as ‘the urgency to act’, and ‘comprehension of technology, costs and processes’. Further, as described in section 4.2.2, the Skeptics, the Status seekers, the Conservative and the Resigned are more prone to procrastination, even though they have moderate-high ability. Thus, these can form the key target segment for the interventions towards procrastination[1].

The specific design question to translate this WHAT into interventions for the Reyeroord context can be defined as:

Specific design question 1

How to persuade the ‘Procrastinators’ about the urgency to act towards gas discontinuation while enabling thorough comprehension of the process, technology and costs (such that it mitigates their loss/ risk perceptions and builds trust), through their social networks?

Having defined the WHAT (content) element of contagion, the next chapter focuses on the HOW – to understand how the contagion can unfold in Reyeroord.

1 Note: since the project involves social contagion -social influence through people’s networks, other personas might be included in the process as well. However, the key target group is identified to specify that the interventions would be directed towards and informed by the characteristics of these groups.

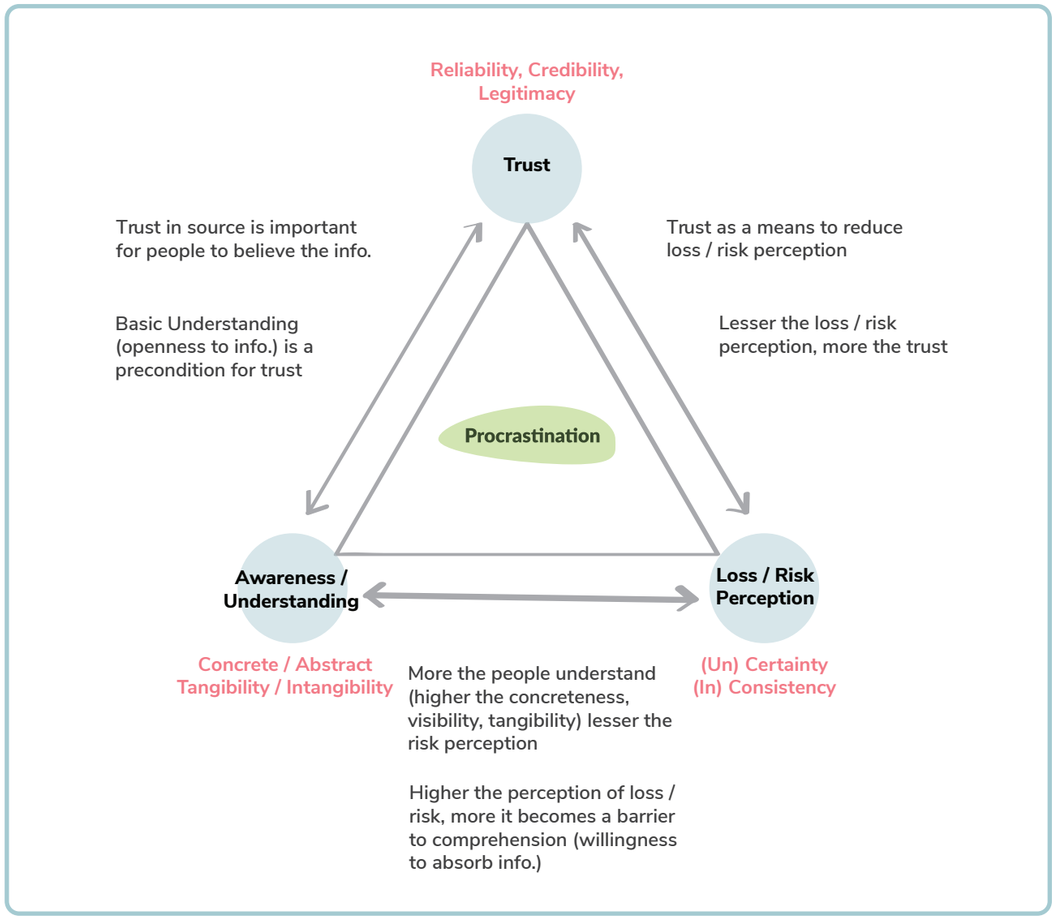


Figure 25: Deconstructing Procrastination towards gas discontinuation; Procrastination is the result of three interrelated themes in this project – Trust, Understanding/Awareness and Loss/Risk perceptions.

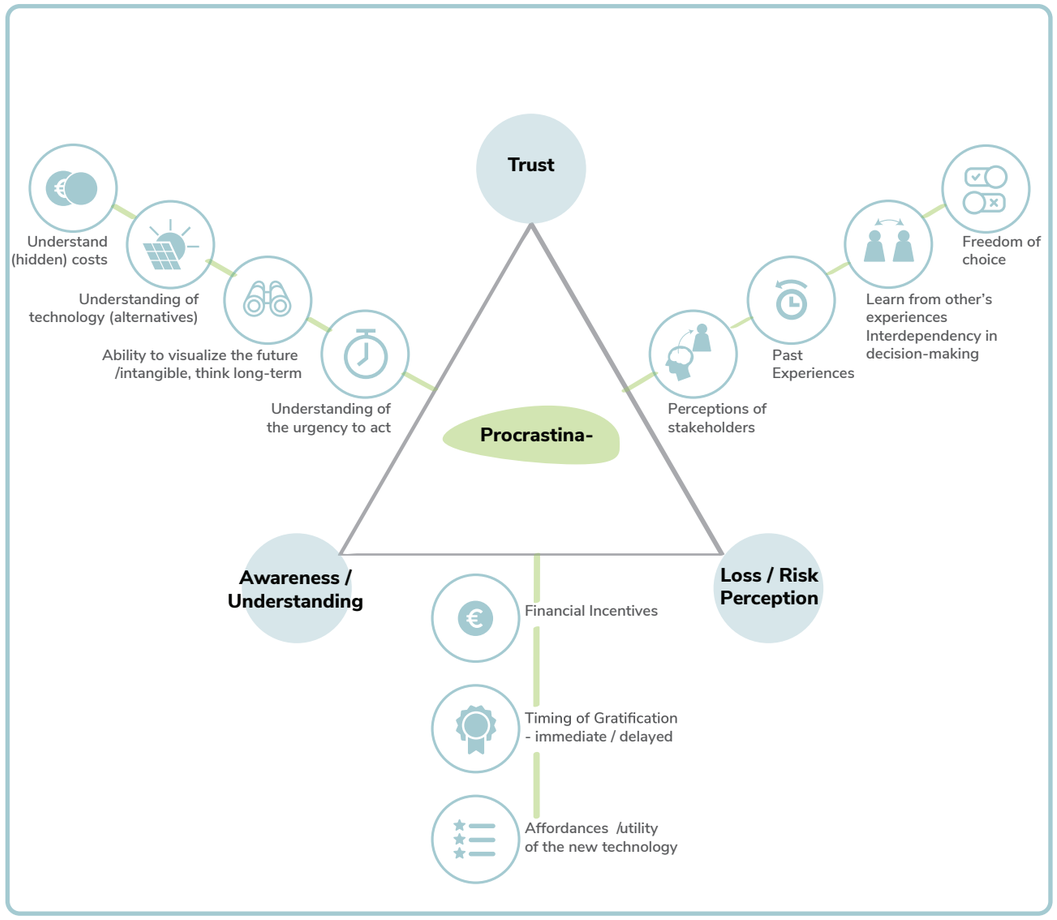


Figure 26: Three key themes underlying the meta-theme of Procrastination and factors related to each theme that can be used as a starting point to design interventions.

Chapter 04 in sum...

- The chapter answers the first research question pertaining to understanding the motivations and apprehensions of the residents towards the energy transition. These help to identify the 'WHAT' / content for contagion in Reyeroord.

- Thematic analysis of the interviews outlines several motivations and apprehensions, which fall under 7 key themes - Other problems and priorities take precedence, Loss /risk perceptions, (lack of) Social cohesion, Procrastination, Understanding and awareness, Trust, Aesthetic preferences and Values and beliefs (Ego-centric vs altruism).

- The motivations and apprehensions are classified into motivation, ability and trigger factors based on Fogg's behaviour model. These factors and Maslow's hierarchy of needs are further used to analyse the construct of the above-mentioned themes. Relationships between the themes were further explored.

- This reveals that people's basic needs (such as safety, physiological, psychological needs) need to be met before they think about the energy transition. People's decision-making follows the Maslow's hierarchy wherein people go up the ladder. The themes 'trust', 'loss/ risk perceptions' and 'understanding/awareness' are highly interconnected, wherein each acts as a cause and consequence of the other two. Further, all these three themes form the underlying construct of the theme 'Procrastination'.

- The significance of these themes in the decision-making process varies based on the different types of residents (their motivations and abilities). Thus, decision-making routes are mapped for different personas; which highlights the different sequences of activation of different themes. Broadly, there are two key routes of decision-making based on ego-centric values or altruistic values. Themes such as Loss /Risk perceptions, Understanding / Awareness dominate the ego-centric route of decision-making. Amongst the personas that have apprehensions to participate in the energy transition, the decision-making process of the Skeptic, Status seekers, Resigned and the Conservatives (all of which have moderate/ high ability but low motivation) highly rely on the themes of trust, understanding/awareness and loss/risk perception. Hence, these re chosen as the key target audience for his project.

- The themes are mapped on a matrix based on the kind of interventions (government driven vs socially driven) that can help in overcoming apprehensions related to it and the urgency of resolving apprehensions pertaining to the theme. This reveals that the theme of trust can be resolved through socially-driven interventions, whereas understanding/awareness, loss/ risk perception and procrastination can be resolved through both, government or socially-driven interventions. These themes along with 'Other priorities take precedence' (which can be resolved through self or govt. interventions) are most important and easier to resolve (as compared to the themes of Social cohesion, Aesthetic preferences or Values & beliefs). Since the very ethos of the project is to use social contagion, the focus of the project is on the themes that can be resolved through socially driven interventions – Procrastination, Trust, Understanding / Awareness and Loss/ risk perceptions.

- Based on the key themes and target audience, the key goal of the contagion for Reyeroord is defined as 'Overcoming procrastination'. Prioritising the underlying factors, a specific design question was formulated to further narrow down to the 'WHAT' of the contagion:

  How to persuade the 'Procrastinators' about the urgency to act towards gas discontinuation while enabling thorough comprehension of the process, technology and costs (such that it mitigates their loss/ risk perceptions and builds trust), through their social networks?

- This specific design question will further be used to guide the ideation phase.

05

Defining the HOW for Reyeroord

Chapter 05- Defining the HOW for Reyeroord

This chapter focuses on the 'HOW' component of contagion identified in Chapter 2. More specifically, it builds on step 1 (mapping social identities) and step 2 (identify homophilous clusters and social contexts of interaction) of the process of contagion highlighted in Figure 7. It answers the second sub-question (RQ2) defined in the beginning of the project - What does the social network of the residents look like? The social identity's and social contexts of interaction derived in this chapter shall inform the design phase specific to Reyeroord.

5.1 Social Identities & social contexts of interaction

Due to lack of access to residents and not being able to probe their identities first-hand, this section outlines the social identities of residents in Reyeroord based on insights from interviews with municipality officials. It takes a more generic (macro) view, as compared to defining individual (micro) identities. Two routes of defining a resident's identity in Reyeroord can be identified (as shown in Figure 27)- namely:

Based on their socio-economic background / type of housing:
Though Reyeroord constitutes a region with below average income in general, one can still make a distinction between the three different income groups – low, middle and high incomes within the neighbourhood. It is observed that people from similar socio-economic backgrounds live closer to each other in spatial clusters (as shown in Figure 28). Additionally, there is a relation between the income level and type of housing. (Few traces of cultural relation between type of housing and socio-economic backgrounds are also found). Defining a resident's identity based on socio-economic background or type of housing can help in outlining social contexts of interaction.

Based on activities pursued (interests, practices, groups they are a part of):
The resident's social identity can also be defined based on the activities they pursue or their interests (based on the communities of practice). Examples of these identities could be – church-goers implying one is religious, walks the dogs implies he/she is a dog owner / lover, goes to the gym implies he/she is conscious about their health etc. While this way of mapping an identity is quite broad, it gives insight into the social contexts of interaction of people, which can be useful for the spread of the contagion.

Both these logics of defining identities gives insight into two types of social contexts of interaction of the residents, and the social networks that these engender.

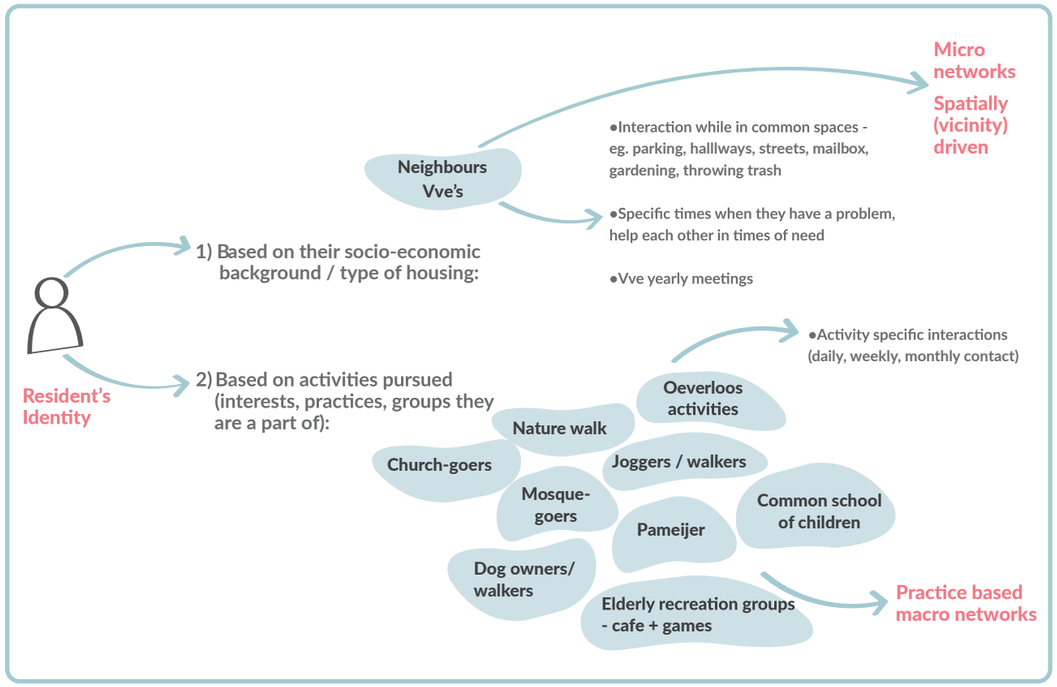


Figure 27: The two routes of mapping a resident's social identity in Reyeroord, and the social contexts of interactions these engender.

The socio-economic / type of housing route gives rise to micro, neighbour-oriented networks. People living in close vicinity (the same building or lane) constitute these networks. People are neighbours. Social interactions are in the form of meetings in the hallways, common spaces like parking, near the mailbox, while throwing trash, getting the newspaper, occasional house visits (in times of trouble or to help one another; frequency can depend on the strength of the ties), monthly /yearly meetings in the case people are part of a Vve etc.

It has also been observed that most of the micro neighbour-oriented networks constitute of one or two volunteers or entrepreneurial people who help the others and /or are more active. The homophily in this context can be defined based on either common economic status, or the context of the type of housing (living situation). Interaction or conversations are sparked by (constitute of) common troubles or experiences, recent events / news, general greetings or seeking advice/ help from one another. These micro networks can serve as clusters (within a clustered network) for the contagion.

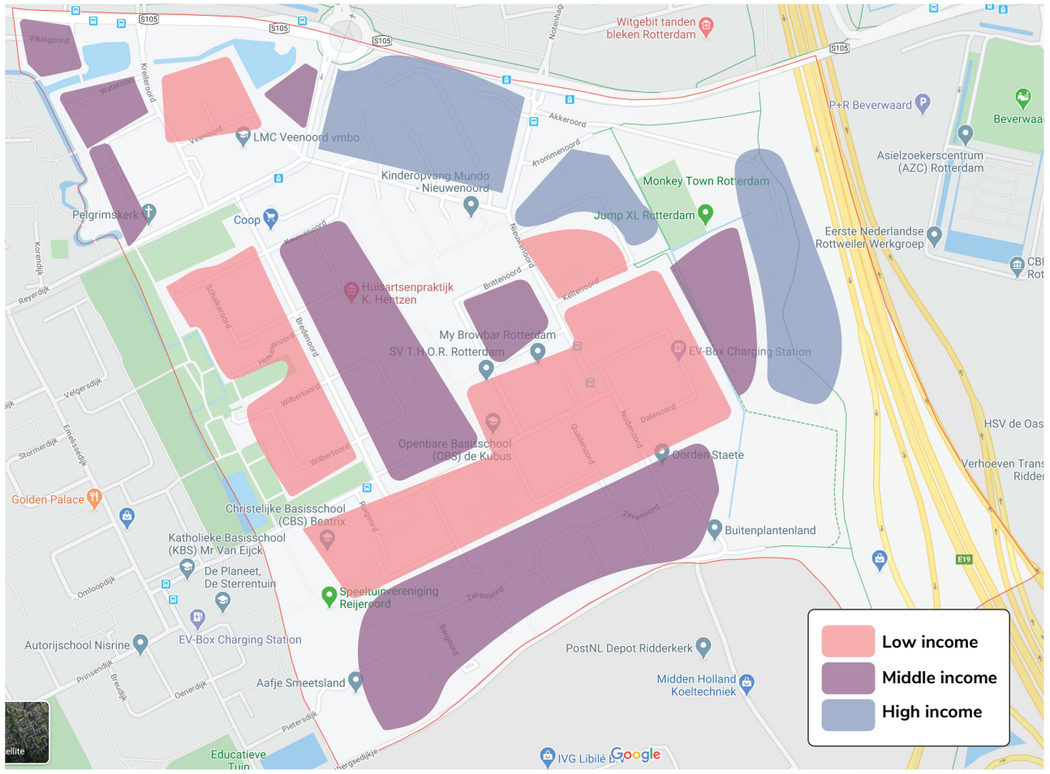


Figure 28: Map highlighting spatial clusters based on income groups within the neighbourhood.

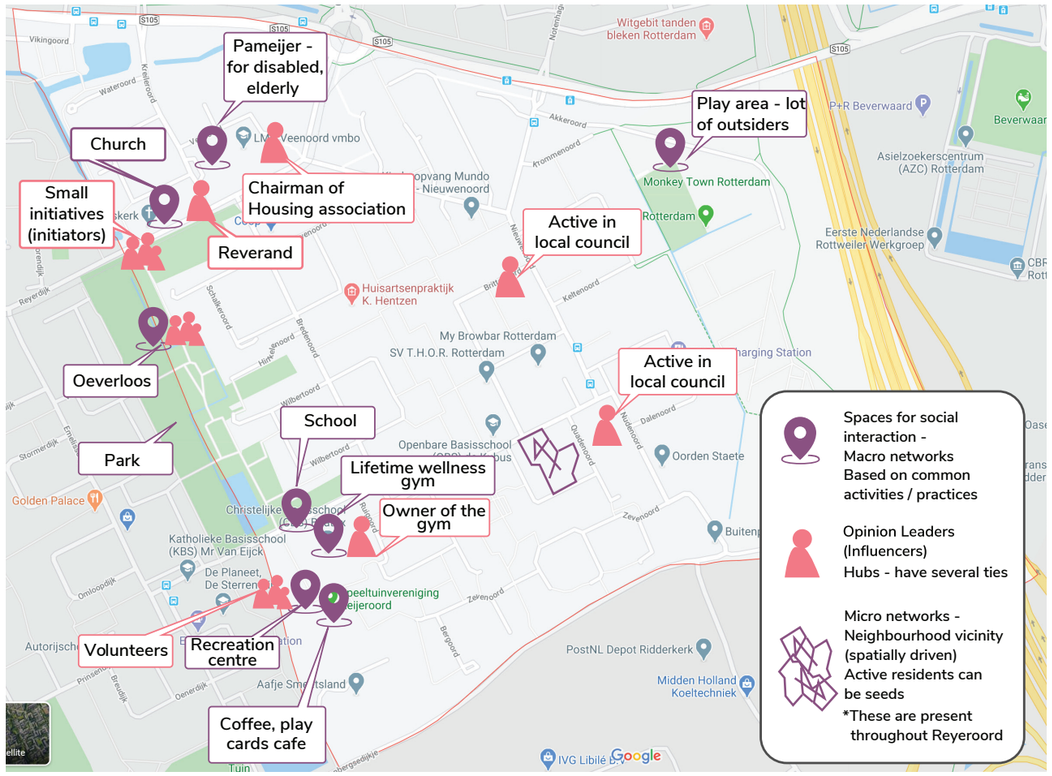


Figure 29: Map highlighting spaces that give rise to macro practice-based networks; and opinion leaders/ front-runners (hubs) in the neighbourhood

The common activities (practices / interests) pursued give rise to social interactions in the common spaces such as the church, gym, schools, recreation centre, elderly activity centers etc. These give rise to macro practice-based networks, where, people from all economic backgrounds (micro-network; neighbourhoods) are present. Hence these can serve as social contexts that help to spread the contagion (grounds for wide bridges) from one neighbourhood to the other. Moreover, the homophily here is in terms of the common practice and the values and beliefs related to it.

Interactions and conversations are usually between selective others (not everyone present). Further, the type and duration of interaction / conversation is defined by the space and other demographic aspects. For example, during the Nature walk, residents generally walk and observe nature, while discussing the happenings of the week. Since the group usually consists of elderly, retired residents, the conversations are varied based on one's experiences, grandchildren, church activities, news, issues in the neighbourhood etc. Further, several opinion leaders / active citizens are present in the community who are associated with these spaces (Figure 29). For example, the reverend in the church, the owner of the gym, volunteers at Pameijer and the recreation centre etc. These are hubs (highly connected individuals), who play an essential role of binding the population together (Centola, 2018 p.49). The role of these hubs in the contagion is explored in the next section.

In conclusion, both the routes of social identities highlight the different social contexts that can be grounds for the contagion to be seeded and spread. The next section makes use of both these contexts to visualise how the social contagion can unfold in Reyeroord.

5. 2 Visualising the social contagion in Reyeroord

Theoretical foundation of complex contagions from chapter 2 and the social identities and social contexts identified in the above section are used to visualise the process of contagion.

As shown in figure 30, the process of contagion can start with the hubs (famous, active people in the neighbourhood). These hubs can serve a dual purpose – first, they can themselves act as seeds for contagion; second, having large number of ties with people from different backgrounds and coming in contact with these people on a regular basis (knowing them), thee hubs can help to identify the seeds (active people / volunteers) in the micro networks. Upon identification of seeds in the micro networks, contagion can be seeded in multiple smaller micro clusters -using a clustered seeding strategy. Here, interventions need to be designed for the contagion of 'urgency to act' and 'information related to the energy transition' (content identified in the last chapter) within the micro network. The interventions need to create reinforcement, wherein each resident has at least 2 sources of exposure (assuming a minimum threshold complex contagion).

Further, assuming that different people from the micro (neighbourhood) networks are also a part of the macro (practice based) networks (e.g. go to the gym, church etc.), once the contagion is spread within the cluster, it will be spread across clusters. Interventions need to be designed at these social spaces of interaction, such that it facilitates the interaction and exchange of relevant information between different residents, in turn enabling the contagion of the 'urgency to act' and 'information related to the energy transition'. These interventions can help build wide bridges, a pre-requisite for complex contagions.

Activated nodes in the activity clusters, shall go back to their neighbourhoods and spread the contagion and get reinforcement from similar others. The key aspect is to use clustered seeding,

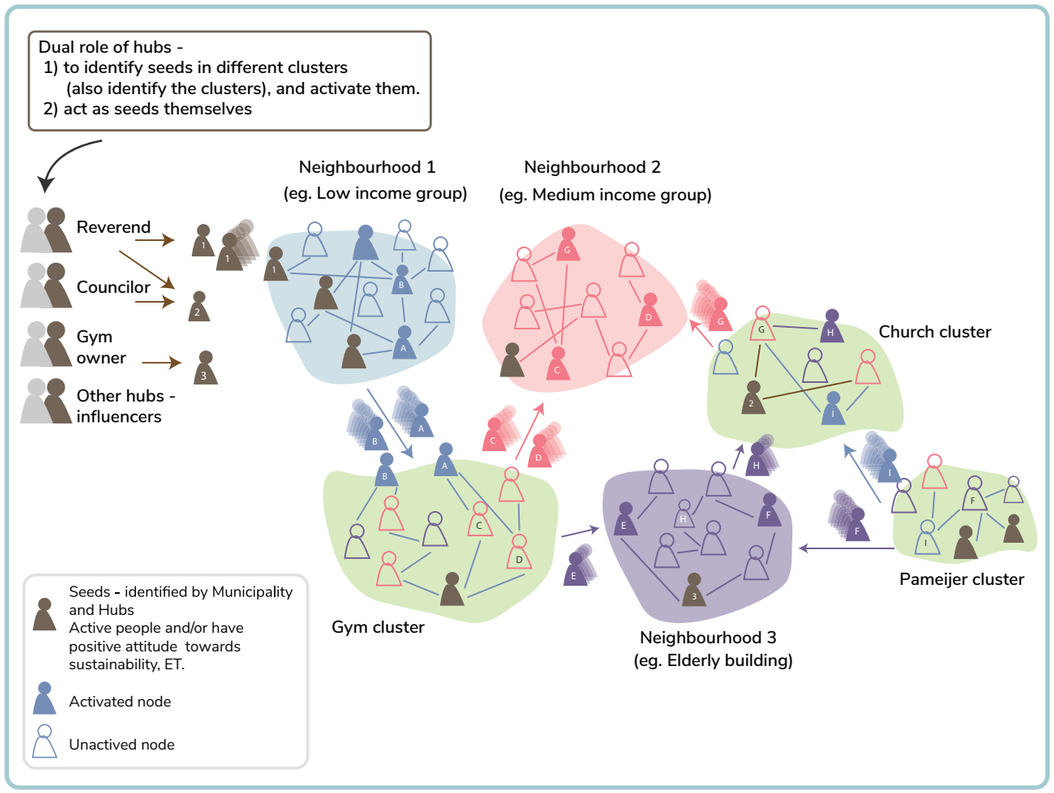


Figure 30: Visualisation of social contagion in Reyeroord

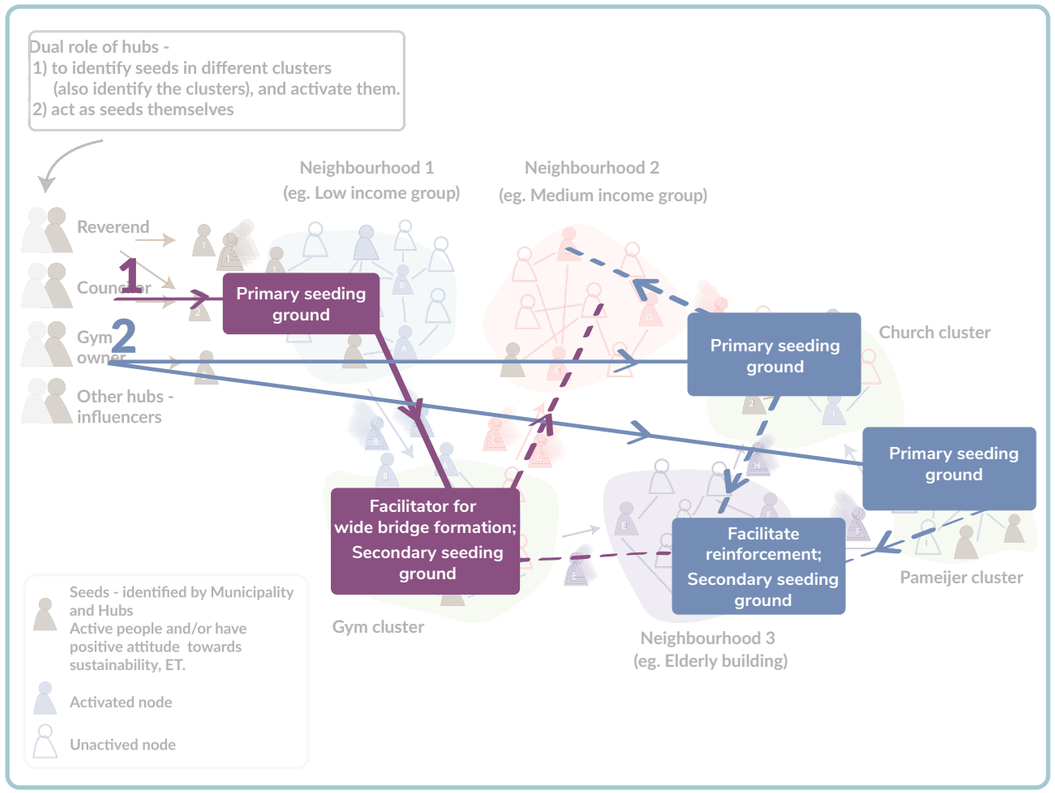


Figure 31: The two routes of social contagion in Reyeroord.

and activating multiple clusters (both, neighbourhood as well as activity networks) at the same time. If the process of contagion unfolds in the above manner, the neighbourhood clusters can be seen as the primary seeding grounds and activity clusters can be seen as facilitators for wide bridge formation and secondary seeding grounds (Route 1 in figure 31). Conversely, as route 2 (Figure 31) highlights, the activity clusters can be seen as primary seeding grounds and neighbourhood clusters as facilitators of reinforcement and secondary seeding grounds. Which route is more effective will have to be tested in the future.

Since costs form the key criteria in the decision-making process of residents in Reyeroord, it is assumed that contagion via neighbourhood groups (wherein homophily is driven by socio-economic backgrounds) will be more relevant. This line of thought motivates the use of route 1 of contagion as the guiding principle for his project. However, how to stimulate the interactions for contagion remains a question unanswered. This forms the second specific design question, described below, which shall guide the ideation phase:

This question relates to step 4 and 5 related to designing interventions for social contagion as identified in chapter 2, section 2.4. These broad social contexts of interaction and the process of the contagion guide the ideation phase.

Specific design question 2

How to spark conversation / interactions between the residents in the neighbourhood (vicinity-based) networks and practice-based networks about the energy transition specifically?

Chapter 05 in sum...

- The chapter answers the research question 2 pertaining to what the social networks of residents look like from a zoomed out (macro) perspective. It defines the HOW component of the contagion.

- Two key routes of defining a resident's social identities are defined. These are used to identify the social networks and social contexts of interaction of residents in order to seed the contagion.

- The first route of mapping people's identity is based on their socio-economic background; which has high correlation with the type of housing they inhabit. People with similar socio-economic backgrounds stay in similar houses (in close vicinity) and know each other better. Thus, these neighbourhood micro networks (based on vicinity of house) can be used to seed the contagion (within clusters).

- The second route of mapping people's identity is based on the activities they pursue, their interests – which give rise to practice-based networks. These activities are related to the social spaces in the neighbourhood – e.g. church, gym, park, Pameijer etc,. Since people from all different neighbourhood (micro) networks come to these spaces, interactions between these people can help in the spread of the target behaviour (contagion) across the neighbourhood clusters.

- Based on these identities and contexts of interaction, how the contagion can unfold is visualised. There are some influencers and active people in the community who are entrepreneurial and more convinced about the energy transition; they can serve as the seeds- especially for the macro practice-based networks. They can also help to identify seed nodes in the micro neighbourhood networks. The micro neighbourhood networks are seen as the primary seeding grounds for within cluster contagion and macro practice based networks prove to be secondary seeding grounds and facilitators of wide bridges. Specific interventions need to be designed to enable the interaction between people within (in the neighbourhood) and across groups (in the church, gym etc.).

- The specific question relates to how to design these interventions that enable the interactions between people within and across clusters to spread the contagion (of the urgency to act, and comprehension of technology, process, costs – WHAT aspects defined in chapter 4). This forms the focus of the design phase.

Part A: Research - Summary & Conclusion

The key aim of the research phase was to understand the context of energy transition in the Netherlands, the theoretical underpinnings of social influence and social contagion, get familiarised with the Reyeroord context, and to understand the residents' motivations and apprehensions towards gas discontinuation, as well as their social networks.

While the government of Netherlands is developing policy and financial measures to incentivise residents to discontinue gas, it is clear that these are not enough. There is a need for bottom-up institutionalisation of greener energy alternatives, wherein social desirability is not solely dependent on financial mechanisms but also intrinsic motivation of the residents.

Zooming into the resident's decision-making process, we see that this intrinsic motivation or positive attitudes and subsequent behaviour is driven by one's values and beliefs. However, these values and beliefs are not stand-alone; they are shaped by the context (and contextual factors) that surrounds oneself. Amongst others, social norms and social groups one associates with are key contextual determinants of how a person behaves. This susceptibility to social influence is driven by one's need to act effectively, to build and maintain social relationships and to manage their self-concept (personal & social identity), wherein one tends to compare themselves with similar others to gauge the appropriateness of their behaviour. Thus, social influence can be seen as a leverage point to shape people's attitudes and behaviour towards gas discontinuation.

Since gas discontinuation entails high costs and risks, it requires a complex contagion (vs simple contagion) to activate residents wherein they get independent affirmation and reinforcement from multiple homophilous others. Further, for the spread of the contagion at the network scale, it requires activating homophilous clusters (within cluster contagion), followed by enabling wide bridges (across cluster contagion). This theory of complex contagions (from Centola, 2018) is translated into actionable components and steps that need to be defined / designed in order to stimulate contagion.

This includes defining three components of a contagion – the WHAT (content for contagion), the HOW (means of contagion) and the STRATEGY (persuasive and tactical ways of stimulating contagion). Within the HOW component, a 6- step process is identified- which involves understanding people's social identities and social networks, identifying apt social contexts of interaction based on the identities, identifying seed nodes, designing interventions for within and across cluster contagion and finally, seeding the contagion, evaluating it and making the necessary iterations. These components and the process are used to guide the Reyeroord case study, with the overall aim to translate these into a framework for future use.

After understanding the Reyeroord context (its spatial and social composition as well as the current energy transition efforts of the municipality), the WHAT for contagion is defined. This is done by answering the first sub-research question pertaining to the residents' motivations and apprehensions towards gas discontinuation. 8 key themes (and their underlying factors) fuel the residents' apprehensions, namely: Other problems and priorities take precedence, Loss /risk perceptions, (lack of) Social cohesion, Procrastination, Understanding and awareness, Trust, Aesthetic preferences and Values and beliefs (Ego-centric vs altruism). The relationship of these themes to the different types of residents (personas) and their decision-making routes is explored. It is evident that the procrastination towards the decision is driven by either low affordability amongst residents or low motivation due to lack of trust, negative loss/risk perceptions and gaps in understanding / awareness. While the low affordability can be resolved through government driven-interventions, the low motivation factors can be mitigated through socially-driven interventions. Thus, these form the focus area of the project and constitute the WHAT. Based on the underlying factors of these themes, a specific design question (1) is formulated which can guide the design process:

How to persuade the 'Procrastinators' about the urgency to act towards gas discontinuation while enabling thorough comprehension of the process, technology and costs (such that it mitigates their loss/risk perceptions and builds trust), through their social networks?

Next, the HOW of the contagion is defined by answering the second sub-research question related to the residents' social networks. Here, two routes of defining the residents' identities and the consequent social networks are observed. The first relates to the socio-economic backgrounds of people which has a correlation with the type of housing people inhabit. People from similar socio-economic backgrounds live in the same vicinity, which gives rise to micro neighbourhood networks. The second route to map residents' identities is based on the activities they pursue and their interests. This gives rise to macro, common practice-based networks at the key social spaces in the neighbourhood e.g. the church, gym, parks etc. People from different micro neighbourhood networks come to these spaces and form the macro networks. Thus, the contagion can be seeded in the micro networks / clusters (for within cluster contagion) and can be spread across clusters through the macro practice-based networks. Specific interventions need to be designed for both, within and across contagion, which facilitate the interactions between the people in both the contexts. This leads to the second specific question:

How to spark conversation / interactions between the residents in the neighbourhood (vicinity-based) networks and practice-based networks about the energy transition specifically?

In sum, the research phase defines the WHAT and HOW of the contagion for Reyeroord, along with specific design questions which build the foundation for the design phase.

B

Part B: Design

06

Design direction

Chapter 06- Design direction

The design phase answers sub-question 3 “How can the social networks of residents be used to influence their decision-making, such that they actively adopt greener energy alternatives?”.

As discussed in chapter 3, the residents in Reyeroord will be faced with the decision to switch to district heating (greener energy alternatives) approximately 2 years from now. During these 1.5 -2 years, the municipality aims to build awareness and positive attitudes amongst the residents towards the energy transition. This needs several small interventions that build positive / favourable attitudes and commitment. While Chapter 4 concluded in a specific design question to overcome specific apprehensions (narrowing down the scope for this project), all other apprehensions need to be overcome. Thus, the aim is to support the municipality’s efforts by developing a generalized tool that can help them in designing these interventions.

Further, from the perspective of social contagion - as identified in chapter 5, how to spark the interactions between residents (both within a cluster and across clusters) for the spread of the contagion (to overcome apprehensions) is a question unanswered. This relates to the STRATEGY component of contagion and step 4,5 of the process of contagion (figure 7) pertaining to designing interventions.

Thus, keeping both the above-mentioned aspects in mind, the following overall design direction is defined:

Overall design direction

To develop a tool that can help the municipality in designing interventions that stimulate social contagion of favourable attitudes and opt-in towards gas discontinuation.

Apart from aiding them in designing interventions to stimulate social contagion, the tool[1] aims to familiarise municipal officials with behavioural & social constructs of decision-making and persuasive behaviour change strategies, which inspire them to incorporate bottom-up, socially-driven interventions and processes in their approach.

The specific design questions 1 &2:

1. **How to persuade the ‘Procrastinators’ about the urgency to act towards gas discontinuation while enabling thorough comprehension of the process, technology and costs (such that it mitigates their loss/risk perceptions and builds trust), through their social networks (neighbourhood networks and activity networks)?**

2. **How to spark conversation / interactions between the residents in the neighbourhood (vicinity-based) networks and practice-based networks about the energy transition specifically?**

derived in chapter 4 & 5 are used to brainstorm ideas and design the tool, as well as to provide specific examples of interventions aimed at triggering social contagion towards gas discontinuation (as described in chapter 7).

Chapter 8 outlines the toolkit - its components and how to use it. Chapter 9 gives insight into the validation of the tool as well as its limitations. The thesis culminates with a discussion in Chapter 10, wherein the elements of contagion and process of contagion are translated into a framework (based on the meta-level aim of the project defined in chapter 2), for future validation. The chapter outlines areas for further research, limitations of the project and a personal reflection.

1 It is a conscious decision made by the author and the mentors to develop a tool that enables the Municipality to design interventions that trigger social contagion, rather than designing specific interventions for Reyeroord. The decision is motivated by the constraints in validation (due to lack of access to the context) of specific interventions due to COVID-19, as well as the nascent stage of the energy transition project in Reyeroord.

07

Ideation

Chapter 07- Ideation

While the chosen design direction involves developing a tool that can help the municipality in designing interventions (that stimulate social contagion towards gas discontinuation), the first step is to understand what these interventions would look like. This is in line with Stappers and Sleeswijk Visser (2014) where they suggest that generalization (discourse) and application (solutions) go hand-in hand; the actor (designer/ researcher) selects and applies existing knowledge to develop solutions as well as reflects on solutions / the creative act and generalises it to develop new knowledge (Figure 4). This phase of the project focuses on the latter, wherein the first step is to brainstorm specific interventions for the Reyeroord context. These specific ideas are then analysed to find overarching themes / strategies for designing interventions, which are translated into the tool.

Section 7.1 briefly outlines the process followed for ideation before delving into different ideas generated during the brainstorm session. Section 7.2 presents concrete concept lines in order to understand what interventions for social contagion could look like. Both, section 7.1 & 7.2 are guided by the specific design questions (for the Reyeroord context),

How to persuade the 'Procrastinators' about the urgency to act towards gas discontinuation while enabling thorough comprehension of the process, technology and costs (such that it mitigates their loss/risk perceptions and builds trust), through their social networks (neighbourhood networks and activity networks)?

&

How to spark conversation / interactions between the residents in the neighbourhood (vicinity-based) networks and practice-based networks about the energy transition specifically?

The ideas generated during the brainstorm and the three concept lines are then analysed and translated into key insights in section 7.3, which are used to develop the tool in the next chapter.

7.1 A plethora of ideas

Brainstorming or idea generation is a vital part of any design process since it stimulates out-of-the-box and lateral thinking, which help in devising effective solutions to a design problem. Being divergent in nature, brainstorm sessions help in generating a large number of ideas (inspired by quantity over quality) and aid in looking at a problem from all perspectives. Generating this plethora of ideas is essential to inspire the design of a toolkit, to ensure all plausible and possible ways of tackling a problem (or arriving at desirable solutions) are covered. Thus, brainstorming ideas towards the specific design question is the first step.

Three digital brainstorm sessions were carried out with 11 designers from different backgrounds (in terms of nationalities, specialisations). In order to guide the process, and to answer the specific design question, 6 key 'How to / How might we' questions were formulated (As shown in Figure 32). The 'How to' questions were generated by breaking down and identifying the different key terms / elements of the specific design question – such as procrastination, urgency, social interactions etc. These were translated into problem statements and written in the form of 'How tos (H2s)'. Some H2s were left generic in nature for example "How to help someone overcome procrastination?" as compared to making it specific for the energy transition (e.g. How to ensure people do not procrastinate the decision of gas discontinuation?). This ensured that the participants who did not have in-depth knowledge of the context (of energy transition or Reyeroord) could also generate ideas; and that there was a broad range of ideas – inspired by participant's experiences, analogies from other disciplines and contexts.

Further, for some H2s, the participants were given specific categories (such as physical objects, daily routines, emotions, activities) as prompts after a round of generic brainstorm, to create a comprehensive palette of ideas. This ensured different levels of abstraction within the ideas– from concrete solutions to more abstract themes, strategies or categories of ideas that can be thought of. Overall, the sessions were structured in a way where initially the H2s were generic in nature, and became more specific as the session progressed.

Each session lasted about 3 hours. The participants were given a short introduction to the project / context. It was a conscious choice not to give a detailed presentation, in order to ensure the participants could come up with unbiased, wide range of ideas. The session made use of the brainwriting /braindrawing technique. Participants got 5-7 minutes to think of, write / draw their ideas after each H2 question (and category) was explained. Once time was up, each participant presented their ideas, stimulating discussion wherein participants built onto each other's ideas. Appendix G presents the ideas generated for each H2 question during both the brainstorm sessions. The ideas generated during the brainstorm were translated into concrete concepts, which are outlined in the next section.

How-tos used during brainstorm sessions

1. How to help someone overcome Procrastination?
2. How to show urgency (importance / seriousness) to act towards a cause / do a task?
3. How to make climate change (energy transition) relevant / a priority for people? show urgency to act towards it? Through :
   a) Physical /Tangible objects
   b) Activities
   c) Emotions
   d) Symbols, values, meanings
   e) Daily routine touchpoints eg. food
4. How to build social pressure amongst people to act towards a cause / do a task?
5. How to enable spread of information / stimulate conversation between neighbours about the energy transition? through physical objects, activities and interactions, games, environmental cues
6. How to enable spread of information / stimulate conversation between people at the church / gym / activity centre about the energy transition?

Figure 32: How-to questions that were used to guide the brainstorm session

An example of the ideas generated for a particular How-to question. Refer to Appendix G for a complete overview of ideas generated for each How-to.

7.2 Concrete examples, concept lines for Reyeroord

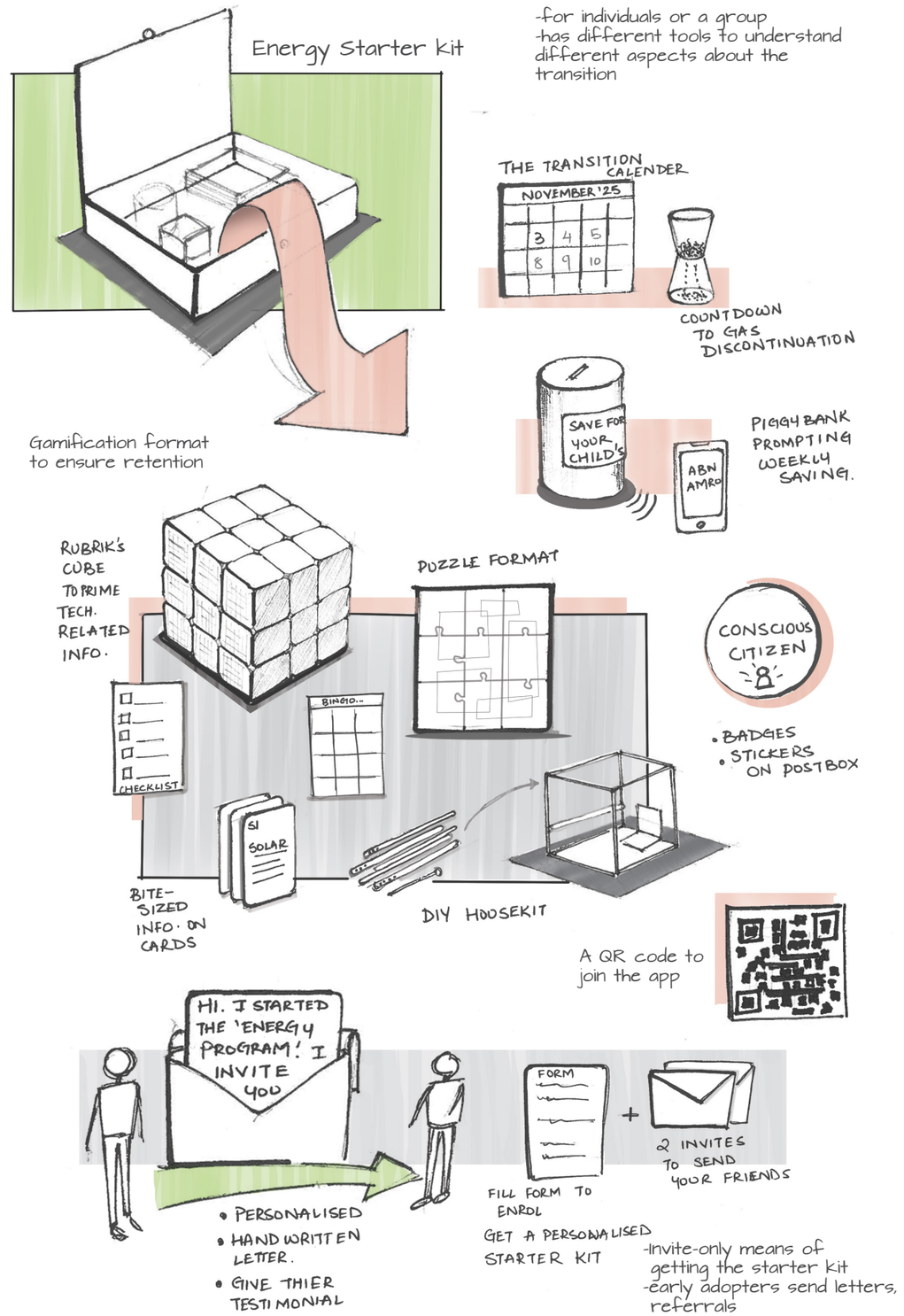
In order to understand the nuances of interventions aimed at social contagion, the ideas from the brainstorm are translated into concrete examples and concept lines.
At first, the ideas are used to generate concrete examples of solutions aimed at achieving the two goals of the specific design question namely:

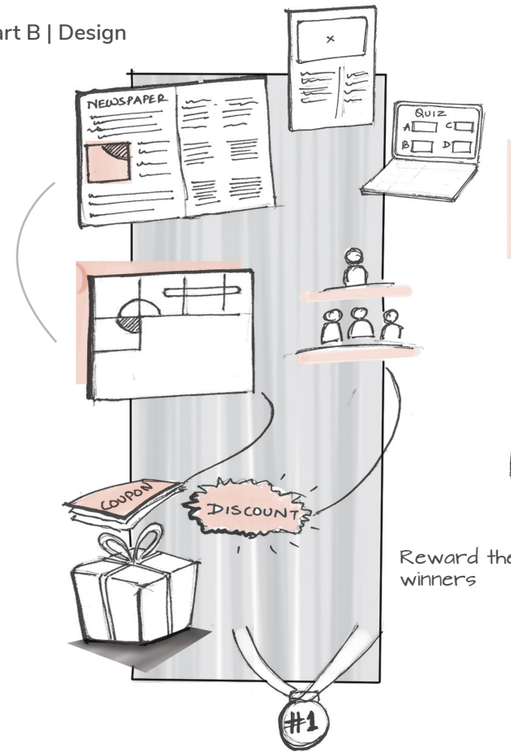
- To ensure people understand the urgency to act towards gas discontinuation
- Accurate comprehension of the process, technology and costs.

Pages 133 to 138 outline these concrete examples derived to meet both the goals – communicate the urgency to act and to ensure the apt comprehension of technology, costs and process. .

Further, these concrete examples are used to generate different concept lines of how social contagion of behaviour can unfold. As identified in chapter 5, the social contexts of interaction in Reyeroord include small neighbourhood networks involving people living in close vicinity, and activity-based networks at the common public spaces like the church, gym, Pameijer etc. The concept lines of social contagion are built around these social contexts of interaction. These can be seen as standalone concepts or can be implemented simultaneously, to generate the requisite wide bridges necessary for social contagion (refer to chapter 2 for in depth explanation).

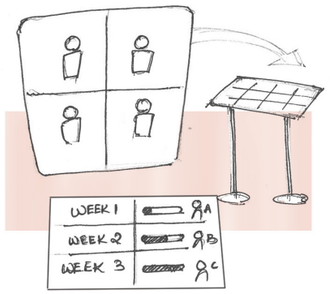
It is key to note that the purpose of these concept lines is to understand the components of an intervention aimed at social contagion, and the nuances in how social contagion can unfold. Further, these provide inspiration for the municipality while developing concepts in the future. Validation and evaluation of these concepts do not lie in the scope of this project. Although, these were presented to the project owner and were successful in providing a fresh perspective towards motivating residents for gas discontinuation through social contagion. These can be tested in field in the future. Figure 33–35 outline these concept lines.





·Let people collect a newspaper clipping each week to finish a puzzle (reveals info. or discount codes for the energy transition) (individual or in a team)

·People can do online quizzes after receiving pamphlets, watching bite-sized videos.



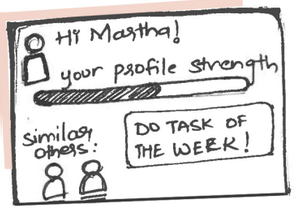
·Do tasks as a team

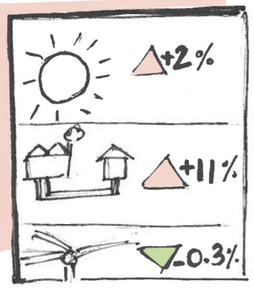
·Each person takes care of one aspect based on their expertise

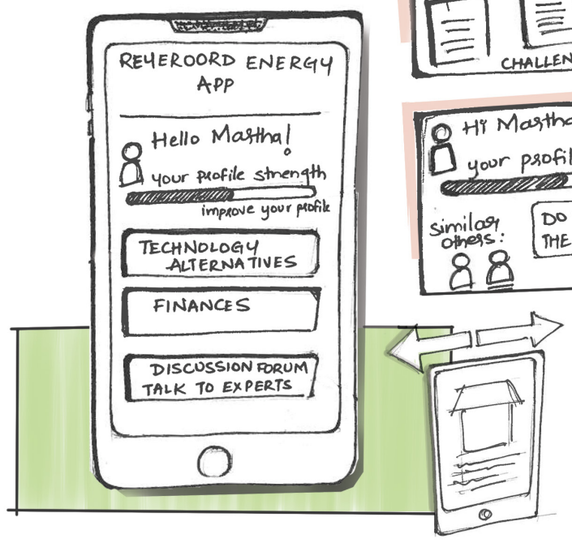
·Weekly task rotation
Build upon previous task owners work

Reward the winners

·Let people reciprocate, feel gratitude;
·Ask for help







·Platform that connects people

·Interesting formats e.g. like stock exchange, to give information or like Tinder, swipe to see if things attributes of technology matches your house requirements.

·One-point of all information. Gives personalised info.

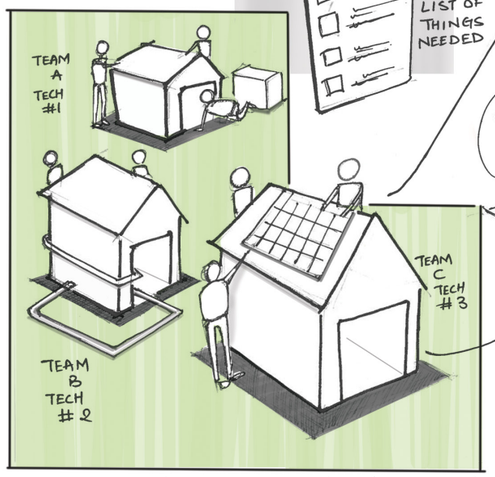
·Games /challenges progress can be tracked here, show leaderboard. Maintain profile ratings

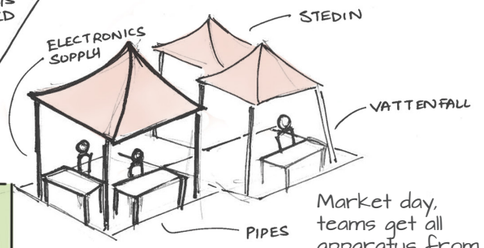
Role play | market day

Each team is alloted a technology, some money and a checklist showing the steps for transition using their technology.

Seeds prompt people to join their team or people are supposed to make their own teams.

In the end, each team presents their experience; collective decision-making





Market day, teams get all apparatus from the stakeholders' stalls

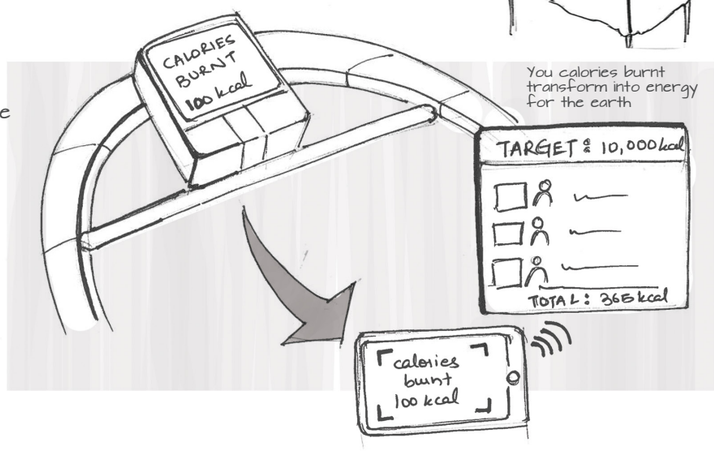
Go TO BUY SUPPLIES/ GET INFO. / CONTRACT

Each team builds a live size model - (role plays) goes through the whole process of transition using a specific alternative tech.

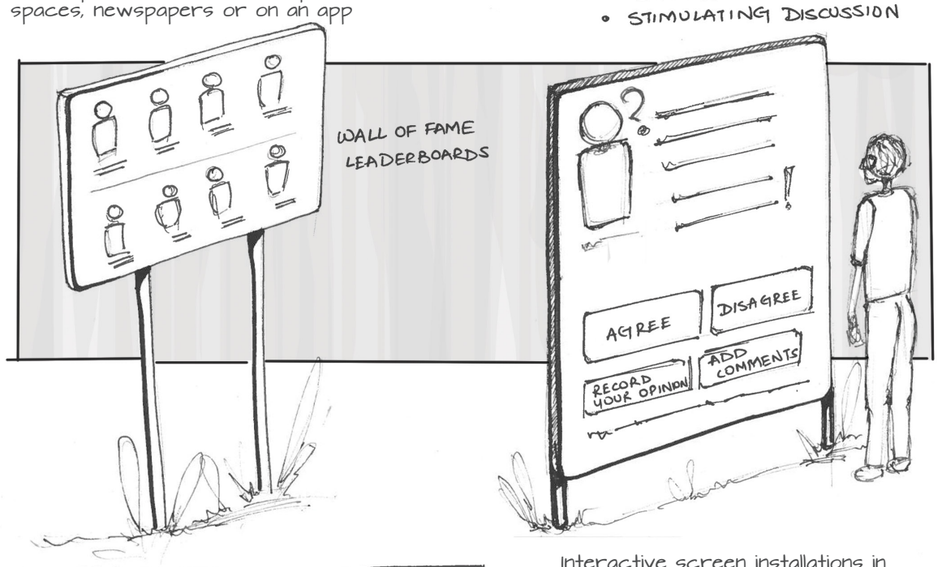
Stalls, info. desks at gym, church

@ the gym
'we care about both, your and the planet's health' campaign

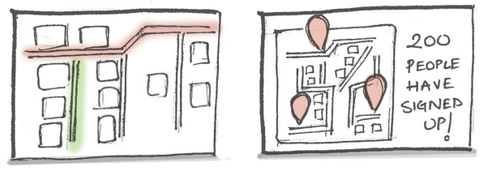
For every 5000kcal burnt, gym contributes 50 euro to the Energy transition fund.



Leaderboards / Wall of fame or shame put in the streets, at public spaces, newspapers or on an app



Interactive screen installations in the neighbourhood. Can stimulate live discussion. Front runners put forth their point of view, others can agree, disagree, comment on it. Also gives the municipality data about the apprehensions of the residents.



• COMPETITION BETWEEN LANES
'MICRO NEIGHBOURHOOD NETWORKS'

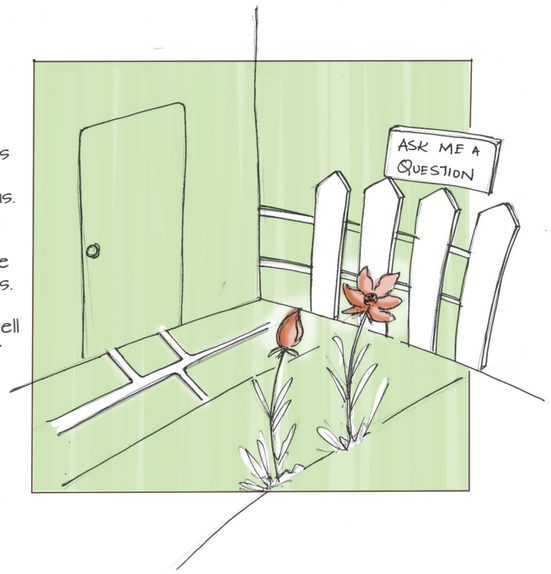
• SHOW PROGRESS OF EACH LANE THROUGH COLOURCODING

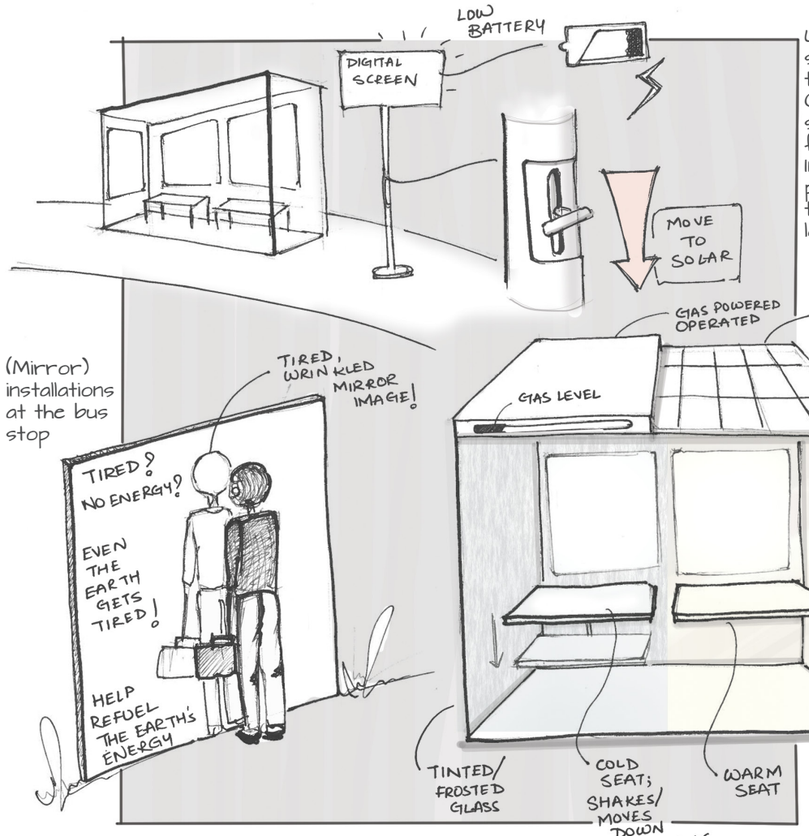
Using symbolism to show the progress / consumption of a household.

Can be done through smart objects - as shown a flower reflects the user's behaviour. Withers or blooms. Makes it highly visible to others.
- Or can be a glowing light on the road. leading up to houses that have already transitioned away from gas.

These stimulate conversation, as well as make people conscious of their behaviour.

Front runners can have signs in their front yards - prompting people to engage in conversation, ask questions.

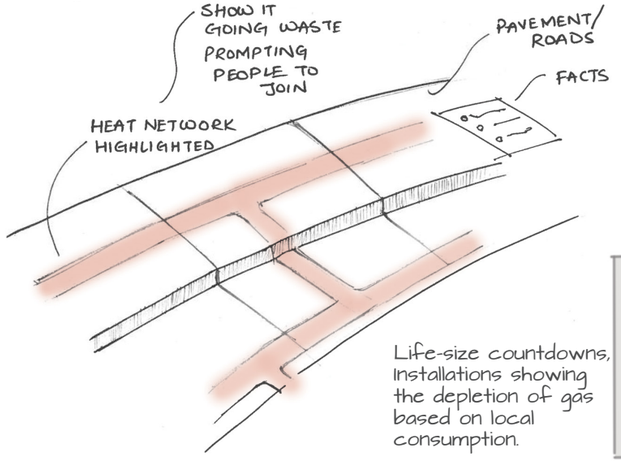




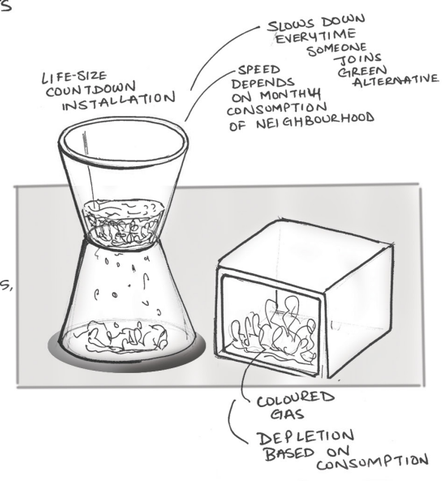
Use priming at bus stops. Digital screen turns off. Citizens need to switch it to solar for it to function. Indirectly ensures people remember that solar energy lasts long.

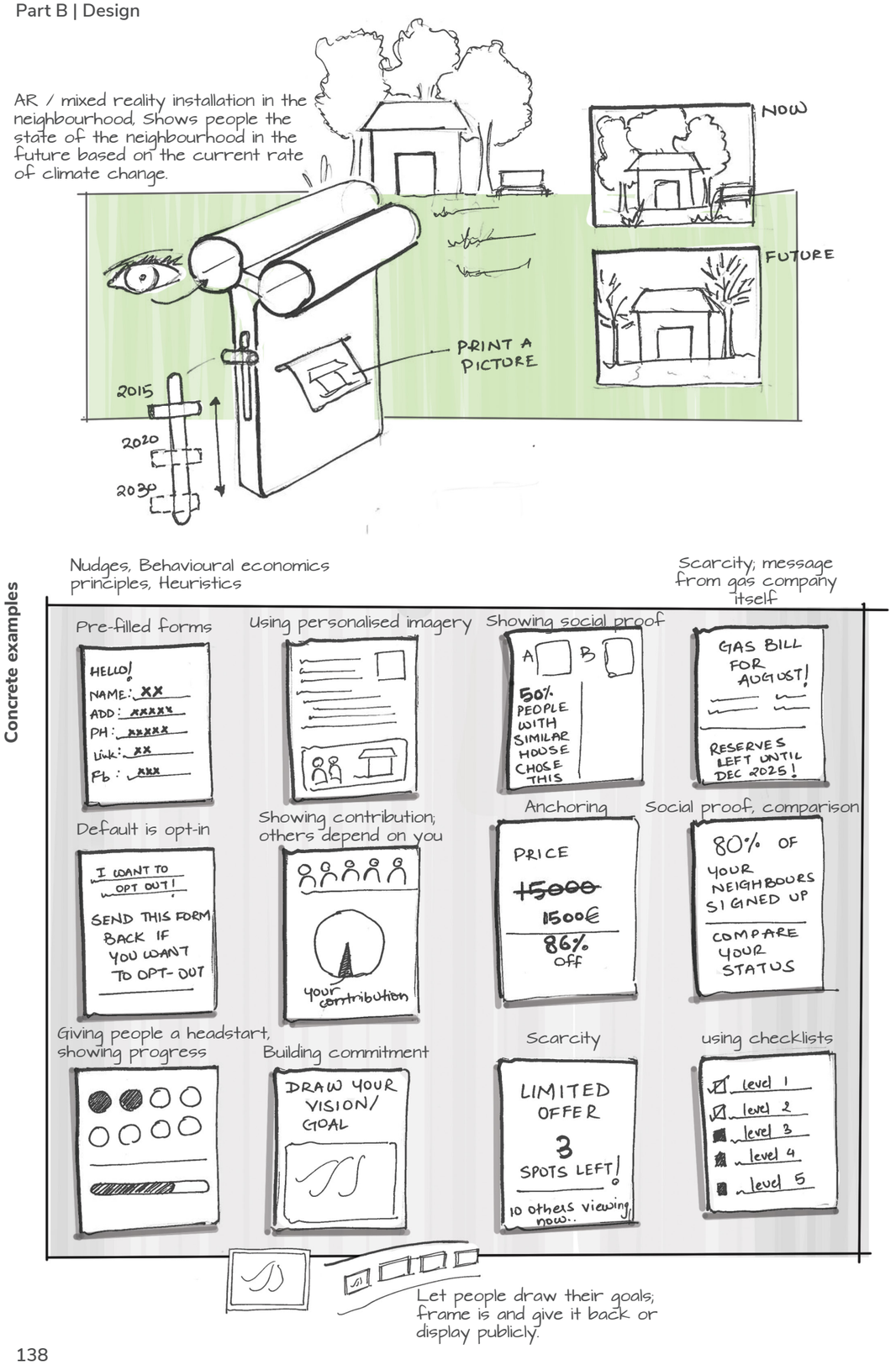
In winters, one side of the bus stop is warm, illuminated. Other side is gloomy, and the seat is not heated. Highlight the power sources of each.

Installation on roads, showing the heat network underground



Life-size countdowns, Installations showing the depletion of gas based on local consumption.





Concept line 1 (Figure 33, pg. 140)
The contagion process starts at the school with the teachers and active parents. Both, the teacher and active parent send personally written letters to other parents. The teacher's letter states that the school wants children to learn how to lead a sustainable life, and is organising a club for parents and children to participate together in. The letter appeals to the responsibility of the parents and invites them to join the club. On the other hand, the active parent's letter also invites the other parents to join, appealing to the parental values. Simultaneously, a few billboards in the neighbourhood show pictures of children from the neighbourhood, along with a picture showing their aspirations for the future and a call to action. These act as a conversation starter –"why is xyz's son on the billboard?", building curiosity amongst parents.

Once a few parents have agreed, the teachers, children and parents form a club, and have weekly / monthly meetings. They are given a starter kit which outlines different activities they can do together. For example, DIY projects, cooking classes, team projects, parents take up responsibilities and teach new sustainable life skills to children based on their own expertise (gardening, reusing things etc.). Further, children are harbingers of change, where they go door to door and check people's energy consumption as a part of a school project. They monitor monthly progress of households and give out badges to households that meet particular energy goals. Children provide tips and tricks, or even invite people into their club. They teach others about greener energy alternatives through weekly postcards. While these activities improve the comprehension amongst the residents, it can also instill the urgency to act – where the children are leading the change.

Concept line 2 (Figure 34, pg. 141)
Active residents in apartment complexes send out letters to their neighbours asking for help to figure out how to go about the energy transition, since they have similar houses. Under the 'Beter een goede buur dan een verre vriend' campaign, neighbours form self-help groups. Each group receives a checklist of things they need to know, sources of information and activities they can do to find out the specifics of the energy transition. They are given tasks like uploading picture of their houses to get advice on technical feasibility, participate in puzzles and quizzes (which are designed to be myth-busters) to get information in a fun way, have role-playing / market days, organise a group utensils buying drive, meet with other stakeholders and experts, share experiences and concerns etc.

Further, the members can have a joint energy saving bank account, such that people push each other to save up or set collective goals. All the activities are grouped into different levels. It is a competition between different neighbourhood groups, wherein the winners gets additional discounts apart from the other group benefits. The progress of different groups is shown as leader boards in the streets. Further, to indicate the progress / participation of a group, they get different colour street lights or lit benches outside their houses. This further becomes a talking point for the neighbourhood, building curiosity amongst non-participants. Last, the members also support each other while the actual renovation/ installation of the heat network happens – like a buddy system – provide each other's meals for those days, take care of children etc.

Concept Line 1 - Through children / school

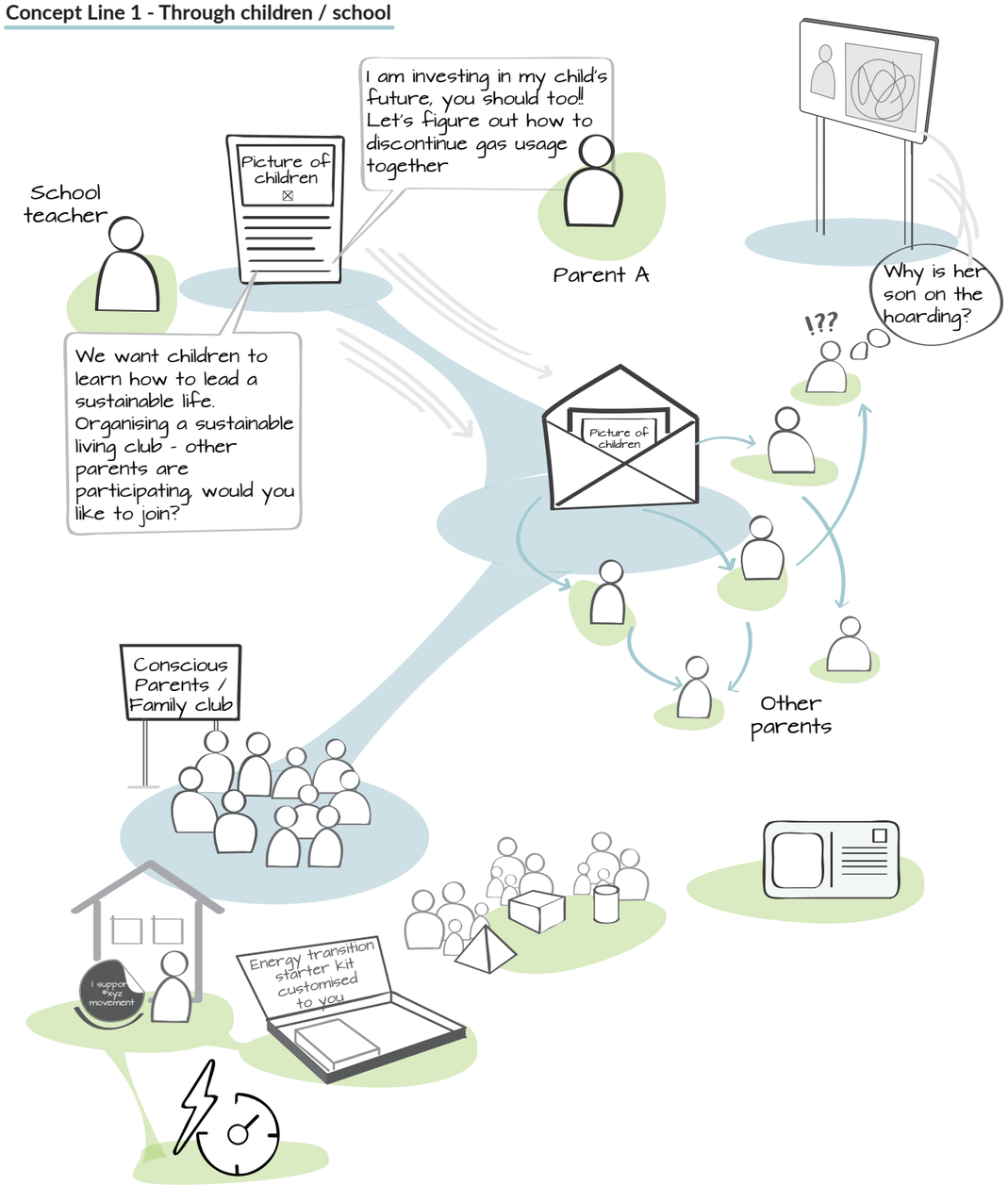


Figure 33: Concept line 1

Concept Line 2 - Neighbours' self-help group

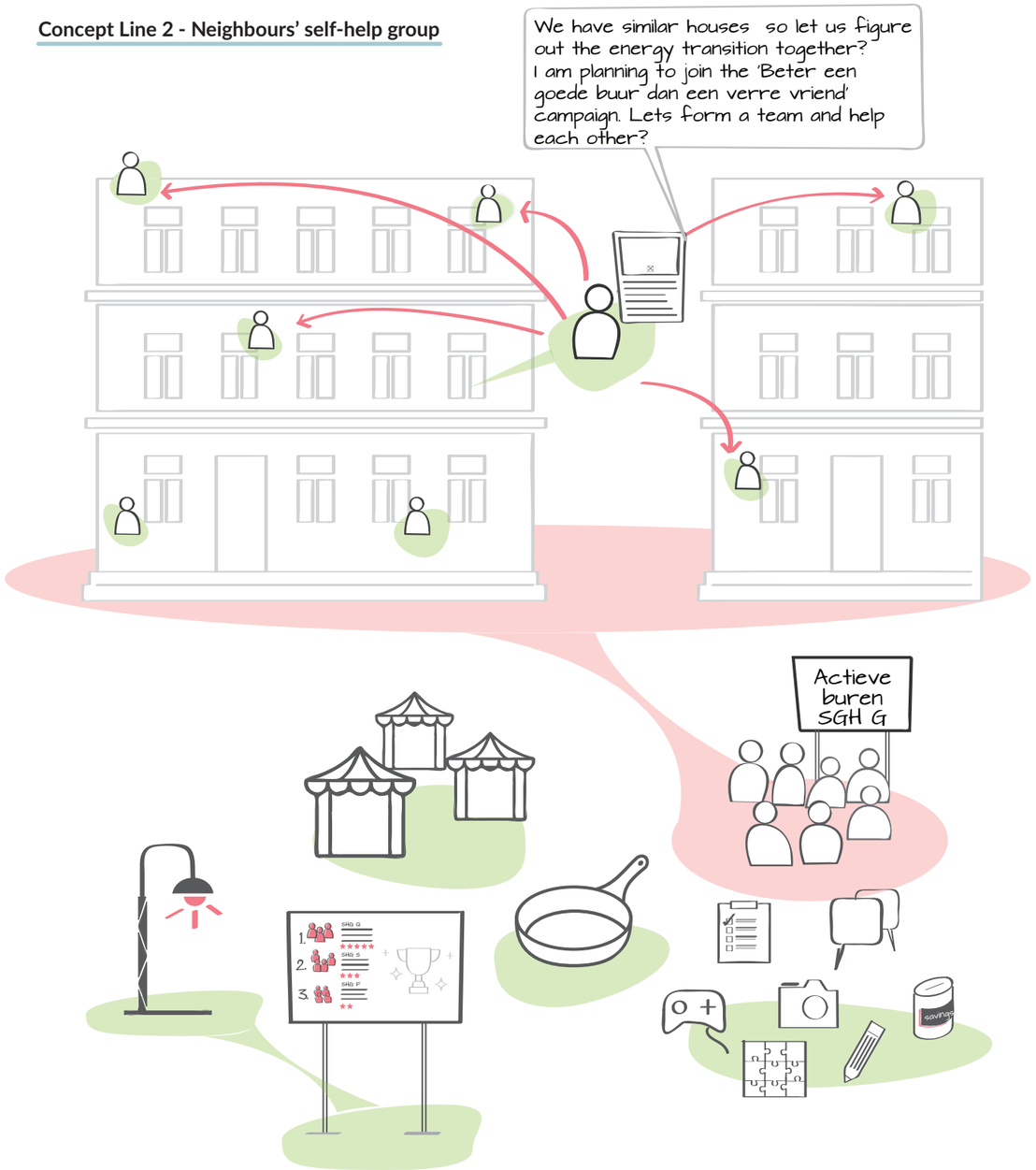


Figure 34: Concept line 2

Concept Line 3 - Competition between activity-based networks

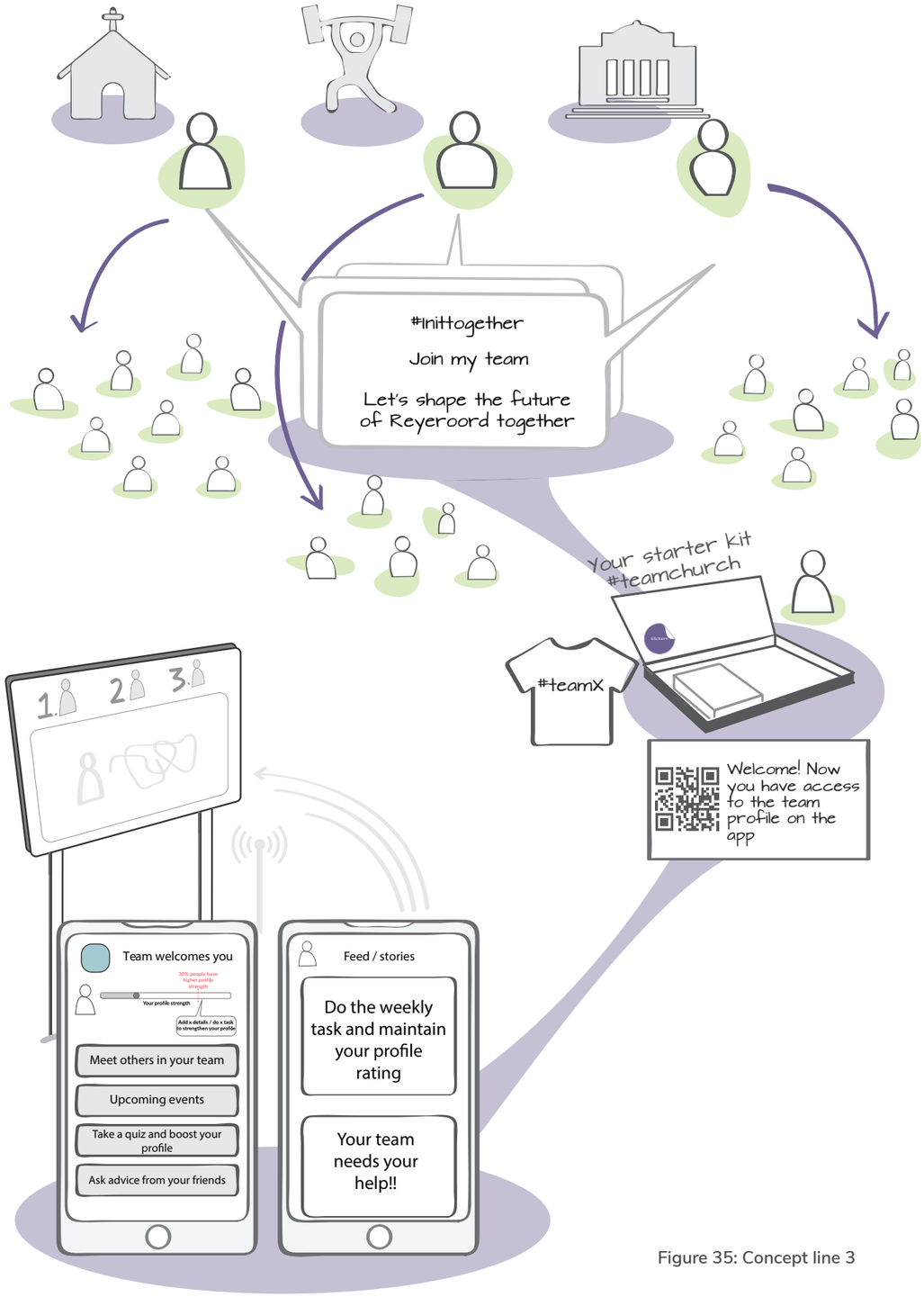


Figure 35: Concept line 3

Concept line 3 (Figure 35, pg. 142)
The contagion starts with front-runners in the community like the reverend, gym owner, local councilor etc. The front-runners compete with each other and each of them flags a campaign #joinmyteam. They persuade the residents to join their energy teams. Once somebody joins a team, they get a team kit with team merchandise and a QR code to join the 'Reyeroord neighbourhood app'. The resident needs to make a profile (can add an avatar /pictures etc). Each week, the residents get new tasks to complete. With each completed task, they get higher profile ratings. The aim is to have maximum number of people in one's team, and to have the best avg. profile rating scores.

The app also shows a regular feed, which provides bite-sized content about the energy transition. One also sees other people's profiles, can add them as friends and invite them to join their team, chat on the platform, or compete head-on. Live feed from the app is broadcasted on screens in the streets. After few months, the team with strongest avg. profile rating wins. The winners get additional discounts on the energy transition, or free gym membership for some months.

7.3 Analysis of the ideas and concepts

This section outlines the insights derived from the analysis of the brainstorm ideas (Appendix G), concrete examples (pages 133-138) and concept lines (Figure 33-25) presented above. The aim is to identify overarching themes, patterns, routes, strategies of arriving at a solution, which can inform the subsequent tool development.

When and for what can social contagion be used?
As seen in Figure 36, interventions stimulating social contagion of behaviours can be used for both, the pre-decision phase (attitude formation phase) and during the decision-making phase. In the pre-decision phase, social contagion can be used to activate residents to form favourable attitudes towards gas discontinuation. Here, resident's apprehensions and other barriers can be overcome through social contagion; for example – as shown in concept line 2, wherein self-help groups help in activating people to save money, understand energy alternatives apt for them etc. During the decision phase, the peer group's favourable behaviour can be made more salient / visible, to build pressure on residents to act promptly e.g.. showing participation through symbolism (stickers, wall of fame, adaptive installations etc).

During the pre-decision phase, several small interventions need to be carried out, to increase engagement and build commitment towards gas discontinuation. As we will see subsequently, both, intrinsic and extrinsic motivations need to be triggered – making use of cognitive and affective means. This is in line with attitude formation theories and models, as described in chapter 4 (& Appendix E).

Anatomy of a design intervention for social contagion.

Upon analysis, we see that each intervention needs to meet two criteria –

- First, it needs to tackle / cater to the main goal (target behaviour) of the contagion, for example – communicate the urgency to act towards gas discontinuation, or ensure comprehension of alternative technologies.
- Second, it needs to give rise to social contagion of this target behaviour.

Zooming-in on the concept lines further reveals that to design an intervention that meets the above-mentioned criteria, one must define four aspects –

- What do people do/see (to bring them closer to the target behaviour / goal) – Action;
- Why would people do this Action – Incentive;
- How will people do the Action – Touchpoints; and
- How will people spread this Action or How will the Action (target behaviour) spread– Spread mechanism

These four aspects can be seen as the four components of an intervention aimed at social contagion, which need to be coherently designed. A fifth component, the 'Who' needs to be identified while visualising how the contagion will unfold. While the 'Where' could also be seen as component, this is already captured while outlining the social identities and social contexts of interactions (step 1 &2 of the process of how a contagion can unfold), and thus, is not explicitly made a component of the intervention itself.

These components can be used as the skeleton to design interventions and will be built upon while developing the tool. Additionally, the two criteria can also be seen as the two steps of designing interventions – First, generate ideas on how to achieve the target behaviour / goal; Second, visualise how the target behaviour will spread. This two-step process is translated into the process of designing interventions, as described in the next chapter. Having identified this anatomy of an intervention, the next step is to analyse the ideas and concepts to find different strategies / ways of designing the intervention (coming to solutions).

Strategies / Ways of designing the intervention

The ideas from the brainstorm session, the concrete examples and concept lines are further analysed to find overarching themes or patterns in ways of designing solutions. Having ideas with different levels of abstraction proved handy in identifying the common underlying principles. Figure 37 highlights the key themes / routes of designing interventions found during the analysis. Note, that all themes / routes are not mutually exclusive and have several overlapping constructs.

These themes can be seen as different ways of motivating people to pursue a behaviour / do something. The themes trigger both intrinsic and extrinsic motivations. Further, the themes suggest both cognitive as well as affective routes of forming attitudes, which is in line with attitude formation theories in literature (refer chapter 4).

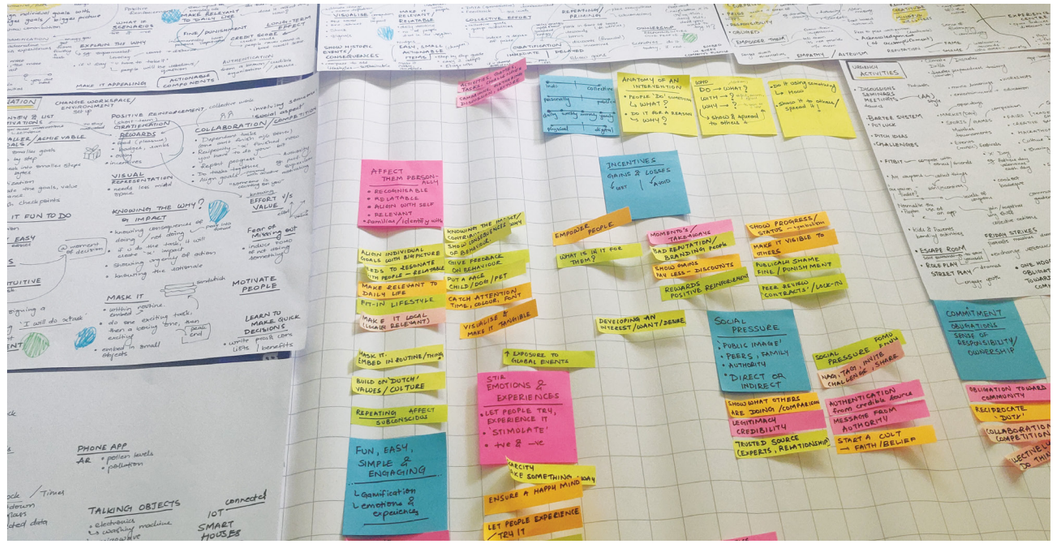
Themes such as 'Make it personally relevant and identifiable', 'Stir emotion, create experiences', 'make it fun and engaging' – can be apt while designing the 'Action' component of the intervention; whereas 'Social pressures' or 'Commitment' can be ways to design both, the Action and Spread mechanism. These themes and the underlying strategies are translated into design principles and inspiration strategies in the tool, as described in the next chapter.

Types of Interventions

The ideas generated constitute permutations and combinations of the following features (filters):

- Who does it: Individual action v/s Group / Collective action,
- Where does it happen: private sphere v/s public sphere,
- How often does it happen: Daily, weekly, monthly, once, once in x months,
- Format: Physical v/s digital touchpoints

These features (filters) can help in defining constraints or generating specific ideas / concepts in case there are specific constraints.



Analyzing the ideas, concrete examples and concept lines

Reyeroord - Timeline

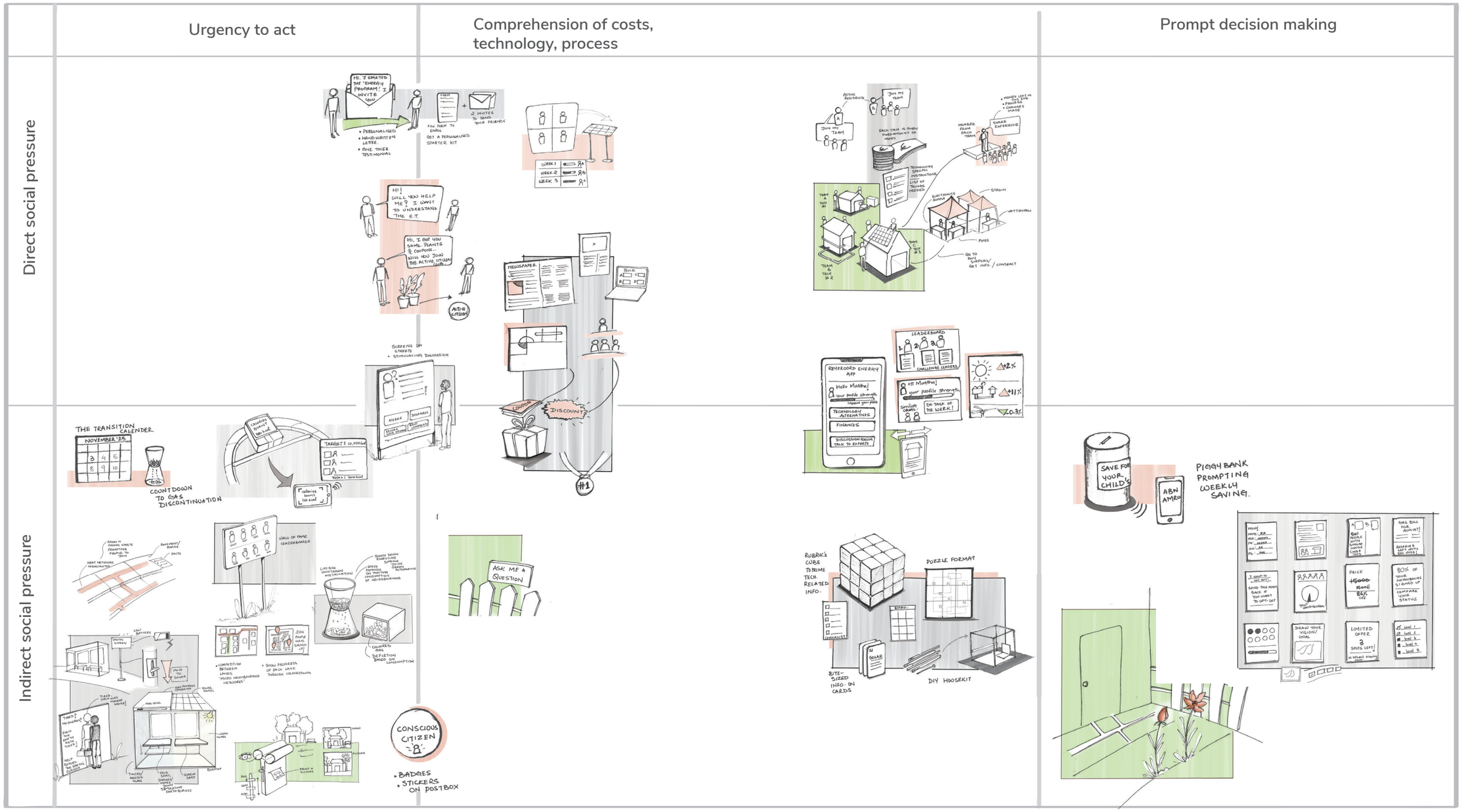


Figure 36: Mapping the ideas on the timeline of transition in Reyeroord

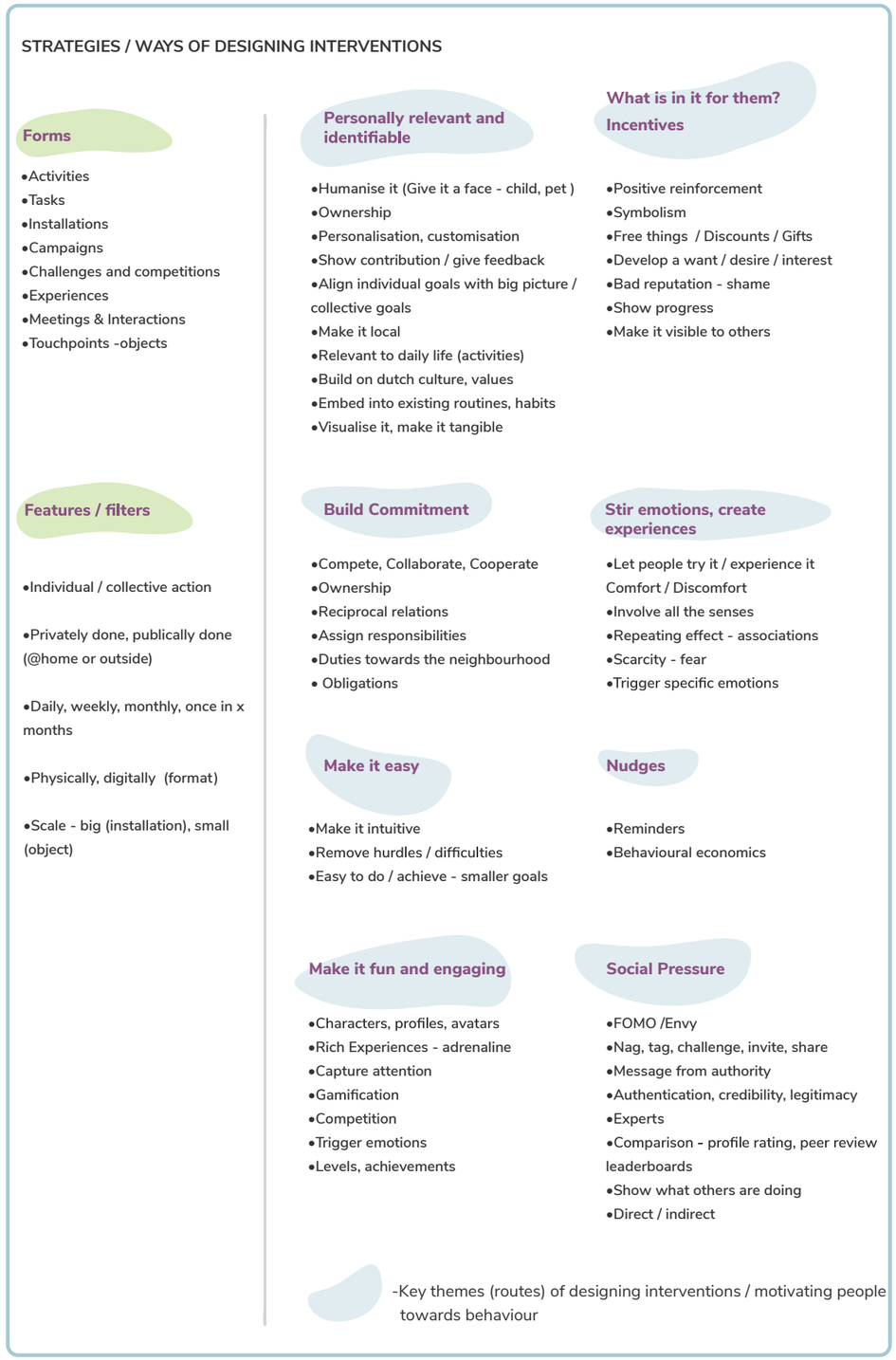


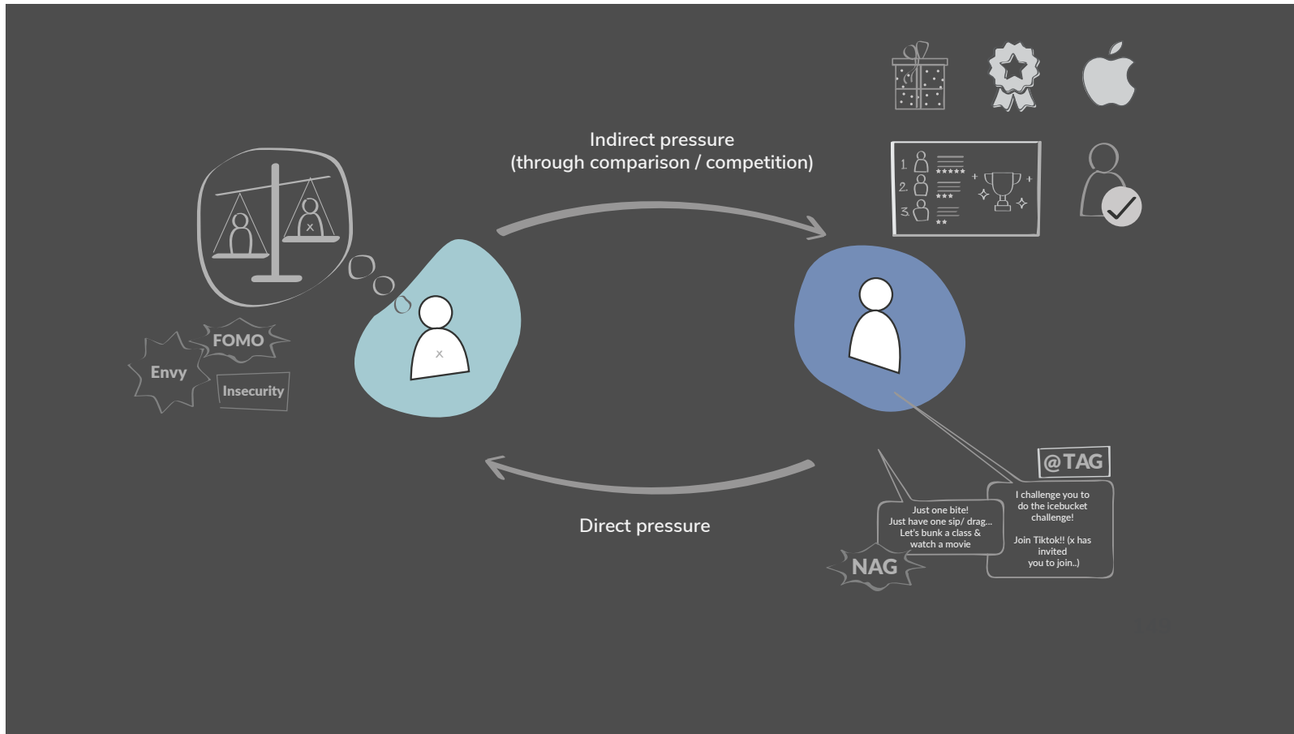
Figure 37: Overarching themes of Strategies / Ways of designing interventions derived from the thematic analysis of the ideas and concepts generated through the brainstorm sessions and ideation.

Social influence at the micro level

The ideas and concepts highlight two ways in which social influence (and consequently, social contagion) can be stimulated– Directly and indirectly; examples are shown in figure 36.

Direct social influence involves direct contact between the influencer and influencee, wherein the influencer invites or forces the influencee to try / adopt a behaviour. The interactions include nagging, tagging, inviting, forcing, challenging etc. Examples of direct social influence leading to trends or adoption of behaviours include social media challenges (where one nominates / tags 5 other people to do a challenge), invite-only events/ product launches – which make behaviour exclusive and desirable, direct peer pressure situations like forcing one to join an event etc.

On the other hand, indirect social influence is triggered by conscious or subconscious comparison of one self with others. As described in chapter 2, in order to manage one's self-concept people conform to social norms as well as compare themselves with similar others (reference groups) to evaluate the appropriateness of their behaviours and beliefs. When the reference /peer group has a higher status, achievement or quality, or possess something (object / experience), the perception of having a lower esteem, stimulated by the (sub)conscious comparison, prompts people to adopt the same behaviour/ invest in that object / experience. Further, it gives rise to conspicuous consumption, 'a rat race' or the 'keeping up with the Joneses' effect. While these phenomena have a negative connotation, the underlying principle of stimulating (sub)conscious comparisons, or triggering emotions such as the fear of missing out, envy, insecurity etc. can be leveraged to activate people towards sustainable lifestyles in general, and gas discontinuation in particular.



Further, in order to stimulate comparison, the behaviour needs to be made desirable. This can be done by designing Incentives – both gains or losses; reinforcing the raison d'etre of the Incentive component in the anatomy of an intervention. Thus, both direct and indirect social influences can be used to trigger social contagion of gas discontinuation. Both these routes are translated into Spread Mechanism strategies in the following chapter.

These insights from the analysis of ideas and concepts are used to develop the tool that can aid the municipality in designing interventions that stimulate social contagion towards the energy transition. Appendix H explains how these insights are translated into the toolkit – the rationale behind every component. The next chapter outlines the finalised concept – The 'Design for social contagion' toolkit.

Chapter 07 in sum...

- The chapter outlines ideas, concrete examples and concept lines generated while answering the specific design questions, upon carrying out several brainstorm sessions.

- These ideas, examples and concept lines are then analysed to understand the nuances of an intervention aimed at social contagion. These highlight different themes of persuasive strategies that can be used to stimulate the behaviour. Several other insights were derived which inform the toolkit development subsequently. These insights include:

    - Social contagion can be used in both, the attitude formation stages and decision-making stages to activate residents towards gas discontinuation.

    - Each intervention needs to meet 2 goals -

    1. It should enable the target behaviour;
    2. It should enable the contagion of the target behaviour

    - For each intervention, 4 components need to be defined:

    1. What do people do/see (to bring them closer to the target behaviour /goal) – Action;
    2. Why would people do this Action – Incentive;
    3. How will people do the Action – Touchpoints; and
    4. How will people spread this Action or How will the Action (target behaviour) spread– Spread mechanism

    - The intervention can:
      -Involve individual action or group / collective action,
      -Happen in the private sphere or public sphere,
      -Occur daily, weekly, monthly, once, once in x months,
      -Have physical or digital touchpoints

    - Social influence can take two routes

    1. Direct influence, where one is nagged /tagged by peers to do the behaviour
    2. Indirect influence, stimulated by comparison of self with peers.
       Both routes lead to the adoption of behaviour, giving rise to social contagion, the bandwagon effect, trends etc.

08

Design for social contagion toolkit

Chapter 08- Design for social contagion toolkit

This chapter presents the ‘Design for social contagion toolkit’ developed during the project in line with the overall design direction outlined in chapter 6. Section 8.1 captures the format and content of the toolkit (building upon insights from the Ideation phase; refer Appendix H for in depth explanation of how the content is derived and Appendix I for the previous iterations of the toolkit). Section 8.2 outlines how to use the toolkit.

8.1 Design for social contagion (DfSC) toolkit

The ‘Design for social contagion’ toolkit helps municipalities in brainstorming and designing interventions that stimulate social contagion of favourable attitudes and opt-in towards gas discontinuation. It inspires persuasive and tactical ways of inducing the target behaviour (i.e. defining the STRATEGY element -E3 of the framework; and Step 4 & 5 in HOW process, as defined in chapter 2 & 10), through social contagion[1] . It should be used along with the ‘Design for social contagion framework (presented in chapter 10).

Apart from using social contagion as a means to activate people towards the energy transition, the toolkit also familiarizes municipal officials with behavioural & social constructs of decision-making and persuasive behaviour change strategies. Specifically for Reyeroord, the toolkit can be used to design interventions within the municipality’s social design and front-runners approach.

The interventions can be designed for both, the attitude formation phase and the decision-making phase. In the attitude formation phase, several small interventions should be designed, which engage the users over a longer time and build commitment; overcoming the apprehensions and others barriers that residents have. In the decision-making phase, interventions are to be designed to build social pressure, prompting positive decisions.

The toolkit[2] consists of 3 elements (Figure 38):

1. A deck of inspiration cards (that provide inspiration to design the different components of an intervention);
2. A set of design canvases (that guide the design process); and
3. A handbook (that outlines how to use the toolkit)

Figure 38: Elements of the DfSC toolkit

1 While the ideas and examples presented in chapter 7 are specific to the Reyeroord context and aimed at answering the specific design question, the toolkit is generic in nature and captures all plausible ways/ strategies of arriving at solutions. This ensures that one can design interventions for different target groups – with different levels of motivations and abilities.
2 Appendix G, section G.3 presents the explorations for the format of the toolkit.

The toolkit is developed mainly for use by municipality officials, as well as designers working on the subject. The key criteria kept in mind while designing the toolkit are that it should be easy to use, should provide adequate inspiration and should strike a balance between structure and freedom. While freedom (of thought) is crucial for the creative process, structure is necessary to ensure fruitful outcomes. Moreover, since municipality officials are not accustomed to design thinking processes, the toolkit helps them dive deep into the inspiration strategies as well as the (design) process of generating ideas / concepts.

Before delving into the elements of the toolkit, the anatomy of an intervention aimed at social contagion (that should be used to design interventions using this toolkit) is defined.

8.1.1. Designing Interventions with the DfSC toolkit - Anatomy of an Intervention

As shown in figure 39, each intervention should
- Fulfill 2 design criteria
- Follow 4 design principles
- Constitute 4 design components[1]

This anatomy of an intervention is the basic logic that needs to be followed to design interventions aimed at social contagion of behaviours.

Since using social contagion to prompt behaviours (specifically towards gas discontinuation) is an unhackneyed approach, the design criteria and design principles help to streamline the ideation process. The design components further embody these criteria and principles, making them more tangible (practical). These ensure consistency and that all aspects of an intervention are thought-off and designed for. (Refer to Appendix H for in-depth explanation of and rationale behind these elements and how they are derived).

The design criteria, principles and components also serve as evaluation criteria while selecting concepts. Explanation of these criteria, principles and components, along with inspiration strategies that can be used to design these aspects are captured in the deck of inspiration cards, described next.

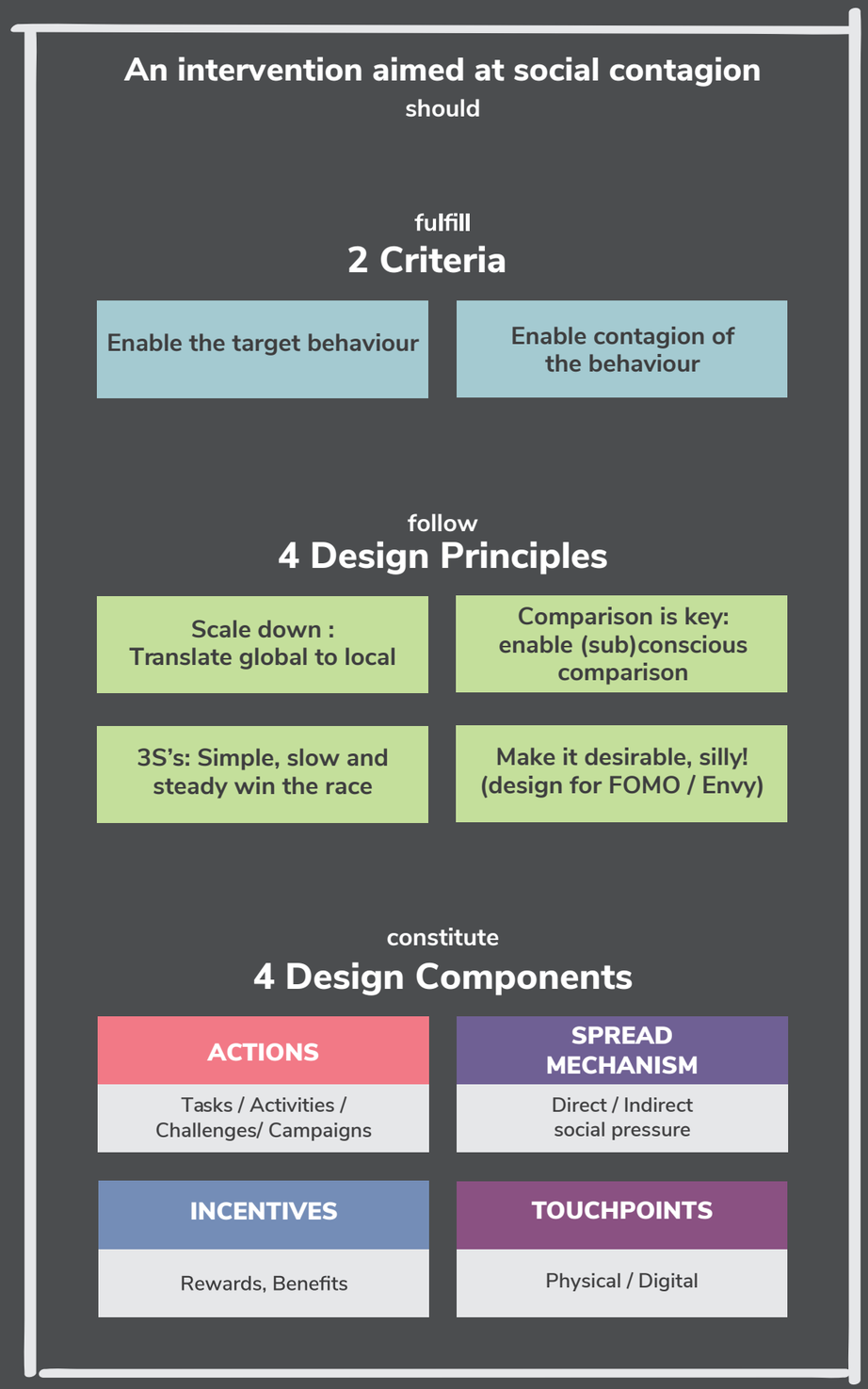


Figure 39: The anatomy of an intervention aimed at social contagion of target behaviour

1 Note: these criteria, principle and components are derived from the analysis of the ideas, concrete examples and concept lines outlined in chapter 7.

8.1.2. Inspiration cards

As described above, each intervention needs to adhere to the anatomy in order to stimulate social contagion. Thus, these different elements of an intervention are captured in a set of inspiration cards which are easy to refer to while brainstorming ideas. Along with explanation of these elements (criteria, principles and components), a set of persuasive strategies are also included to inspire the design of each 'design component' (Action, Spread mechanism, Incentives and Touchpoints).

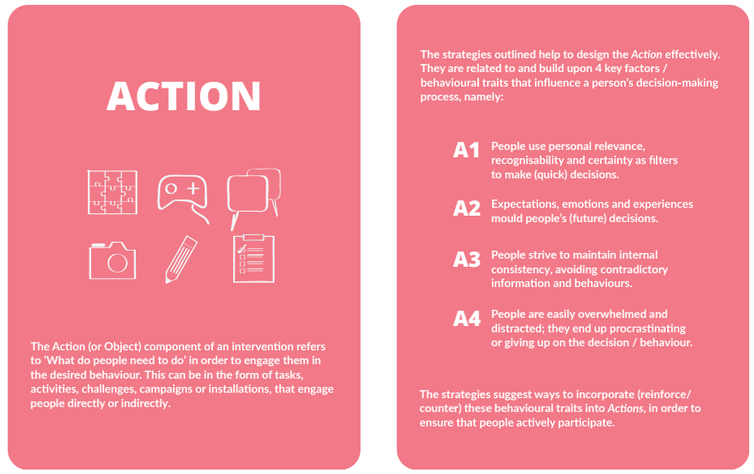
Apart from being easy to use and handle, the card format of presenting the design principles and inspiration strategies provides flexibility in use. One can easily select specific strategies, use different permutations and combinations (couple / bundle the cards) or use a single stand-alone card. The design criteria and principle cards can be kept in the centre, visible to all, such that they are handy and easy to refer to. Further, each strategy can be presented / viewed incrementally, making it less overwhelming. The cards help in capturing the essence of a strategy in-depth – through explanations, examples and suggestions. This in-depth and rich explanation is necessary to help municipality officials dive deep into the subject matter, and also to understand how to apply these persuasive techniques (which they are not familiar with).

Figure 40: The 4 types of cards in the inspiration deck.

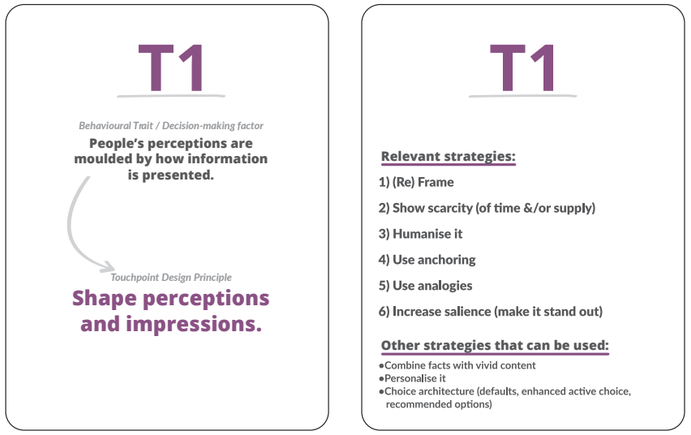
The deck includes 4 different types of cards (as shown in figure 40):

- Design criteria & design principle cards (Figure 40A): Each design criteria and principle is captured on one card, wherein the back-side of the card gives a brief explanation of the design criteria/ principle.

- Component Index cards (Figure 40B): Each design component is explained on 1 or 2 Component index cards. These state what the component is, how to brainstorm ideas for the component, and the explanation of the categorisation (and categories) of strategies under that component. Each component is assigned a specific colour.



- Category Index cards (Figure 40C): The categories (of strategies) under each component have a category index card. The Component design principles (e.g.. A1, A2,T1,S1,S2 etc.) are outlined on the front side. The back side provides the list of relevant strategies that fall under that category. These follow the colour scheme based on the design component they belong to.



- Strategy cards (Figure 40D): Each strategy card outlines one persuasive technique relevant to the design component (indicated by the colour). The front side outlines the Categories / Component design principles that the strategy falls under (right above the name of the strategy), along with the explanation of the strategy. The back side provides an example of how to apply the strategy. It was a conscious choice to use examples from different domains such that it can spark more creative ideas. Wherever possible, the examples include instances of behaviour change (towards sustainable and healthy lifestyles), or compliance to desirable behaviour (e.g.. on-time tax payment, organ donation etc.) to ensure that the users understand the power of these persuasive techniques in actually bringing about a change. Apart from the example(s), the cards also provide suggestions on how the strategy can be applied. These act as prompts for idea generation.

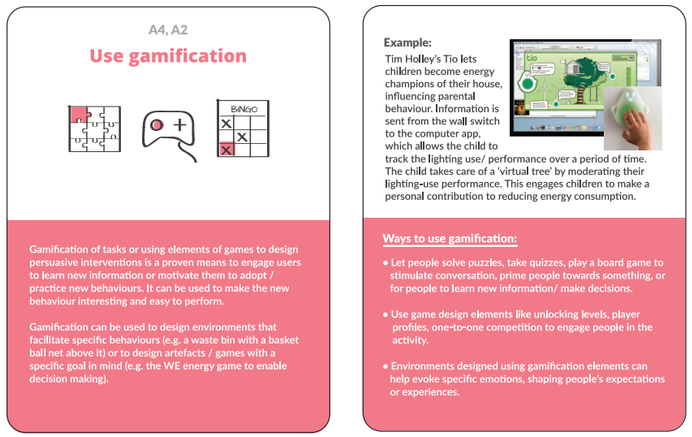


Figure 41 gives an overview of all the cards included in the deck. Next, Pages 161, 164-170, explain the design criteria, design principles, design components and the categories under each component in brief. For a detailed explanation refer to Appendix H and J (for the final set of inspiration cards).

(Note, that the strategies under each design component are derived from the overarching themes identified Chapter 7; which were then compared to similar behaviour change and persuasive intervention design techniques, toolkits and strategies, such as the Design for Intent toolkit by Lockton (2010), Social influence strategies by Cialdini (2016), The Brains, Behaviour and Design toolkit, Behavioural intervention design toolkit for service design developed by van Lieren (2017), MINDSPACE framework for behaviour change by Dolan et al. (2011), Persuasive patterns card set (Toxboe, n.d.), amongst others).

Design Criteria

Each intervention needs to meet two criteria:

1. ***Enable the target behaviour:***
   It needs to meet the overall goal of the contagion – Enable the target behaviour to overcome apprehensions towards or barriers to adoption. Examples of target behaviour are 'understand the urgency to act towards gas discontinuation', or 'comprehension of alternative technologies'.

2. ***Enable contagion of the behaviour:***
   Each intervention needs to give rise to (prompt) social contagion of the target behaviour (defined in criteria 1) amongst the target group.

2 DESIGN CRITERIA

1) Enable the target behaviour

2) Enable the contagion of behaviour

4 DESIGN PRINCIPLES

1) Scale down : Translate global to local

2) 3S's: Simple, Slow & steady win the race

3) Comparison is key: Enable (sub) conscious comparisons

4) Make it desirable, silly!

4 DESIGN COMPONENTS

ACTION

A1) Make it relevant, recognisable and certain.

- Personalise it
- Provide feedback & show contribution
- Emphasize or establish ownership
- Make it tangible, concrete, explicit & visible

A2) Shape expectations, emotions and experiences.

- Build positive expectations (let people try it)
- Elicit reciprocity
- Use priming (elicit associations & past memories)
- Trigger specific emotions (use peak-end effect)

A3) Build commitment through consistency.

- Let people pre-commit
- Foot in the door principle
- Create dependencies amongst people
- Give people a headstart; build onto the existing (routines, values, norms).

A4) Simplify and Engage.

- Use gamification
- Make it bite-sized and incremental
- Combine facts with vivid content

SPREAD MECHANISM

S1) (Stimulate) Direct social pressure

S2) (Stimulate) Indirect social pressure

- Use symbolism
- Show experiences of others
- Show performance of peers
- Provide social proof

INCENTIVES

- Give people a social identity; Provide people group membership
- Use cash or kind incentives (special privileges, perks or guaranteed outcomes)
- Provide unique, fun, novel experiences
- Make it an achievement, a new skill or quality

TOUCHPOINTS

T1) Shape perceptions and impressions.

- (Re) Frame
- Show scarcity (of time &/or supply)
- Humanise it
- Use anchoring
- Use analogies
- Increase salience (make it stand out)

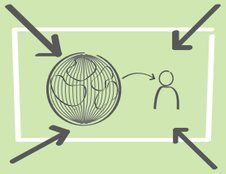
T2) Make it easy (to do / use).

- Minimise effort
- Shape Choice architecture (defaults, enhanced active choice, recommended options)
- Provide social proof

Figure 41: An overview of all the cards included in the inspiration card deck.

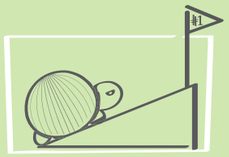
Design Principles

Since designing interventions for social contagions is an unhackneyed approach to activating residents towards gas discontinuation, four design principles are defined in order to guide the design process, provide consistency across interventions and steer the direction of thought. These can also serve as evaluation criteria while shortlisting and selecting the concepts.



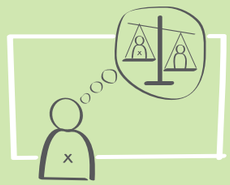
1. ***Scale down: Translate global to local***

   While social contagion is inherently a scaling up exercise, the first step to achieve contagion is to activate individuals. Prompt action and pro-active adoption is pursued only when something affects one directly or is relatable. To avoid /overcome procrastination of the decision at hand, the global phenomena like climate change, sustainability need to be made personally relevant, relatable, recognisable for the residents. Thus, scaling down and translating the global/ national issues to regional, local, familial or individual scale is important while designing interventions, in order to capture people's attention and trigger action.



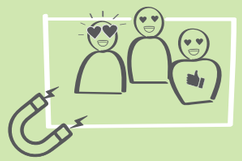
2. ***3 S's- Simple, slow and steady win the race!***

   In order to encourage people to take action, it is necessary to reduce the effort they need to put in. Easier/ simpler it is to do a behaviour, the lesser the motivation required on the consumer's end. Hence, the target behaviour and the interventions should be easy to do, use, remember and understand. Further, since attitude formation is a long-term process, incremental (and continuous) nature of interventions builds commitment and a continued relationship with the behaviour. It helps to overcome future inaction due to cognitive dissonance. Thus, the 3S's should form the ethos of all interventions.



3. ***Comparison is key: enable (sub)conscious comparison***

   People have the tendency to constantly evaluate themselves in terms of the appropriateness of their abilities, behaviours and beliefs based on those of similar others (reference groups). They use social norms or social proof to guide their behaviours and manage their social identities (self-concept). Thus, in order to achieve social contagion, this (sub) conscious comparison to people who have adopted or are committed towards the target behaviour must be stimulated through the interventions.



4. ***Make it desirable, silly!***

   People need to have both, intrinsic and extrinsic motivations to opt for sustainable options. Making the behaviour desirable (e.g. by designing incentives and well-curated experiences) can help in prompting adoption as well as inducing emotions such as the fear of missing out, envy, insecurity etc., upon comparison. These in turn increase the desirability of the behaviour, stimulating adoption and paving the way for social contagion.

While all the principles need to be kept in mind, principles 1 (Scale down), 2 (3S's win the race) and 4 (Make it desirable, silly) specifically help in designing interventions to achieve the target behaviour (goal; criterion 1 of an intervention), whereas principle 3 (Comparison is key) and 4 (Make it desirable, silly!) guide the social contagion (criterion 2 of an intervention) aspect of the intervention. Further, Principle 1 & 2 are more relevant while designing the Action and Touchpoint components of an intervention, whereas Principle 3 & 4 are relevant while designing the Spread mechanism and Incentive components of the intervention.

Design Components

Each intervention aimed at social contagion has four key components[1] that need to be well thought off and designed for. These help to meet the design criteria defined above, and give shape to the design principles. For each component, the card deck includes different categories of persuasive strategies that can inspire the ideation and ensure these are effectively designed.[2]

The four components and the categories of strategies under each are explained in brief. The list of strategies that fall under each category can be found in Figure 41.

1 Note that all the 4 components have several overlapping constructs and are not mutually exclusive. However, they are specified as different components to guide the design process, and to ensure each aspect is explicitly thought about and defined.

2 While the aim was to capture all ways of arriving at solutions, this toolkit and the strategies listed are only a starting point to inspire ideas towards social contagion. It is by no means a complete collection of persuasive strategies. The selection is meant to provide enough depth and coverage to help establish a foundation. Which strategies are more effective towards stimulating social contagion towards gas discontinuation, or how can these strategies be further customised to the energy transition are areas for future research.

Actions

This component defines ‘What do people need to do / see’ in order to engage them in the desired behaviour (meeting the 1st criteria – enable the target behaviour to overcome specific apprehensions / barriers.) This can be in the form of tasks, activities, challenges, campaigns or installations, wherein people are asked to do (create, solve, collect, share, experience etc.) something; engaging them directly or indirectly.

The Action persuasion strategies are classified under 4 key Action design principles (A1,A2,A3,A4) identified based on key factors / behavioural traits that influence a person’s decision-making process. The strategies suggest ways to incorporate (reinforce/ counter) these behavioural traits into Actions, in order to ensure that people actively participate.

A1

Make it relevant, recognisable and certain

People use personal relevance, recognisability and certainty as filters to make (quick) decisions. If the behaviour /information seems personally irrelevant or not familiar, the process of decision-making is not pursued. Additionally, people prefer outcomes that are closer to the present, like to maintain status quo and don’t always connect their actions to its consequences. The larger the delay between an action (decision) and its consequence (outcome), the weaker the link in people’s minds. This leads to a myopic vision, which prevents people from pursuing future-oriented decisions. Thus, the interventions (Action) need to be personally relevant, recognisable (familiar) and certain in order to capture people’s attention and get their buy-in. This is in line with the Design principle 1 – Scale down: Translate global to local.

A2

Shape expectations, emotions and experiences

Expectations, emotions and experiences mould people’s (future) decisions. Emotions, as well as the (past) experiences that give rise to these emotions, drive how people perceive, evaluate decisions; or form opinions and behave. Further, people’s experiences are often strongly influenced by their existing expectations. Positive expectations increase the likelihood of a positive experience. Thus, setting up these positive expectations along with triggering specific emotions and creating memorable experiences (both +ve and -ve) is a way to influence people’s decision-making.

A3

Build commitment through consistency

People strive to maintain internal consistency, avoiding contradictory information and behaviours. They pay more attention to information that is consistent with their current attitude, behaviour and beliefs. Thus, building upon existing routines, habits, values, beliefs and prevalent social norms is an effective way in ensuring people are committed to doing the new behaviour. Additionally, people also maintain this consistency on commitments they make. Once people have made a promise /pledge to do something or invested time/ money/ effort in something or set specific goals, they feel obligated to follow through. Thus, Actions should be designed to build this commitment in order to ensure people pursue the energy transition in the long run.

A4

Simplify and engage

People are easily overwhelmed and distracted; and end up procrastinating or giving up on the decision / behaviour. Thus, the information being provided or the Actions towards the desired behaviour need to be simplified and made fun and engaging. The effort required to do / comprehend / remember tasks and information needs to be minimal, since people’s minds are already pre-occupied.

The interventions, specifically the Action component can be designed using different permutations and combinations of the above listed strategies. Further, the spectrums in Figure 42 can be used to define the ‘where (it takes place)’, ‘who (does it)’ and ‘how often’ for each Action. Specific combinations of these ‘Where’, ‘Who’ and ‘How often’ help to define constraints for specific contexts before beginning the design process.

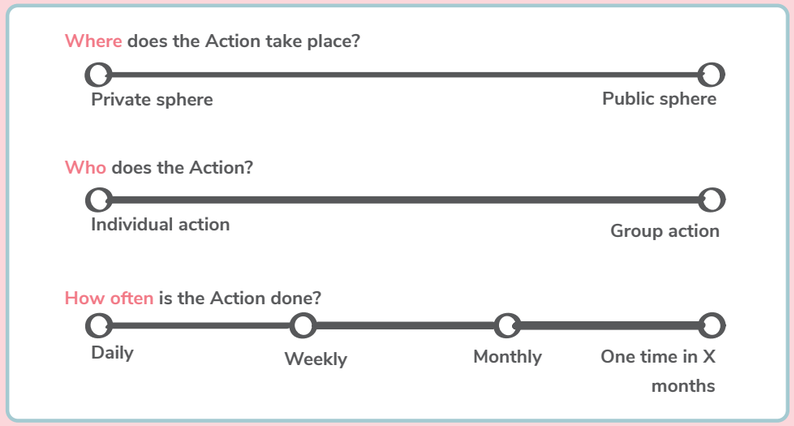


Figure 42: Filters to design interventions / define design criteria.

Spread Mechanism

While the key focus of the Action component is to prompt people towards the desired behaviour, the Spread Mechanism relates to the second criteria an intervention must meet – to enable social contagion. It defines how the Action /target behaviour will spread amongst the target group. It makes the design principles 3 (Comparison is key: Enable (sub)conscious comparison) and 4 (Make it desirable, silly) more tangible.

Two routes (S1, S2) of spreading behaviours / building social pressure towards the adoption of the target behaviour are identified.

S1

(stimulate) Direct Social Pressure

Direct social pressure involves direct contact / interaction between an activated person (who is currently performing / is convinced to perform the desired behaviour) and the targeted person. During (through) the interaction, one's peers directly request / force them to do or participate in the desired behaviour. This can be in the form of an invitation, tagging on social media, nominating someone, nagging them through phone calls etc. Upon being tagged / invited, one feels obligated to reciprocate or join the bandwagon, conforming to the new behaviour or social norm. This enables the contagion of the behaviour.

These interactions between people need to be designed for / facilitated. It can be through different channels (e.g. social media, physical meeting points, bulletin-boards, newspapers etc.). The Spread mechanism (tag, nag, invite, nominate, challenge, share, refer etc.) can be selected based on the Action.

S2

(stimulate) Indirect Social Pressure

People can feel the social pressure to join a trend or perform certain behaviours even if they are not directly forced to do so. They have the tendency to compare themselves and their behaviour to peers. In order to belong to certain social groups or maintain a social identity, they feel pressurized to imitate others or conform to the social norms. This can be leveraged to stimulate people to carry out the desired behaviour.

Comparison with peers and the subsequent emotions such as fear of missing out (FOMO), envy, insecurity can be triggered by designing the Spread Mechanism and Incentives (for an Action / desired behaviour). These incentives and the participation of others need to be made explicit and visible (conspicuous), such that they trigger social comparison.

Incentives

For each intervention, intrinsic and extrinsic motivations that make people want to do the target behaviour or participate in /perform the Action, need to be explicitly designed. Along with motivating people to participate in the Action, these should stimulate comparison amongst peers.

The incentives can be tangible or intangible, and can be embedded into the Action / Spread Mechanism (touchpoints), or be separately designed. One needs to think of 'Why would people participate in this Action? What will they gain / lose?'. Further, if made conspicuous, the Incentives need to trigger the feelings such as the fear of missing out, envy etc. amongst non-participants to stimulate adoption and subsequent social contagion.

Here, the timing of incentives - immediate / in the future, needs to be kept in mind. Since people are present-oriented, future gains needs to be translated to present gains. Further, since people are averse to losses, these can prove to be an incentive to trigger people towards the behaviour. For example, loss of any of the above can prompt action. The spread mechanism and incentive can be incorporated together – for example, people have a soothing doorbell if they opt-in, but an unpleasant loud one, when they haven't adopted the behaviour. While the sound of a bell can be indicative of peer's /neighbour's participation (and help in the spread of the behaviour), people would not want to have an unpleasant door bell and it can serve as an incentive for them to opt-in or do the Action.

Touchpoints

Touchpoints form the interface between people and the target behaviour, defining 'How will people do the Action or spread the behaviour'. These can be physical or digital - in the form of artefacts, environments or interpersonal encounters. Explicitly designing touchpoints can ensure well-curated interactions & experiences, which are necessary to build positive attitudes. They also help in making things more tangible, concrete or certain.

The Touchpoint inspiration strategies build upon behavioural economics principles and nudge[1] theory as a means to make the Touchpoints (consequently, Action, Spread mechanism and Incentive) more effective in getting people's buy-in. The strategies are classified under two (inter-related) Touchpoint design principles (T1, T2) based on two factors that shape people's decisions.

T1

Shape perceptions and impressions

People's perceptions are moulded by how information is presented. This is due to perceptual biases arising from the use of heuristics to make decisions. These heuristics and cognitive biases can be used to shape people's perceptions and impressions about the energy transition, ensure accurate comprehension and prompt immediate action.

T2

Make it easy to do /use

People rely on short-cuts to make decisions / do things. They want to put in minimum effort. Thus, the touchpoints need to be easy to use (or should make the Action easier to do / information easier to remember).

1 The ethical considerations of nudges need to be kept in mind. These should not be manipulative (enforced) and jeopardise people's freedom of choice. While the principles are used to optimise the choices and effort, they should always be used to improve the welfare of the target group. Further, one must ensure they are transparent and not misleading; and provide for an easy opt-out or alternative.

8.1.3. Design canvases

In order to guide the process of using the inspiration cards and the elements from the anatomy to design interventions, the toolkit includes a set of design canvases. These canvases have evolved from being a 'fill all in' template like the business model canvas (Osterwalder, 2005), to a combination of fill-in and process guide templates, that facilitate the design process during an idea generation session. (The evolution of the design canvas (iterations and validation of these iterations) can be found in Appendix I).

While the set of canvases captures and guides the design process – from problem definition, brainstorm, conceptualisation, evaluation and detailing (providing the requisite structure/ backbone); each step provides enough freedom for people to jot down their thoughts – use it creatively. However, some details (e.g.. in the definition of the goal) have bounded boxes, to ensure concrete decisions are made upon discussion, which can further help in guiding the process. Examples of the output of each step are provided in the canvas and in the handbook. A detailed explanation of the 4 canvases and the how these are to be used along with the cards is presented in the next section, with the help of examples.

8.2 Using the toolkit

This section outlines the process of using the toolkit. Each canvas and the steps it includes are outlined with an explanation of what the step entails and recommendations of how to use the cards along the process. Filled-in examples are used to illustrate what the output of each step would look like. (Note: the examples presented are generated during different validation sessions with designers, and are compiled by the author to show the plausible outcomes). The canvases presented here belong to the iteration tested with municipality officials. The final refined concept (set of canvases), is presented in Appendix J.

Step 0 - Preparation and Familiarisation

•The toolkit is designed to be used during a creative session to design interventions aimed at social contagion. It is recommended to use the toolkit as a team (of min. 3 people). However, it can be used by individuals as well. In case there are more than 3 participants, breakout into smaller teams of 2-3 participants while carrying out the brainstorm and conceptualisation.

•Although the toolkit is designed for municipal officials and is structured in a way that they can understand the process and do it themselves, a mixed group of participants with a few designers and municipality officials would lead to better outcomes.

•The ideal duration for the creative session is 4-5 hours (or a day long workshop) with several breaks in between. Block out enough time for the session, well in advance.

•The session can be carried out physically (offline) or digitally (online; through a creative platform like Miro, or Mural).

•It is recommended to have a facilitator for the creative session, who can manage, monitor and guide the process. Having a facilitator with a design training would prove to be advantageous. If not, the facilitator should be familiar with the purpose and process of the workshop. They should to go through the design process or the handbook well in advance to be able to explain the process and details to the participants during the session.

•Short energizers should be incorporated in the process, in order to stimulate creativity. Take a short break after each step.

•Before starting the session, the participants should familiarise themselves with the purpose and process of the session. They can be given a short presentation by the organiser (facilitator), or can go through the handbook.

•It is a must that each participant understands the anatomy of an intervention and the different types of inspiration cards. Allot specific time for this familiarisation phase. Once all participants have understood the anatomy of an intervention (the design criteria, principles and components), the creative session can begin.

•The STPS questionnaire (Kaptein, 2012), which builds on Cialdini's Social influence principles can be used during the research phase (before designing interventions) to understand the susceptibility of the target audience to the different social influence strategies. The results from the analysis of the questionnaire can be used as constraints while guiding the design process.

Step 1 -Define Design Question & Brainstorm ideas (Figure 43; Canvas 1)

Definition steps – 1A, 1B, 1C

The first step before starting the brainstorm is to define the design question. This is captured in the first three steps of canvas 1. Upon discussion, the team needs to identify what would be the content for contagion or what is the goal /target behavior to be achieved through the contagion (1A). This can also be pre-defined by the project owner, or through insights from field research (e.g.. On the motivations and apprehensions of residents, as done through this project).

The next step is to convert this goal 'What' question into a 'How-to' question (1B), such that it is easy to answer the question while brainstorming. For example: if the goal is to ensure appropriate comprehension of technologies, costs and processes amongst residents, the How to question can be – "How to ensure that the residents comprehend hidden costs? Or How to ensure residents do not misunderstand the information provided?" Figure 44). The overall goal can also be split into smaller 'How-tos' (which can be assigned to different teams in the brainstorm session).

The third aspect that needs to be defined is the social context where the interactions for social contagion will take place (where the design interventions need to be designed for) e.g.. Church, gym, vicinity of the house schools, etc. Step 1C captures this 'Where' of the contagion. Defining this social context based on social identities of people is a part of the overall 'HOW' process, as defined in the Design for social contagion framework (chapter 10).

Brainstorm Steps- 1D, 1E

Upon definition of the overall aim and context of the interventions, the next step is to select relevant categories of Action strategies that can help in meeting this overall goal (1D; Figure 45). The aim of this selection process is to narrow down to relevant strategies, which can make the process less overwhelming (participants can focus/ refer to only relevant cards). Alternately, each participant can get 1 / 2 cards from each of the Action categories to ensure all routes of achieving a solution are covered during the brainstorm. Similarly, 1-2 Spread mechanism and Incentive cards should be distributed amongst the participants.

Once each participant has a few inspiration cards, begin the brainstorm activity. (Note: this needs to be done in smaller breakout teams of 2-3 participants). A specific time can be assigned for the participants to go through the inspiration cards. Each participant should explain the inspiration strategies they read (in brief) to the rest of the participants. This ensures that all participants have a basic understanding of different strategies (that they can use during the brainstorm). The repetition also helps in better retention and comprehension of the strategy that the participant has read. Alternately, participants can be sent two inspiration cards for reference everyday in the week leading to the brainstorm session. This can give them enough

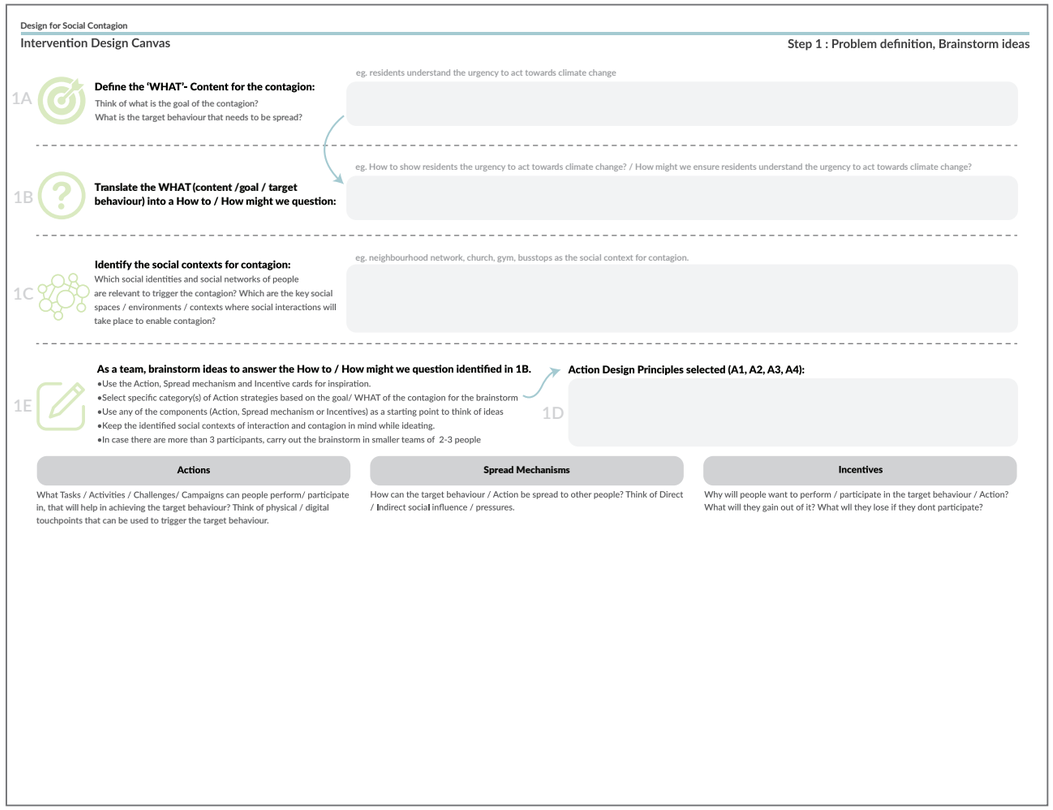


Figure 43: Design canvas 1 - guides the problem definition and brainstorm steps.
Refer appendix I for bigger image.

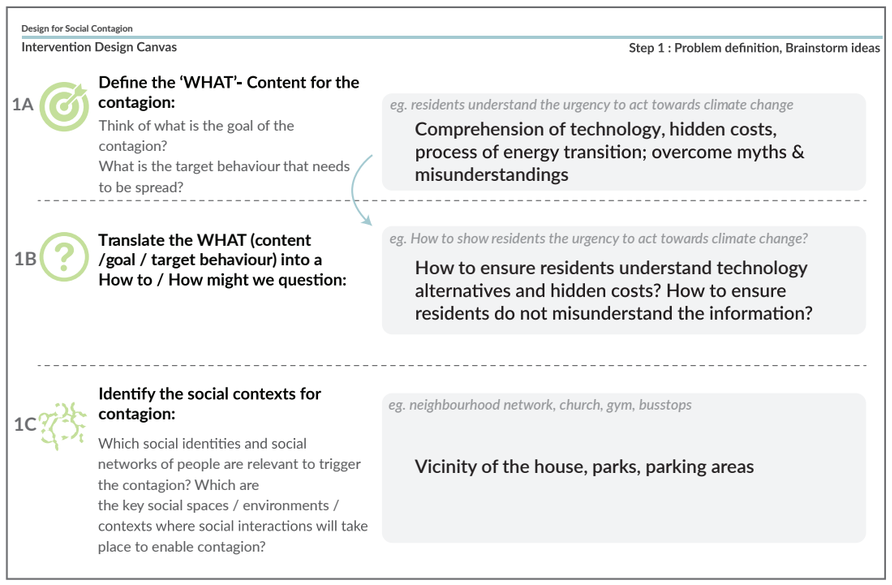


Figure 44: Examples of filled-in steps 1A, 1B and 1C

time to go through the cards. However, it should be kept in mind that not all participants may have the time or take the effort to do the same.

The brainstorm activity (1E) can start once everybody has discussed the strategies. The design criteria and principle cards are to be kept in the center or where they are visible to all teammates, such that they are easy to refer to. Participants should use the Action, Spread mechanism and Incentive cards as inspiration for coming up with ideas. Since the touchpoint cards include nudges, or behavioural economic principles, which are more useful in making the concepts more effective, it is recommended to use them later in the process. However, they can also be used for inspiration in this phase, if the participants do not find it overwhelming. To make the brainstorm more interesting, the cards can be rotated amongst the participants. Each participant gets one card for 30-40 seconds, where they brainstorm ideas related to that particular strategy and then pass it on. Although, one has to ensure that the participants are already familiar with the strategies for this rotation; reading all the content would not be possible during rotation.

Figure 46 outlines what the outcome of a brainstorm session could look like. This should be treated as a parking lot for all ideas wherein participants are encouraged to come up with all types of ideas – big, small, whacky, simple. As seen in figure 46, participants can think of all the three elements (Actions, Spread mechanisms and Incentives) together, or individual ideas for each.

Figure 45: Step 1D from canvas 1; participants have to select relevant Action categories.

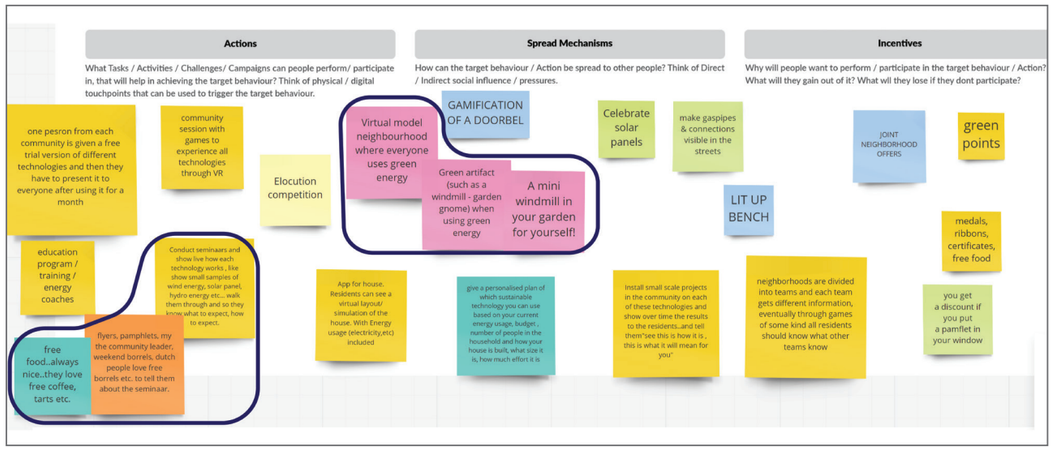


Figure 46: A glimpse of what the outcome of the brainstorm session would look like.
Refer appendix I for bigger images.

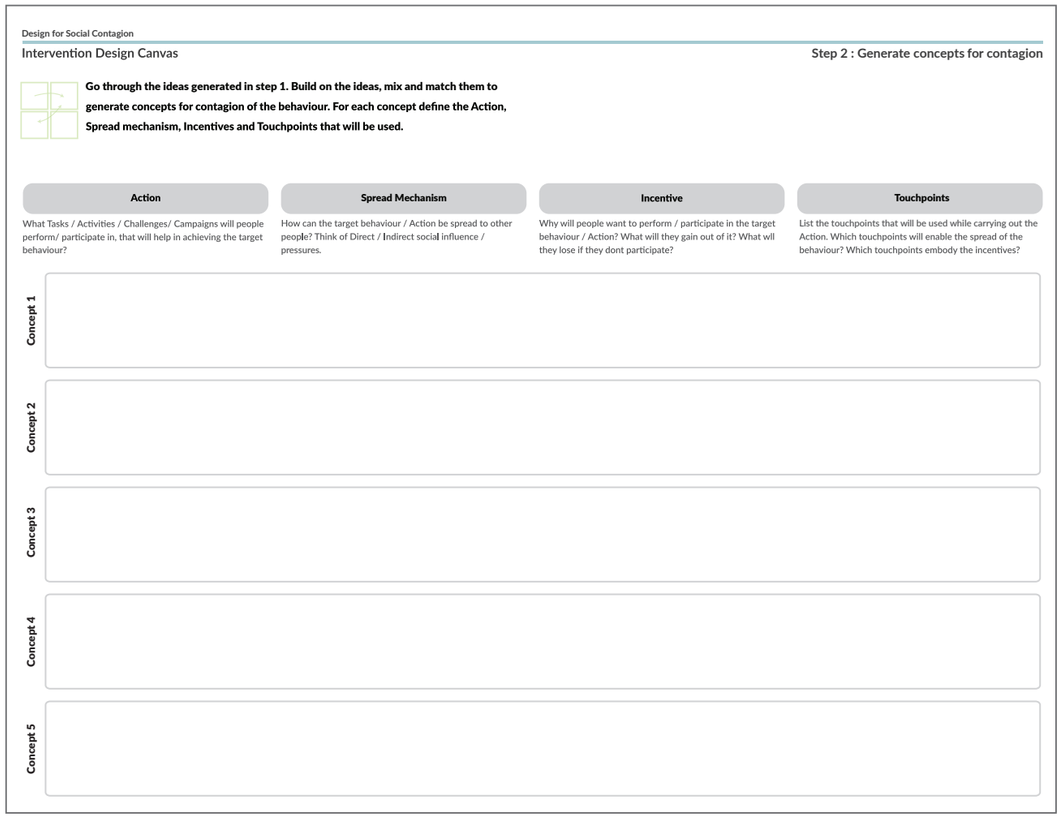


Figure 47: Design canvas 2 - guides the concept generation phase.
Refer appendix I for bigger image.

Step 2 -Concept generation (Figure 47; Canvas 2)

Once all participants have put down all ideas, they should present their ideas to the others in the smaller breakout team. The discussion helps in building upon each other's ideas and grouping similar ones.

The participants then mix and match ideas and generate concrete concept lines – wherein they think about all the components – Actions, Spread mechanisms and Incentives, and also list all the touchpoints included in a specific concept.

Specific space is allotted for each concept line on the canvas. These are left blank (not structured with specific columns to fill in), to ensure participants have the freedom to generate concepts as they like. For example, as shown in Figure 49, participants used the space to categorise their ideas and the concept-lines were in the form of themes – personalization, experiential and community influencers, each having several small ideas under it. While in another session (Figure 48), participants generated specific, single concepts.

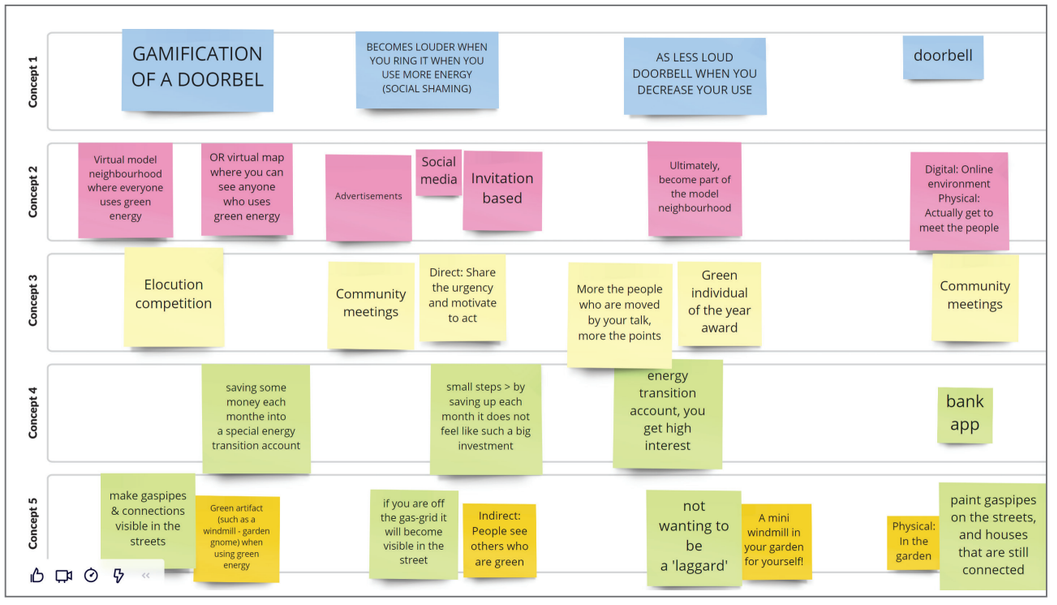


Figure 48: Example of the outcome of concept line development. Here, the participants used the concept space to create specific, individual concepts.

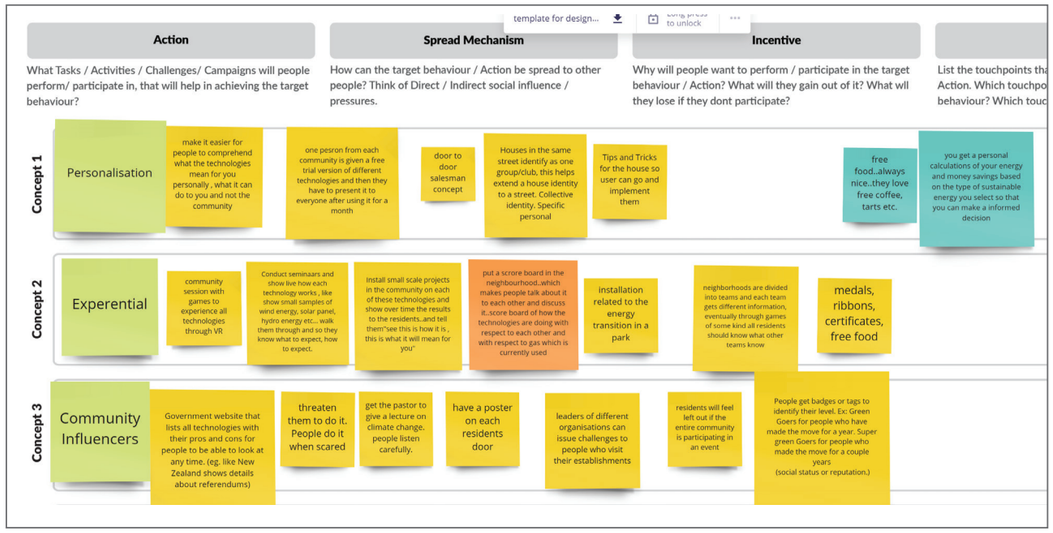


Figure 49: Example of the outcome of concept line development. Here, the participants used the concept space to categorise their ideas from the brainstorm. Each concept is based on an overall theme e.g. Personalisation, Experiential etc. Within the concept line, there were several smaller ideas clubbed together. Refer appendix I for bigger images.

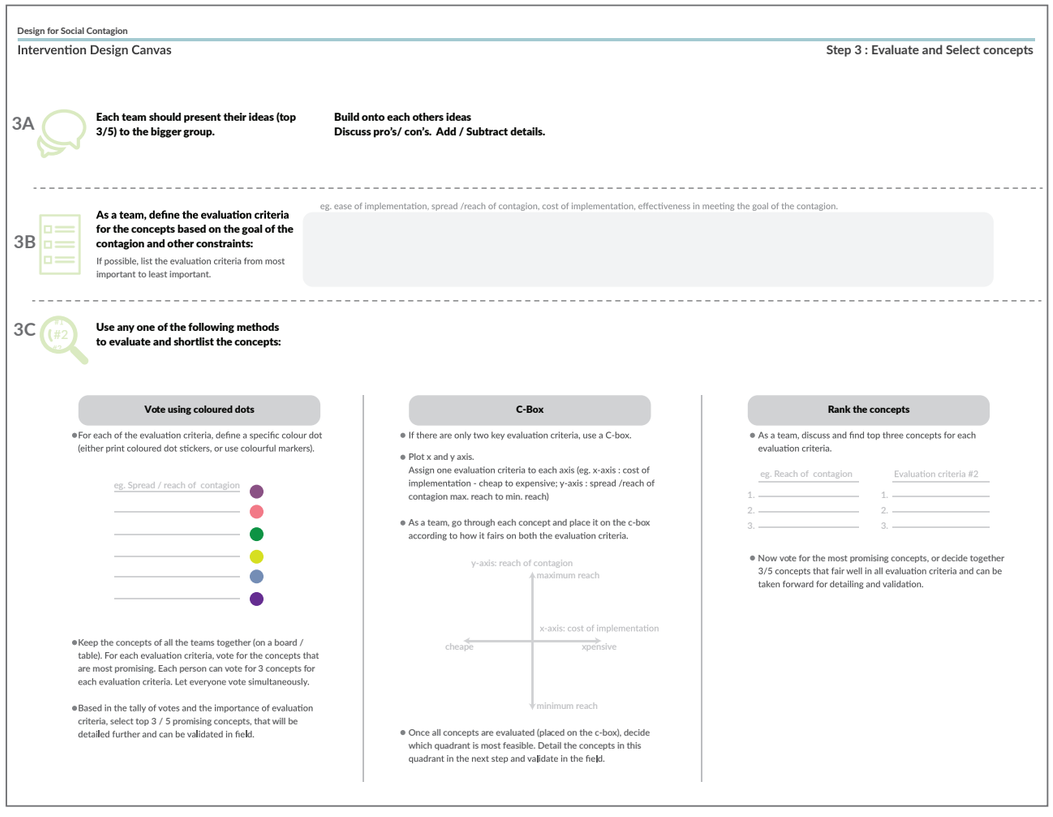


Figure 50: Design canvas 3 - guides the concept evaluation and selection phase. Refer appendix I for bigger images.

Step 3 -Concept evaluation & selection (Figure 50; Canvas 3)

Once all break-out teams have generated concepts, they can come together and present these to the other teams (3A). The discussion helps in further fine-tuning the concepts, adding/ subtracting details, building upon one another's ideas. Next, the participants should decide the apt (qualitative) evaluation criteria for the concepts (3B). The criteria can be based on the elements from the anatomy of an intervention (design criteria or design principles; how well does an intervention meet the criteria / principle?) or other factors such as the feasibility, ease and cost of implementation, or the potential of spread of behaviour (range).

Once the team has defined the evaluation criteria, they can choose any one of the concept evaluation and selection methods outlined on the canvas (3C). Since the aim of the evaluation stage is to narrow down and identify the most promising concepts that can be further developed or validated, commonly used design concept selection and evaluation methods such as C-box, Power dot voting or Harris profile are used.

All participants evaluate / vote / rank the concepts together/simultaneously. The top potentials can be taken forward to the detailing stage. Figure 51 outlines what the outcome of dot-voting would look like.

Step 4 -Concept evaluation & selection (Figure 50; Canvas 3)

The fourth canvas helps in further carrying out the first stage detailing of the concepts. 4A includes visualizing how the contagion will unfold. Who will initiate the contagion/ Action? How, where and how often will the Action take place? To whom will the initiator spread the contagion? - are few questions to be answered.

Subsequently, the participants can use the Touchpoint inspiration strategies (based on nudges, and behaviour economics principles), to detail/ visualize what the touchpoints would look like (4B). This can help in making the interventions more effective. Figure 53 show examples of what the output of the detailing stage would look like.

Note, the Touchpoint inspiration strategies can be used by the municipality to make any other 'touchpoints' or artefacts they use to communicate /interact (not part of social contagion interventions) with the residents more effective.

The concepts can then be prototyped and validated in field, and further undergo several rounds of iterations. If required, quantitative tools / methods can be used to simulate the social contagion process and predict its reach.

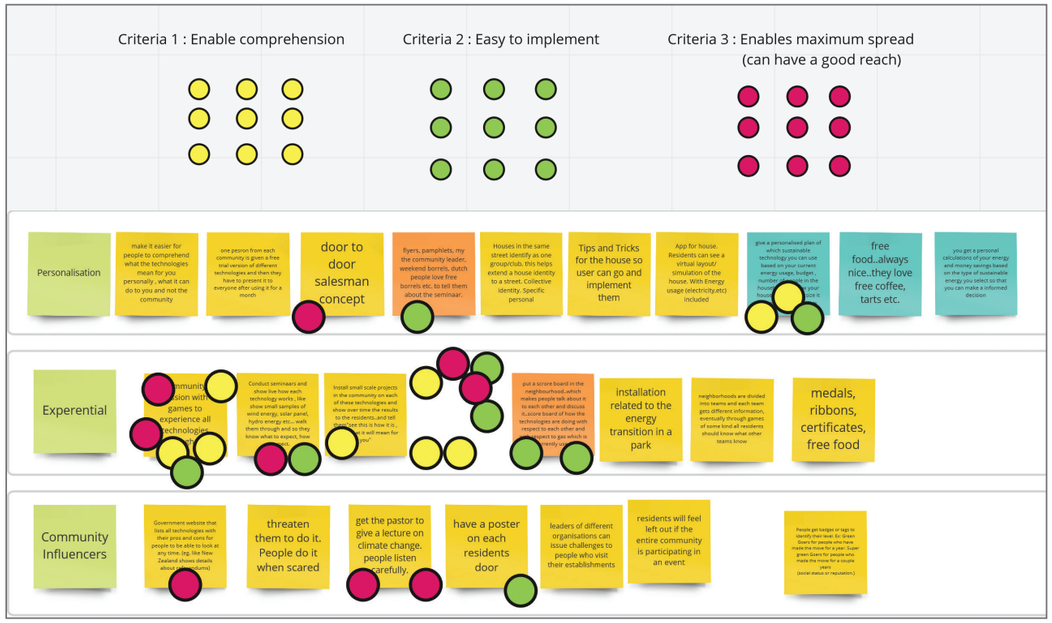


Figure 51: An example of what the outcome of a dot-voting evaluation of concepts would look like.

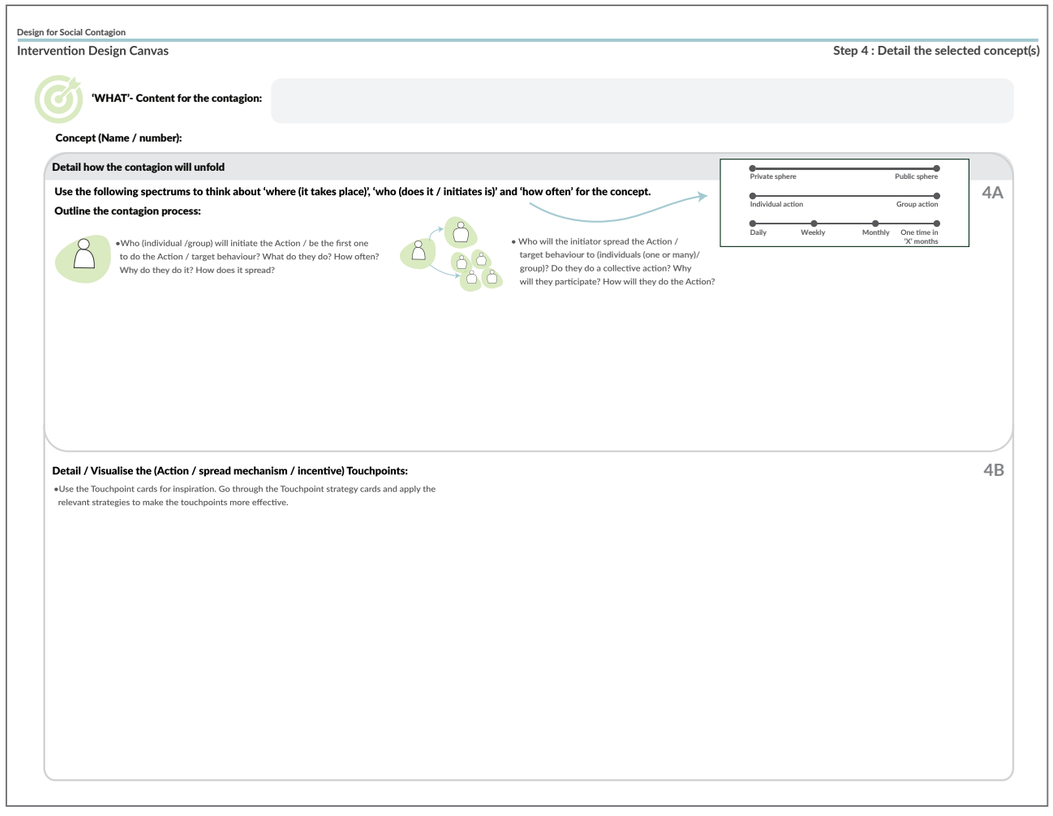
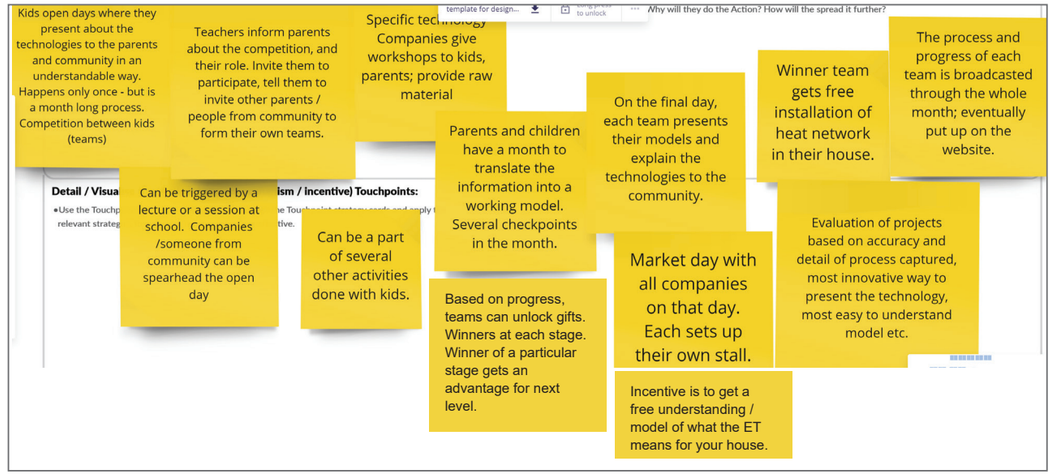


Figure 52: Design Canvas 4 - guides the detailing phase.
Refer appendix I for bigger images.



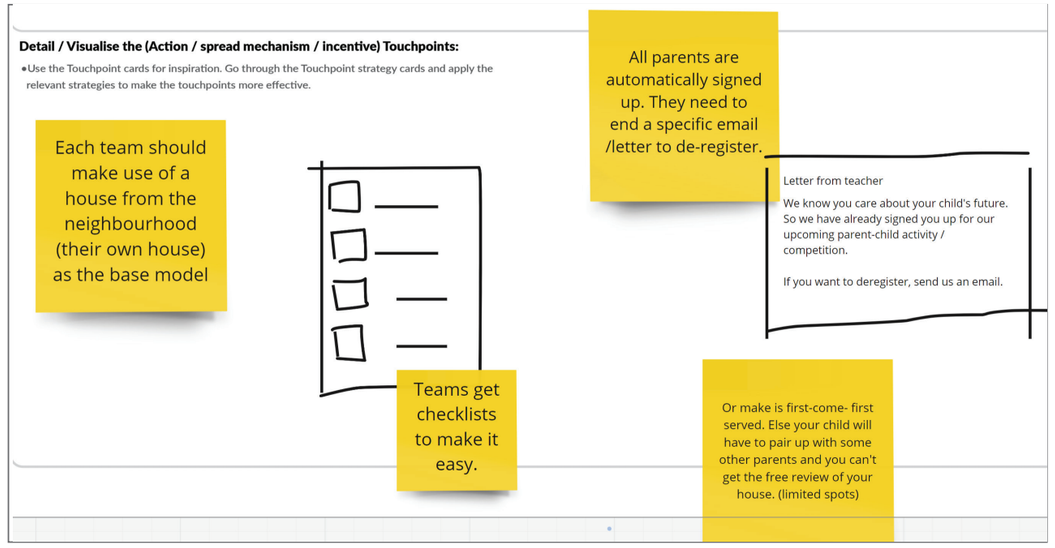


Figure 53: An examples of what the outcome of detailing step using touchpoint strategies could look like, Level of detailing will vary based on the concept.

Having outlined the specifics of the toolkit and how it can be used, the next chapter presents insights from the validation of the toolkit with municipality officials.

Chapter 08 in sum...

- The chapter present the ‘Design for social contagion toolkit’, which aims to help the municipality in designing interventions using the principle of social contagion to overcome resident’s apprehensions. It also familiarises the municipality officials with behavioural and social constructs of decision-making.

- The toolkit consists of three elements:
  1. A deck of inspiration cards
  2. A set of design canvases (which guide the process of designing interventions and using the cards), and
  3. A handbook (that outlines how to use the toolkit).

- The design principles, design criteria and design components forming the anatomy of an intervention are captured in the inspiration cards. Especially for the design components (Action, Spread mechanism, Incentive and Touchpoints), several persuasive strategies are presented through the cards, that can help in designing these components.

- Strategies within each component are categorised based on behavioural traits or factors that affect a person’s decision-making.

- A set of 4 canvases guide the process of designing interventions during a creative session - from problem definition, brainstorming, concept generation, evaluation & selection of concepts to detailing.

- The cardset + canvas format provides flexibility in use, and strike a balance between structure and freedom (of use). The cards help in diving deep into each strategy- the explanation being necessary for municipality officials to truly understand it.

- The toolkit should be used with a team, and the duration of the creative session should be minimum 4-5 hours with breaks in between.

09

Validation of the toolkit

Chapter 09- Validation of the toolkit

This chapter presents the results and insights from the validation of the toolkit with officials from the municipality of Rotterdam (the key target group of this toolkit)[1]. Subsequently, these insights are used to refine the toolkit further.

9.1 Protocol of validation

The key aim for the validation of the toolkit was to see if it helps the municipality (municipal officials) in designing interventions to activate residents towards gas discontinuation through social contagion. Whether it adds value, brings a new perspective, inspires ideas and will be used by them in the future; along with its usability aspects such as ease of use, structure, if its self-explanatory etc. form the aspects for evaluation.

The validation was carried out by organizing a creative session, just as the toolkit would be used in practice. The session was carried out online, through Miro (a collaboration tool) and Zoom, and it lasted for 2.5 hours. It was planned according to the 5 steps – from familiarization to detailing, guided by the canvases. The Miro board was designed in order to provide a specific working space for each breakout team. Participants included 7 municipal officials from different departments and with varying backgrounds (all involved directly or indirectly in shaping the Energy transition in Reyeroord).

Few days before the session, an agenda (outlining the basics of the toolkit and its overall aim, along with an overview of the session- steps to be followed) was emailed to the participants, to set apt expectations.

The session started with a quick introduction and 15 min presentation outlining the ethos of the project – why social contagion, the toolkit and its components, anatomy of an intervention etc., building the relevant context to the session. Once all participants were familiar with the process, the participants were allotted to specific teams and joined a breakout session and team board on Miro.

Here, the teams were pre-defined by the author, based on the expertise and backgrounds of participants. It was a conscious decision to have one team with more people with a design background, and who were younger in age. The second team had people from diverse backgrounds, who were slightly older. This was to see the influence of 'design training' on the ideas generated and the ease of using the toolkit (designers being more used to / familiar with such a process).

1 Refer to Appendix I for the previous iterations and insights from their validation.

The problem or question to be answered was already defined on canvas 1, such that the focus is only on brainstorming ideas (due to lack of time). These were purposely kept broad / generic in nature to see how people proceed – whether they narrow these down or let them be as is. A set of inspiration cards were selected at random and allotted to each participant (each participant had an Action, Spread mechanism and Incentive card; some participants were given the same Action cards in order to understand any differences in interpretation). The participants then went through the cards and followed the 'brainstorm' and 'generate concept lines' steps in the breakout teams.

Figure 54 and 55 show a few concepts that the teams generated. The author acted as a facilitator to answer doubts and moved between the breakout rooms. She stepped in only if the teams got stuck (not a frequent occurrence), and could not figure out what to do.

Once both teams had generated concepts, everybody came together and each team presented their concepts. Due to lack of time, the evaluation and detailing steps were not carried out. The participants then gave their feedback and suggestions. They were provided different aspects (as shown in figure 56) to comment upon, along with them sharing their experience and recommendations.

9.2 Insights from (Results of) validation

9.2.1 – Participants' feedback and suggestions.

Figure 56, 57 outline the feedback of the participants and their suggestions / recommendations. Following are the key take-aways from the feedback:

- The cards are self-explanatory and their structure (explanation +examples) provide the requisite inspiration. However, there are two difference in opinions when it comes to the amount of text. While most people think that the cards have too much text, few others find that much text necessary (or not bothersome) since it helps to understand the underlying principles; which is important for municipality officials who are not familiar with these persuasive strategies. It is good to note that practical aspects such as limited time, reading the cards digitally -where both front and back side of the cards are presented side-by-side, can affect the perceptions.
  A middle road is taken while refining the cards, where the text is reduced (but not to just one-liners), and made more legible. Overall, the cards and the strategies included provide enough inspiration during the brainstorm session.

Figure 54: The output of two teams for the brainstorm step

Figure 55: The output of two teams for the 'generate concepts' step.

Figure 56: Participant's comments

- One of the key points of discussion and feedback relates to the problem / question definition phase of step 1. Several participants point out that it can be difficult for municipality officials (who do not have a design training) to formulate narrowed/ specific design questions. They might tend to use broad, generic goals, such as gas discontinuation, to guide the brainstorm session. These can lead to generic ideas or worse, no ideas. Thus, the process of narrowing down from a broad question to specific problems that shall be tackled through the session, needs to be steered. This shall also ensure that a lot of time is not wasted/ spent only on the definition step.
  As shown in the section 9.3, the first canvas is split into two different canvases, wherein problem definition is given specific focus on one canvas.

- In general, the participants were happy with the balance of structure and freedom through the process. They deem it important that the process is structured (through explanations, steered by breaking it into steps, having the design principles and components etc.) since many of them are not very familiar with the design process. Further, they appreciate the presence of a moderator / facilitator who can guide the process.

- Most participants suggest to have a filled-in example sheet or a video / guide that can explain the process, ensuring people know what to do. Further, they find value in the quick introduction presentation given in the beginning, which provides clarity and sets apt expectations. Thus, apart from providing examples on the canvas itself, a handbook that takes one through the basics of the project and the toolkit, is developed.

- In general, the toolkit met its aim of inspiring new ideas and facilitating the process of designing interventions to activate residents using social contagion. Participants were enthusiastic about the process and the ideas generated and look forward to receiving the toolkit. It is easy to use, even by people who are not familiar with the whole project. However, the brainstorm and concept generation steps of the process (toolkit) are of most value to the municipality (as compared to the detailing step). Participants point out that detailing can be done later by the project team or project owners; but the true value is inspiring the new perspective of activating residents towards the energy transition. This also helps to build ownership towards the energy transition project (in general) and the specific ideas, amongst the municipality officials.

- Last, a few recommendations were about the practical aspects, such as duration of the session (it should be longer, at least a whole afternoon), familiarity with Miro (difficult to use for first-timers), language barrier (since English is not everyone's native language, it can be difficult for them to understand the cards; this reflected in the different levels of comprehension and interpretation of the same cards amongst different participants) etc.

About the cards

....their structure

"It is good that you give the overall explanation and then zoom into a concrete, tangible examples and some other examples"

"I also really like the design of the cards. They really spark inspiration. its really cool"

"good to categorise the cards.."

"What helps is that if you are stuck in the process, you [can] pick a card and try to use that as an injection to rethink in the process.."

....the amount of text

"quite a lot to read"

"to be honest, I wasnt' bothered by it (refering to the amount of text).. that the card was too long.. for example, I have the F-I-T-D card. I didn't fel like it was too much text.. you need a few lines to explain the idea behind it.. (expains the principle the foot-in the door technique)... I think it needs some sentences to explain this else people will not get it... I think it what was very strong was also to always use an example.. because then you think this is the theory and this is how you can apply it... "

"If you cut down the text too much, it can raise extra questions; then it is not immediately clear to the one who is reading the cards... "

....familiarisation with cards

"It could be good if [we] receive them earlier, and [we can] read through them not all at once.."

"I was also thinking (in this situation) like getting one card at home like a post card or something. You make it really special that people [municipal officials] are also more stimulated to read or go into it... They are curious, "Oh! what's this?" and they ask other participants 'did you also get a card.. Then you already sparkle the creative process before the session starts.."

" you shouldn't read the cards or the info. too much in advance, then the knowledge will go and you also think 'why am I reading this card now?'... "

About the canvases / process

....problem / question definition

"Canvases are really clear. I was wondering.. you already chose some questions [refering to the problem definition] and wrote down.. I think if we do the whole process.... if you are a lazy reader, its good to get an example [of how to define this] ..... Now its filled in, but [we] have to do it ourselves, it can cause a little bit of struggle, maybe some discussion"

"It depends on the target group; if you have designers .. those people are really used to translating a what question o a How to. So its easy for them. Its logical. But for a lot of other people it isn't, and they dont know how to formulate something like that..."

"...For a lot of colleagues, they have this high, 'higher' ambition or they know that like the overall goal is to get everybody disconnected from gas. But how can they narrow it down to a question that can be solved, or can be enough to focus on, is very hard..."

"for people who do not have a design background, the first phase of formulating the question can be hard. In my experience with another design session, when we had to have a short discussion about definition, it took us more than an hour...(to arrive at what is the exact problem, what is our understanding, what is the meaning of this session /work) .... if you can do something on the canvas that can help narrow down it will be good. Translating the what question to a how-to, is tricky. You really need to steer it.. provide guidance so its clear to everyone what to do, and what to expect if you work on the canvas. from then on, its all very clear..." "you need to be cautious, that people dont start the session with a very difficult (broad) definition discussion.."

"maybe come up with some check questions tht help to narrow down the question... that can really help the process... if its specific, (we) can be more focused on the rest of the session..."

"I can also imagine that if you are doing this for the first time, maybe tha the questions might become too big or too general.. already these questions you have given are big and in our group we were struggling how to translate these into actions. So I do imagine that if (we) do this process by ourself, it might become a very broad question. Provide a guideline to make it narrow /specific... "

About the canvases / process

...on freedom v/s structure

"What I also saw because like.. to be honest, your explanation in the beginning was quite clear - like this is how it works, this is how you came up with the toolkit and 4 different type of cards and also the cards itself were quite good, explained themselves wuite good.. & the examples really helped to understand the cards better. And because of that.. How I sense in my group.. for us it was quite clear and also the structure was quite clear to us. That gave us a lot of time to really do the brainstorming itself. And thats the fun part about it. Just think about ideas.....
... And that what it should be for us, like that we can as Gemeente use this structure and toolkit to brainstorm interventions.. and in my group most of the time, we were busy with that... because the structure behind it was good and clear... so I think you succeded in this test... because it as a test like.. does it work?... and I think it worked..."

"we are civil servants, we need a little bit of structure"

"At one time, you (Jesal) said that 'you can also just put in your ideas and not fit them within one specific category' (describing the brain-storm phase)..... I was thinking maybe it can help to give such guidelines to the facilitator or maybe [saying] like think of a 'parking lot for your ideas' or something like that...a free space... Because therre are some people that are restricted by feeling that they have to put it within a specific category.."

"I think if you are using this for the 1st time, or if you are not used to brainstorming, there is already enough freedom in the exercise itself. And then if you use it for the 2nd / 3rd time, then you can take your freedom - you can say, 'I know the cards by now, so I can skip some steps'... and its possible to do that because of how the canvases are designed... "

....on the detailing step

"detailing (step) with the whole group wont be so useful... especially when you have such a big group, then you really want to use the power of brainstorming-- to come up with ideas and build on each other's ideas "

"together as a group, you have this collective intelligence and thats what you want to use during the session.... "

About the toolkit in general

"It was quite successful; it worked pretty well... the participants.. they dont know your research completely (I know a bit)... but you could see how easily they could work with this.. with just only the small introduction you gave at the beginning... and for the team it was quite easy to work with it ...."

"for everybody, it was 2 hrs of their time, but they were very enthusiatic and also about the ideas we came up with... I think the brain-storm part can be really useful for us..."

"It shows that you set up a good and clear set up and framework which is quickly under-standable for a lot of people, esp. within the Gemeente.. they know how it works and it is easy to work with.."

"it also has something to do with ownership (of ideas)... so if you are a group of colleagues and like you are part of this ideation process with these principles.. I think it also helps to build ownership towards ideas and what you want to do with these, also the ownership of the overall outcome...if we hire a bureau and they come up with ideas, I think it lacks a bit of our ownership..."

"...I think thats also where the power of designers like you is... they bring creativity, something different, (different) narrative looking from different angles.... we as Gemeente find it difficult (to adopt / imple-ment).. (you need both - creativity and practicality..)"

On the Practicalities

"you should recommend to use a facilitator, to steer the process....[the question is] are people really going to fill it in how you want it?.. sometimes people need a little bit of steering even if it is self-explanatory...; Provide an example sheet"

"Your presentation was very clear... maybe you can work out a presentation in miro with some short sentences with arrows... so its clear for someone who joins later - the steps you have to take... I even had some problem with 'ok, what is the next step..?'....."

Figure 57: Participant's comments, feedback, suggestions.

9.2.2 – Other observations and insights

Following are other insights / observations derived by observing / analyzing how the session proceeded, the interactions and discussion between the participants.

- The inspiration cards are fruitful in prompting new ideas and rich conversations / discussions.

- It is observed that people draw on own experiences, or parallel examples that they know off to derive ideas. They use both, their role as a municipality official and their role as a consumer to think of ideas. They think of times when they have been on the other side, where these persuasive tactics have been applied on them. For example, participants described their experience in camps wherein you are given tokens to take a shower within specific amounts of time, or how NS uses AR to let people vote on things they like / dislike through an app, the Duolingo format of learning or showing leader-boards etc. Participants also recollect their feelings / emotions related to these experiences (e.g.. “it’s a competition/ goal for yourself to bathe quickly”) which helps to accentuate and make people realise the power of these persuasive strategies. This self-reflection and sharing of stories also steer the process, wherein people are prompted to build on others experiences or ideas. Further it helps in team building.

- Apart from personal experiences, the cards also help people to think of business (private sector) partnerships that the municipality can build (are required for each concept), in order to activate residents. E.g.. One team thought of partnering with Albert heijn for providing meal prep boxes, coupons and cooking classes – to promote electric cooking.

- The cards help participants to learn about / realise behavioural and social constructs of decision-making, when they think of their own experiences. For example, when reading the foot-in-the-door principle card, a participant describes how she has experienced it, and exclaims that she understands why she feels the need to agree to other requests.

- Thus, the cards facilitate both, wide-ranged and deep discussions.

- Participants were seen building upon existing projects / ideas they are working on already. They applied the principles to these ideas to make them more effective and attractive for people. For example, one team built on the concept of energy coaches, or radio podcasts already being implemented by the municipality.

- Since the participants were familiar with the other goals/ projects of the municipality, they were able to generate ideas with the bigger picture in mind. For example, one of the projects of the municipality is related to establishing circular economy projects in Reyeroord. Thus, one participant suggested to dismantle the existing gas pipes and using it as pots and planters for residents’ plants or at Oeverloos (a community space). This also points to the importance of knowing the context (the community, the neighbourhood, other projects and goals) while doing the ideation activity. This leads to more feasible, context specific ideas (something that lacked in the previous validation sessions, since people were not aware of the context in-depth).

- While brainstorming is divergent in nature, it was observed that the teams forgot / overlooked the overall goals / defined questions in step one while generating ideas. Thus, a constant reminder of the goal needs to be provided, or it should be made visible at all times.

- Although the cards stimulate creativity, the municipality officials have a very analytic mindset. They needed to be constantly reminded to let go off being analytical while brainstorming. They need a push to think out of the box. This also points to the importance of having a facilitator. It was observed that in both teams, one person unofficially took up the facilitator role, guiding the process.

- Each person adds their subjective interpretation to the persuasive strategies. For example, one participant had the ‘show people’s experiences’ spread mechanism card. Rather than the generic view presented on the card, the participant looked at it as learning from one’s elders’ or colleagues’ experiences specifically.

- Explaining the cards you read to others is a good way to ensure accurate comprehension, and retention – the power is in the rehearsal and repetition.

- The separate components outlined (Action, Incentive, Spread mechanism and touchpoints) help in holistically thinking about how to tackle a problem and help in developing a good level of detail even in the first version of the concepts.

9.2.3 - Limitations

While the toolkit was successful in achieving its goals, there were several limitations that may have affected the process.

- The two biggest constraints (and limitations) are related to time and the digital medium of validating the toolkit. Due to limited time, the whole process was not carried out, and each activity was time boxed. This constrained the discussion, wherein participants were prompted to move on to the next step within the allotted time. Thus, the full potential of the toolkit and the nitty-gritties of each step – like selecting the apt Action categories have not been validated.

- Few inspiration cards were selected at random and distributed amongst the participants. Thus, the potential of each strategy in prompting ideas has not been validated through this project. This forms an area for further research, wherein individual strategies can be tested, and further customized for the energy transition.

- Since the session was carried out online, it also constrained the discussion – which was not as organic as it would be physically. Further, some participants were unfamiliar with Miro, and thus spent most time in figuring it out. This lowered their productivity. Technical glitches (e.g.. A person not realizing they are muted for the longest time etc.) further affected the discussion and group activity.

- To ensure the author understands the ideas and discussion, the participants were told to converse in English as much as possible. However, since it is their native language, most of the participants think in Dutch. Thus, the essence of ideas (and the discussion) may be lost in translation.

- The problem definition step needs to be validated in the future, since during the session it was already defined. Further, how specific should the question be to generate apt ideas, needs to be researched in the future.

- Having described the validation protocol and outcomes, the next section outlines how the feedback is incorporated to refine the toolkit.

9.3 Refined concept

Building upon the above insights from validation, following are the changes incorporated in the final concept.

- The first canvas (step 1: problem definition and brainstorm ideas; figure 43) is split into two, wherein the problem definition steps are further detailed. Figure 58 outlines what the revised problem definition canvas looks like.

- After the first step (1A) of defining the overall goal / target behaviour, an extra step (1B; figure 59) is included. The prompts on the side, trigger the participants to break down the overall goal defined in 1A into aspects or think of smaller problems that contribute / are obstacles to achieving the goal. This additional step can ensure that the team uses a specific design question to inform the brainstorm session. The next steps 1C (translating the problem identified into How-to's) and 1D (identifying the social contexts of interactions) are left as is. However, more examples are provided to ensure participants understand what to do.

- Since it was observed that participants forget / overlook the specific question defined during idea generation, an additional step is added on the top of the second canvas (brainstorm ideas; Figure 60). This step prompts people to copy the specific question defined in step 1C in the space provided, to ensure they can refer to it easily and it is right in front of their eyes at all times.

- Finer details like adding a space to write down the allotted time for a step (on all steps), a prompt stating that it is a 'parking lot of ideas' (on the brainstorm step), or removing the tabs behind the names of the components (on the brainstorm sheet; the tabs made people feel the need to build complete concepts -think of each of the components for an idea during the brainstorm) were tweaked.

- Although the detailing step (5; 5A, 5B) might not be carried out during the session (will be carried out later by the project owners), it has still been kept as a part of the process. This is to ensure that no matter when it is done, the specific aspects are defined and the Touchpoint inspiration cards are used to make the concept more effective.

- The text on the inspiration cards is reduced and made more legible.

- The final version of all cards, canvases and the handbook are presented in Appendix J.

Future implementation

In the future, the Design for social contagion toolkit and framework can be made available through the ENRGISED project website. A digital copy can be downloaded or a physical copy can be ordered. The specifics can be worked out upon finalization of the website.

The validation and the subsequent refinement of the toolkit culminate the design phase of the project. From a discourse perspective, the next chapter presents the design for social contagion framework, positions the outcomes of the project in the bigger picture and suggests areas for further research.

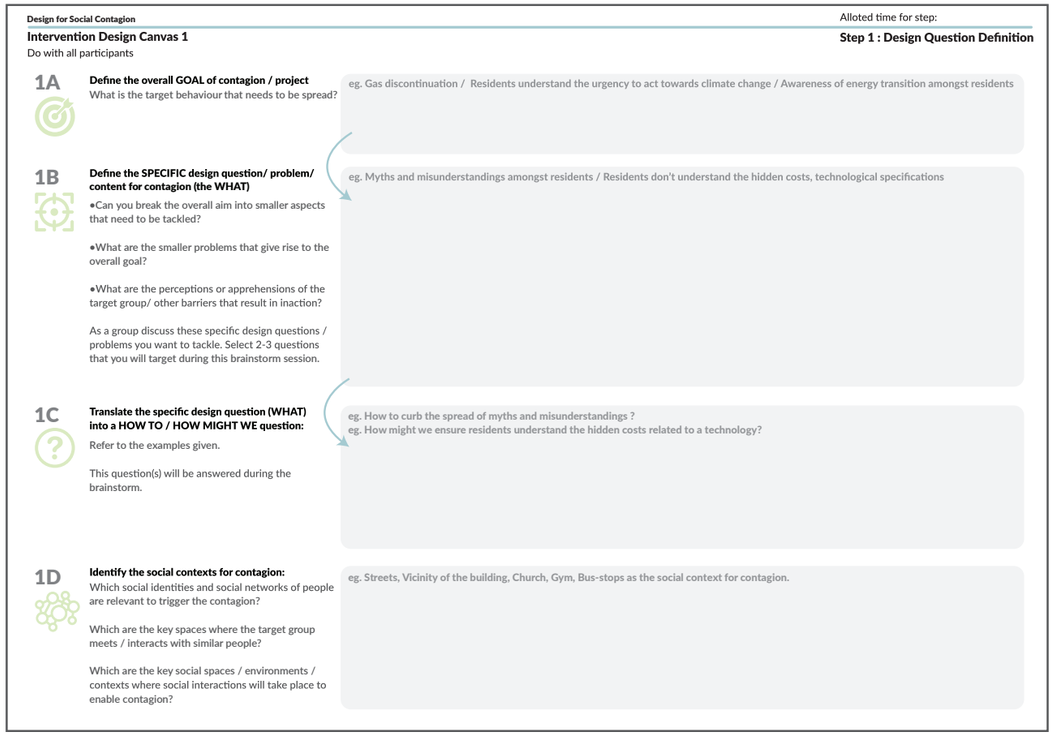


Figure 58: Revised canvas 1. Original is split into two. This canvas focuses on the problem definition phase, with additional steps to narrow down to a specific design question for the brainstorm. Refer appendix J for bigger images.

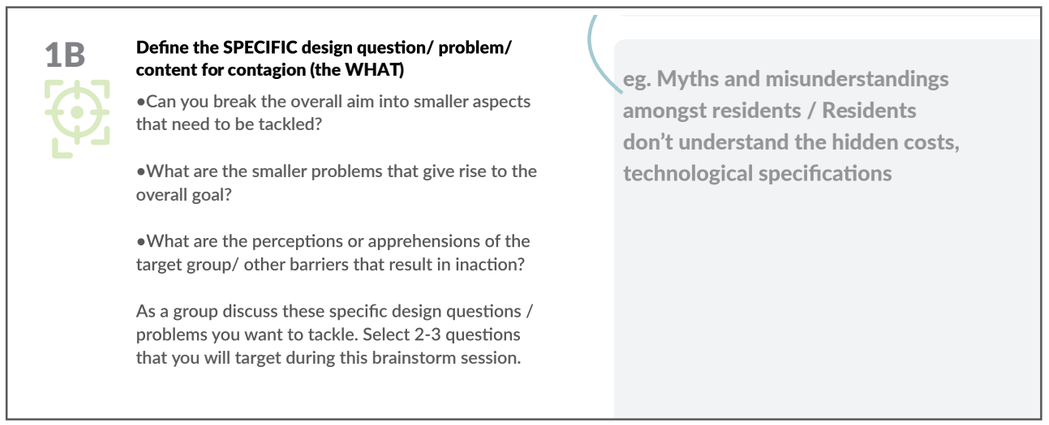


Figure 59: Step 1B - that helps to narrow down to a specific design questions.

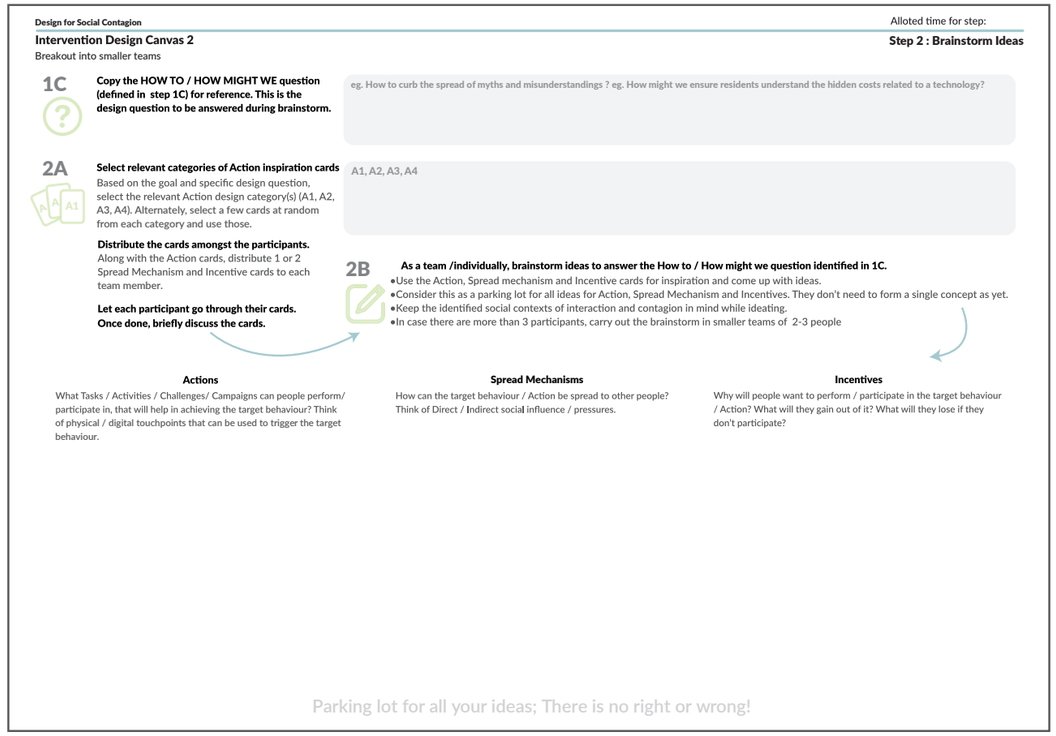
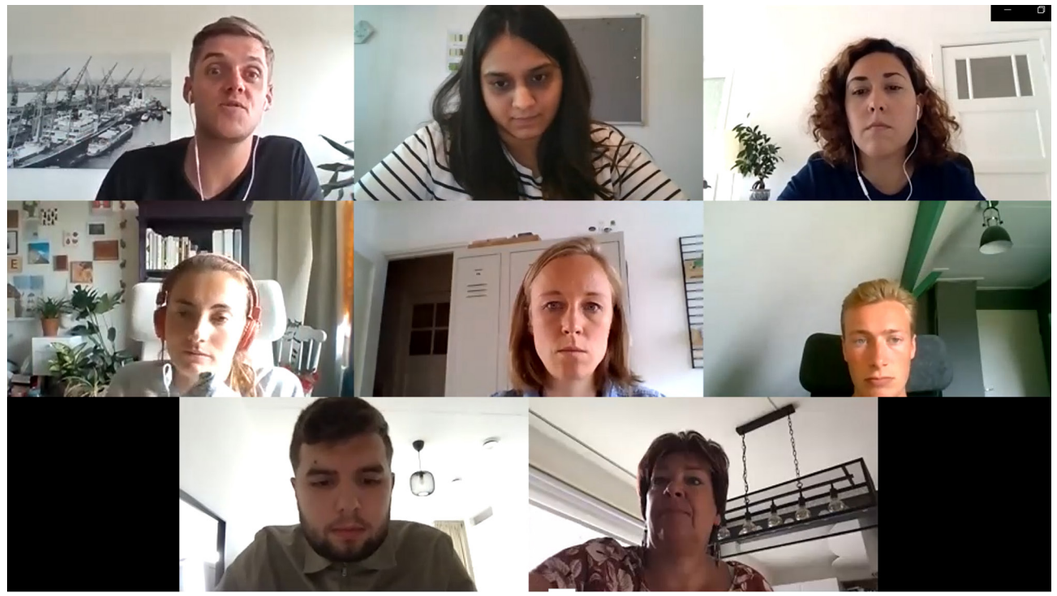


Figure 60: Revised canvas 2. Original is split into two. This canvas focuses the brainstorm phase. Step 1C (copy design question) added here, helps in making sure people remember the goal of the brainstorm. Refer appendix J for bigger images.



Participants from the municipality

Chapter 09 in sum...

- The chapter outlines the results from the validation session with municipality officials. Insights are used to refine the concept further.

- Overall, the toolkit is successful in its aim of helping the municipality design interventions using the phenomenon of social contagion / social influence. More than others, the brainstorm and concept generation steps of the toolkit bring value to the municipality - a fresh perspective.

- Most participants found the cards very inspiring. However, some participants found the text to be a lot. On the other hand, others find it an apt amount to understand the underlying constructs of a strategy. A middle ground is chosen while refining the cards wherein, the text is reduced and legibility improved.

- One of the key points of discussion was related to the problem definition stage. Many participants pointed out that it is difficult for them (municipality officials) to define a specific narrowed down design question (the canvas does not prompt the development of a narrow question - a pre-requisite to have a fruitful creative session). Thus, the next iteration includes 5 design canvases - wherein problem definition and brainstorm are split into two steps. Within the problem definition step, an additional step prompting participants to define a specific question is added - to steer the process.

- The toolkit paved the path for a rich discussion (although there was very limited time), which is exemplified by the breadth of aspects people thought off. From personal experiences, stories, other examples they have witnessed, to building on to their current projects to make them more effective, as well as other private sector partnerships they can build to activate residents.

- Knowing the context for which you are designing closely really helps in designing feasible, context specific ideas.

- The toolkit also helps in building ownership towards the ideas amongst municipality officials.

- Participants like the balance between structure and freedom on the canvases , and through the process, in general. They commend that the structure is well-designed, such that is leaves time for people to just be creative - the goal of a session.
- The toolkit is easy to use and grasp, which is exemplified by how simply the participants could design ideas given the limited time and digital medium of validation.

- In sum, the toolkit meets all its aims.

10

Discussion

Chapter 10- Discussion

They say every end is a new beginning. As this thesis comes to an end, this chapter reflects on the outcomes of the project as well as outlines avenues for further research. At first, the relevance of this thesis or social contagions as a means to transitions is outlined with respect to the bigger picture of energy transitions in the Netherlands. Next, the discussion moves to generalising and consolidating the findings into a framework for future validation. Limitations of the current project and areas for future research are pin-pointed. Ethical considerations of using social influence processes and persuasive techniques are discussed. The discussion culminates with a personal reflection.

10.1 Keeping the bigger picture in sight: Positioning the project and its outcomes in the bigger picture.

As discussed in the introduction, the energy transition to greener energy alternatives (discontinuing gas) in all spheres – mobility, built environment, industry etc. has high-priority on the agenda of the Dutch government. While efforts towards this transition have been shaping since the early 2000's, the urgency to achieve the set goals has multiplied many-fold; owing to the earthquakes in the gas producing region of Groningen and climate change in general. However, affecting the requisite change at the national scale is challenging owing to the interconnectedness and dynamic nature, specifically of (visibly well-functioning) utility systems such as energy systems. Here, persistence of lock-ins (as outlined in Appendix B) at different levels and within different domains, further makes it difficult to stimulate systemic change. Thus, overcoming these lock-ins is a pre-requisite.

As Frantzeskaki and de Haan (2009) suggest, change within an existing system comes about by both external and internal factors, with the prevalence of certain conditions of change, namely:

- Tensions (Mismatches between the functioning of the regime and the landscape),
- Stresses (Internal mismatches in the functioning of the regime) and
- Pressures (Presence of a competitive alternative to regime functioning).

While the Natural gas regime is faced with Tensions (in the form of climate change and earthquakes) and Pressures (presence of alternative technologies, and decentralised ways of energy production and consumption), it manages to maintain an equilibrium (opposes /balances these tensions and pressures) due to the lack of (minimal) internal Stresses in its functioning. Thus, the need to amplify the Tensions and Pressures, and further stimulate the 'Creative Destruction' (as Kivimaa and Kern (2015) term it) of the regime (through Stresses) in order to achieve systemic change is apparent. While top-down efforts driven by policy measures, standardization of practices and exercise of power, help in shaping the creative-destruction of the regime, this cannot be achieved without adequate bottom-up pressure; since both, top-down and bottom-up efforts reinforce each other and keep each other motivated. Imbalance in these efforts can lead to a stand-still, or even worse – selfishly driven outcomes fulfilling the motives of specific stakeholders.

Frantzeskaki and de Haan (2009) identify 'Formation forces (related to the potential for societal innovation)' such as presence of a niche, presence of new demand, or the presence of new functioning as factors contributing to bottom-up pressures. In the Dutch energy context, the presence of alternative greener energy technologies, the practice of decentralised production and consumption of electricity, or energy sharing models serve as bottom-up pressures. While technology alternatives being viable and widely available is a leap forward, it is not enough to trigger the requisite mass-scale diffusion and adoption. Even though the number of energy cooperatives, or conscious citizens who are switching to the greener energy alternatives is increasing, this rate of adoption does not significantly contribute to the overall greenhouse gas reduction goals. Thus, as discussed earlier in chapter 1, social acceptance (and adoption) – specifically community acceptance (Van Rijnsoever, Van Mossel, & Broecks, 2015) needs to be scaled-up, and institutionalisation of the technologies expedited. Specifically, bottom-up institutionalisation (as compared to top-down institutionalisation, which is often met with resistance) needs be achieved.

Building on Thornton et al.'s (2012; in Fuenfschilling & Truffer, 2014) family and community sector institutional logics (Figure 61), this project contributes to this bottom-up institutionalisation of greener energy alternatives. Social contagion can be seen as a means of scaling-up the efforts and influence of niche-actors (alternative energy providers as well as early adopters). It serves as a means to amplify the bottom-up pressures, necessary to bring about transitions.

As seen in chapter 3 (section 3.2.4), social desirability (and acceptance), is closely linked with technical feasibility and economic viability, both at the micro (individual) and macro scales (market, national). The complex knot of these three aspects needs to be loosened (if possible, untangled). In other words, the dependence of each of those factors on the other two needs to be reduced, in order to expedite transitions. Social influence and social contagion processes can help in reducing this dependence of social desirability (acceptance) on financial viability and technical feasibility. Here, the words 'reduce dependence' are of utmost importance, since it does not mean that financial viability and technical feasibility will have no effect in stimulating social acceptance.

Further, the interdependence of the three factors, points to the significant role of all stakeholders (specifically, municipalities, energy providers and early adopters) in shaping social contagion. Being a niche, the early adopters or other niche-actors need the support from local actors

or municipalities in seeding the contagion. This points to the managerial, supporting role of municipalities in social contagion processes; further accentuating the interdependence of top-down efforts and bottom-up pressures in affecting systemic change. This can be seen as government (municipality /top-down)-managed (seeded/steered), bottom-up efforts.

In sum, this project and the phenomenon of social contagion helps in scaling-up the social desirability and social acceptance of green energy alternatives. It can be seen as a means to achieve bottom-up institutionalisation of the green energy alternatives, which can in turn expedite the energy transition.

Having identified the contribution of this project and its outcomes to the bigger picture of energy transition, the next section focuses on theoretical and practical implications.

Institutional logics of societal sectors.

Categories	Family	Community	Religion	State	Market	Profession	Corporation
Root Metaphor	Family as firm	Common boundary	Temple as bank	State as redistribution mechanism	Transaction	Profession as relational network	Corporation as hierarchy
Sources of Legitimacy	Unconditional loyalty	Unity of will, belief in trust and reciprocity	Importance of faith and sacredness in economy and society	Democratic participation	Share price	Personal expertise	Market position of firm
Sources of Authority	Patriarchal domination	Commitment to community values and ideology	Priesthood charisma	Bureaucratic domination	Shareholder activism	Professional association	Board of directors, top management
Sources of Identity	Family reputation	Emotional connection, Ego-satisfaction and reputation	Association with deities	Social and economic class	Faceless	Association with quality of craft, personal reputation	Bureaucratic roles
Basis of Norms	Membership on household	Group membership	Membership in congregation	Citizenship in nation	Self-interest	Membership in guild and association	Employment in firm
Basis of Attention	Status in household	Personal investment in group	Relation to supernatural	Status of interest group	Status in market	Status in profession	Status in hierarchy
Basis of Strategy	Increase family honor	Increase status and honor of members and practices	Increase religious symbolism of natural events	Increase community good	Increase efficiency profit	Increase personal reputation	Increase size and diversification of firm
Informal control mechanisms	Family politics	Visibility of actions	Worship of calling	Backroom politics	Industry analysts	Celebrity professionals	Organization culture
Economic System	Family capitalism	Cooperative capitalism	Occidental capitalism	Welfare capitalism	Market capitalism	Personal capitalism	Managerial capitalism

Adapted from Thornton et al. (2012).

Figure 61: Institutional logics of societal sectors- Source Fuenfschilling & Truffer, 2014

10.2 Bridging the gap between Academia and Practice

While contagions – both simple and complex and social network dynamics have been the subject matter of many studies, most of these focus on quantitative methodologies to analyse and simulate social influence processes. Further, the sparse qualitative studies include sociological and ethnographic methods of understanding and mapping social networks, and are predominantly analytic in nature. These present theoretical insights about contagion processes and examples of how contagion can unfold (specifically complex contagions), but offer limited practical guidance on designing the contagion process. This project aims to bridge this gap between theory and application of social contagion processes, by outlining a framework with actionable steps (inspired by several examples provided by Centola (2018) in this book How behaviour spreads), that can aid in stimulating behavioural contagion, qualitatively.

Further, several studies on sustainable consumer behaviour highlight the significant role played by social norms, social proof and social influence in shaping people's behaviour. However, most of these studies or interventions focus on the individual scale of affecting behaviour, as compared to the network scale. The framework presented next, and the toolkit developed through the project focus on both, individual and network scale of social influence processes.

Last, this approach of using social contagion and social influence processes provides a novel perspective for designing for transitions. The framework and toolkit can add to the growing maturity of the domain of Transition design, specifically providing a different leverage point /method within the 'Theories of change' component of the Transition Design Framework developed by Irwin et al. (2015).

The Design for Social Contagion Framework

As described in chapter 2, the meta-level aim of the project is to translate the identified elements and process of contagion into a framework, which can serve as a stepping stone in using social contagion theory to realise energy transitions, qualitatively. It can be used, validated and built upon by different designers or municipalities keen on activating residents towards energy transition (sustainable lifestyles) in their respective contexts. Figure 62 presents the 'Design for social contagion framework' which captures the elements and process of contagion (building upon the findings of Chapter 2 – refer for detailed explanation).

As outlined, while designing for contagions, three broad elements need to be identified / defined – the WHAT (content) of the contagion, the HOW (means/mode) of the contagion) and the Strategy of the contagion.
Specifically, for the energy transition, the WHAT (content for contagion) can be defined by identifying the specific apprehensions or barriers to adoption amongst residents.

The Design for social contagion framework

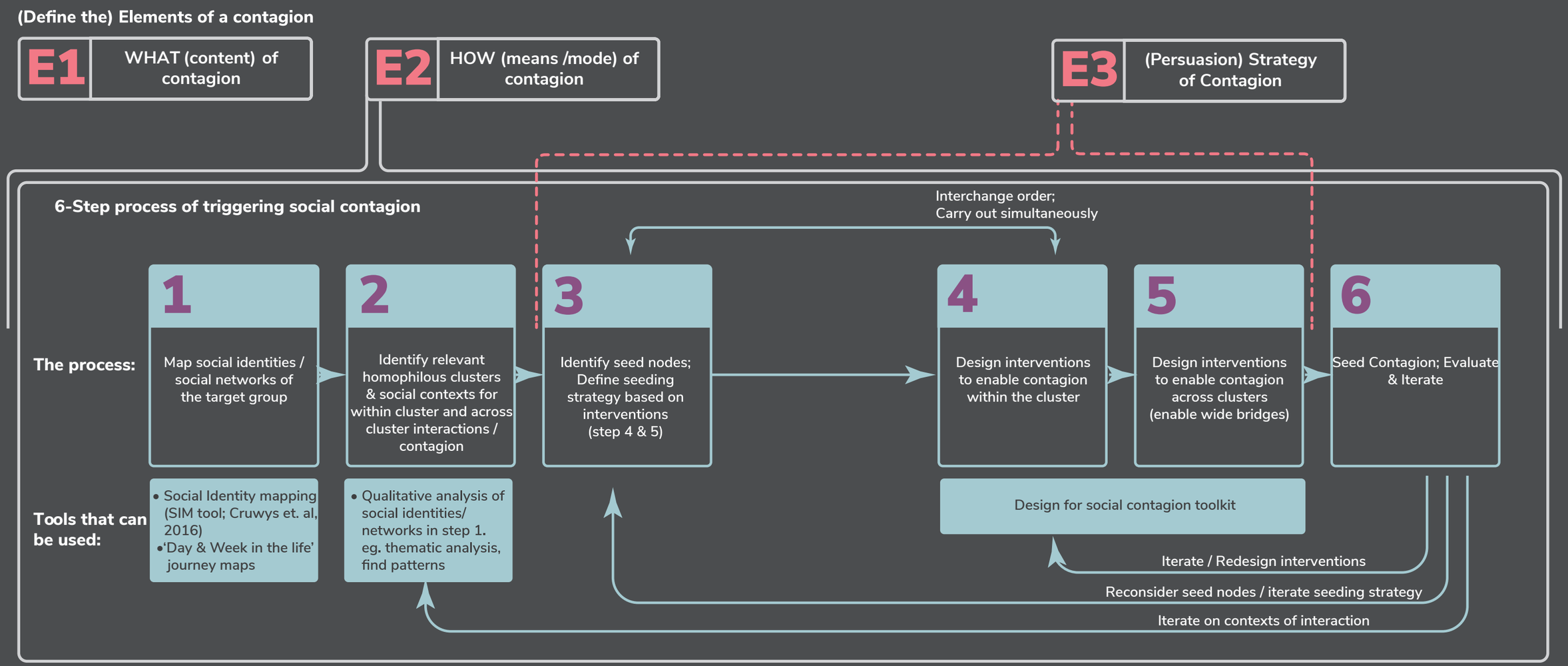


Figure 62

The HOW element which includes visualising and designing the network dynamics (how the contagion will unfold) can be defined using the 6-step process. The first step includes mapping the residents' (or target audience's) social identities and understanding the social networks these ensue. This can be done by mapping the day-in-the-life or week-in-the-life of the target audience, followed by an interview. Alternately, tools such as the Social Identity mapping (SIM tool; Cruwys et. al, 2016), Ethnographic Social network mapping (Trotter II, 1999) can be used. However, it should be noted that at times it is difficult for people to understand the concept of social identities, or it might be difficult for them to remember and articulate all their identities. Thus, methods like day-in-the-life journeys prove more useful, since they provide a detailed overview of the person's social interactions / contexts, which can help in identifying implicit identities. Further research needs to be carried out to understand which methods serve the purpose the best. Additionally, future research can be carried out to understand whether mapping social identities (and then deriving social networks) or mapping social networks directly is more fruitful.

The second step goes hand-in-hand with the first step, wherein qualitative analysis of the input from step 1 is used to identify the relevant identities (relevant to the content / goal of contagion; and networks) for contagion; and the consequent homophilous clusters (groups where individuals have similar characteristics -e.g. cultural background, physical appearance, taste etc.). Based on these clusters, specific social contexts of interactions (between people from the clusters) need to be defined. Both, contexts for within cluster interaction (where people from the same cluster interact) and across cluster interactions (where people from different clusters interact) ought to be defined.

Identifying these social identities and social contexts are important, since these help in selecting the apt strategy for contagion. For example, if one of the relevant identities of the target group is being a parent, the social contexts of contagion can be the school, where the targeted person meets other parents (notice the homophily!). Another example is, if the relevant identity of the target group is based on their type of housing (similar people live in similar houses), the context for within cluster contagion is the vicinity of the houses. Context for across cluster includes public spaces like the gym, church, gym, activity centers etc. in a neighbourhood, wherein individuals from different vicinity clusters interact.

Upon identifying the social contexts for contagion, the next step is to identify seeds nodes (people who can initiate the contagion, within and across clusters) and seeding strategy. Seeds can be selected based on the intent and content of the contagion as well as the demographics (and susceptibilities) of the target group. The criteria for selection can include most influential people, people with the biggest network, people already activated (have a positive attitude), entrepreneurial & risk taking or active people / volunteers in the community. A clustered seeding strategy (using multiple seeds in the homophilous cluster) ought to be used.

The persuasive and tactical aspect of the seeding strategy can be designed based on the type of interventions defined in step 4 & 5; thus, all these three steps need to co-evolve. 'How to identify and select the seed nodes qualitatively (important attributes of seed nodes)', 'whether seed nodes are important for contagion processes' and 'specific seeding strategies' are areas that need further research.

The next two steps involve designing interventions for within cluster spread of behaviour and across cluster spread of behaviour. The 'Design for social contagion' toolkit designed within this project can be used to design these interventions. This also helps in identifying the Strategy (3rd element) of the contagion. Although the toolkit has undergone a few rounds of validation and iteration, this needs to be further validated with different teams of municipality officials working in different contexts. Which strategies are more effective in achieving the energy transition, and how can the strategies be further customised to the energy transition are areas for future research.

The last step is to seed the contagion, wait for a while, evaluate the contagion and iterate. Based on the results of the evaluation, the iterations can be in the interventions themselves, the seeding strategy or the social context of the intervention or completely new interventions. Further research into 'how to evaluate the contagion qualitatively' is required.

Although used as a guideline while carrying out this project, this framework needs to be validated in field within different contexts. More than a theoretical outline, it provides actionable steps for researchers, municipality officials, designers interested in using social contagion theory to activate residents towards the energy transition (or sustainable lifestyles in general). Owing to its limited scope and duration, the project draws excessively on the theoretical foundations of complex contagions outlined by Centola (2018) through his work. While this can be seen as a limitation, further research can be carried out to refine the framework using other theoretical underpinnings.

10.3 Ethical considerations

Ethics refers to moral principles that govern a person's behaviour or the conducting of an activity. Since persuasive techniques, specifically social influence has power to change behaviours and influence values/ norms/ beliefs, designers (or anybody using these techniques) need to be highly reflexive about their intentions as persuaders. Persuasion is widely considered unethical if it is for the purpose of personal gain at the expense of others, or for personal gain without the knowledge of the audience. Thus, ethical considerations need to pinned down for two broad aspects of this project (which need further in-depth research):

- As described time and again through the thesis, social influence stems from (sub)conscious comparisons and the feelings of FOMO, envy, insecurity etc. While this is outlined as a design principle, designers[1] need to visualise the future repercussions of the comparison stimulated. Systemic impact of this comparison or the intervention in general, needs to be mapped to foresee any negative effects. The interventions should not be manipulative (enforced) and jeopardize people's freedom of choice. The strategies should always be used to improve the welfare of the target group. Further, one must ensure that the process and execution of the interventions is transparent and not misleading; It should provide for an easy opt-out or alternative. In-depth research needs to be carried out in the future to understand the ethical implications of the strategies, and (governed) social contagion processes in general.

- Further, while designing incentives like giving people a social identity or perks and privileges, one must ensure it does not lead to discrimination against anyone (on any grounds). While using symbolism or showing others' performance stories, privacy aspects need to be kep in mind. One must have consent from the residents, before using their data. It can be anonymised. However, getting consent does and developing specific protocols does make it tedious to design and implement these interventions.

- The intent of a designer needs to be clearly stated during the design phase. Positive intent needs to be reinforced, while negative intent eliminated. To begin with, tools like 'ethics for designers (Gispen, 2017)' can be used during the design process to ensure the designers are aware of the impact of their design, and their moral responsibility. However, 'How to ensure the toolkit is not misused' is an area for future research.

10.4 Limitations of the project

Due to limited access to the context and residents, majority of the Reyeroord specific data is derived from interviews with other stakeholders (municipality officials, energy providers) who work closely within the context. Although it gives a birds-eye view, it might miss specific details, which only first-hand interactions with residents can provide (since they are the experts of their lives).

Specific social identity and social network mapping exercises could not be carried out with the residents. Relevant insights were derived from the above-mentioned interviews. Assumptions about these social identities and networks were validated with few municipality officials. However, these lack detailed first-hand validation from the residents.

1 Here, 'designers' refers to anybody using the toolkit to design interventions

Due to time constraints, all aspects of the design toolkit have not been validated in one single creative session. Different elements have been tested in different sessions with different groups. In the future, consolidated validation of all the aspects of the toolkit needs to be carried out in a single creative session with the apt target group.

10.5 Personal Reflection

Well, this is it. After almost six months this thesis comes to an end. With that, I reflect on the journey thus far, both of this project and my masters in Strategic design.

I am glad that I challenged myself and took up this project even though I had my doubts in the beginning – owing to the vast and vague nature of the project, as well as the language barriers. For the first few weeks, I kept wondering if I would be able to deliver anything concrete and valuable. However, the results of the project have proved to me that the fuzzy front-end does clear up. It depends on how you steer your project. I pride myself in being able to swap between the big-picture and detail oriented mindset, and having a knack for prioritisation. I believe this project helps me exemplify those skills and adds a feather to my cap.

With regards to the outcome of the project, I truly believe that systems and their transitions cannot be completely controlled or designed. As Mieke van der Bijl-Brouwer rightly says, 'all you can do is positively influence system evolution by seeding different experiments in the direction of change you seek'. I believe this project is one such experiment (or provides a different leverage point) that can help in steering the change to greener energy alternatives.

Through my masters I have developed an interest in Transition design. While I was able to explore the theoretical facets of the domain through a research project I carried out with Dr. Rebecca Price, I was keen on applying it in practice. This project helped me dive deep into the practical side of transitions. Further, within the project, one of my key goals has been to strike a balance between theoretical and practical aspects. I believe this has followed through – with the social contagion theory laying a strong foundation for the project and the toolkit outlining practical ways of applying it. Striking this balance has been a major learning through the project.

From a personal growth perspective, these unusual circumstances have taught me how to motivate myself and take it easy on myself whenever required. I am a perfectionist and strive to get every single aspect right. However, I have learnt to let go, since sometimes not everything is in my control.

An interesting observation was that through the duration of the project, I saw myself going back and referring to the notes or lecture slides of almost every single course I have pursued during this Masters – be it Design strategy project, Brand and product commercialisation, Context-mapping, Design for supply chain networks, Consumer behaviour or Experience and persuasion. This in itself showed me the multiple aspects that are involved in any project. It also accentuated the fact that the underlying principles of design or strategy remain the same. Only the scale and context vary, which shape how you apply these concepts.

I am happy that over the last two years, I have built a skill set for myself to tackle any kind of (innovation) challenges – from commercial business strategy, service design, supply chains and network design to social design, behavioural design and transition design. I am confident to take up any project be it at the individual, community, organisational or macro scale.

Conclusion

The purpose of the project was to explore how social contagion (social influence) processes can be used to activate residents towards the energy transition in the Netherlands. Building upon the resident's motivations and apprehensions and the theory of complex contagions, the project culminates with the design of the 'Design for social contagion' framework and toolkit.

These shall help the municipalities in devising persuasive and tactical ways of inducing social contagion of the target behaviour. The framework outlines a list of steps to shape the contagion, whereas the toolkit helps with specifically designing interventions. The toolkit has been validated with the municipality officials, and it was successful in meeting its goals. Along with helping the municipality in designing interventions, it provides a new perspective; and familiarises the municipality officials with social and behavioural constructs of decision-making which they can use in their work flow. A few sets of the toolkit will be given to the municipality and stakeholders within the ENRGISED project for further use in other contexts.

The project, its outcomes and the underlying principle of social contagion provide a new perspective and leverage point to untangle (loosen) the complex knot between social, technical, financial and political aspects by increasing the social desirability; a new means to transitions. It bridges the gap between academia and practice by providing actionable steps to shape contagions, qualitatively.

References

A

Ajzen I. (1991). The theory of planned behavior. Organ. Behav. Hum. Decis. Process. 50:179–21

B

Beckman, K., & van den Beukel, J. (2019). The great Dutch gas transition. Retrieved from https://www.oxfordenergy.org/publications/the-great-dutch-gas-transition/?v=796834e7a283

Blythe, J. (2013), Chapter 7: Attitude formation and change. In: Consumer Behavior, 2nd edition,
London: Sage Publications.

Borgman, K. (2019). AARDGASVRIJ REYEROORD plan van aanpak.

Brains Behaviour and design. (n.d.). Retrieved June 29, 2020, from http://www.brainsbehavioranddesign.com/aboutus.html

Buskens, V. & Raub. W. (2013). Rational choice research on social dilemmas: Embeddedness effects on trust. Pp. 113-150 in The Handbook of Rational Choice Social Research, edited by R. Wittek, T. Snijders & V. Nee. Stanford, CA: Stanford University Press.

C

Cascio, C. N., O'Donnell, M. B., Simons-Morton, B. G., Bingham, C. R., & Falk, E. B. (2017). Cultural context moderates neural pathways to social influence. Culture and Brain, 5(1), 50-70. doi:10.1007/s40167-016-0046-3

Centola, D. (2007). Complex contagions and the weakness of long ties. The American Journal of Sociology 113(3), 702-734. https://doi.org/10.1086/521848

Centola, D. (2018). How Behavior Spreads: The Science of Complex Contagions. PRINCETON; OXFORD: Princeton University Press. doi:10.2307/j.ctvc7758p

Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. Pp. 151-192 in The Handbook of Social Psychology, edited by D. T. Gilbert, S. T. Fiske, & G. Lindzey. New York: McGraw-Hill.

Cialdini, R. B. (2016). Influence: The Psychology of Persuasion. Blackstone Audio, Incorporated.

Costanzo, M., Archer, D., Aronson, E., & Pettigrew, T. (1986). Energy conservation behavior: The difficult path from information to action. American Psychologist, 41(5), 521–528. doi: 10.1037/0003-066x.41.5.521

Cruwys, T., Steffens, N. K., Haslam, S. A., Haslam, C., Jetten, J., & Dingle, G. A. (2016). Social Identity Mapping: A procedure for visual representation and assessment of subjective multiple group memberships. British Journal of Social Psychology, 55(4), 613-642. doi:10.1111/bjso.12155

D

Daganzo, M. A., & Bernardo, A. B. (2018). Socioeconomic status and problem attributions: The mediating role of sense of control. Cogent Psychology, 5(1). doi:10.1080/23311908.2018.1525149

Design Council. (2005). The 'double diamond 'design process model. Design Council.

Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R., & Vlaev, I. (2011). Influencing behaviour: The mindspace way. Journal of Economic Psychology, 33(1), 264-277. doi:10.1016/j.joep.2011.10.009

E

Evans, M., Jamal, A., and Foxall, G. (2010), Chapter 3: Consumer response to marketing actions 2: Learning and attitudes. In: Consumer Behavior, 2nd edition, West Sussex: John Wiley & Sons Ltd.

F

Festinger, L. (1954). A Theory of Social Comparison Processes. Human Relations, 7(2), 117–140. doi: 10.1177/001872675400700202

Fogg, B. J. (2009). A behavior model for persuasive design. Proceedings of the 4th International Conference on Persuasive Technology - Persuasive 09. doi: 10.1145/1541948.1541999

Frantzeskaki, N, & De Haan, H. (2009). Transitions: Two steps from theory to policy. Futures: the journal of policy, planning and futures studies, 41(9), 593–606. doi:10.1016/j.futures.2009.04.009

Fuenfschilling, L., & Truffer, B. (2014). The structuration of socio-technical regimes—Conceptual foundations from institutional theory. Research Policy, 43(4), 772-791. doi:10.1016/j.respol.2013.10.010

G

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems. Research Policy, 33(6-7), 897–920. doi: 10.1016/j.respol.2004.01.015

Gemeente Rotterdam. (2018). WijkProfiel Retrieved from https://wijkprofiel.rotterdam.nl/nl/2020/rotterdam

Gispen, J. (2017). Ethics for designers. Retrieved August 04, 2020, from https://www.ethicsfordesigners.com/about

Goldsmith, E.B. & Goldsmith, R.E. (2011). Social influence and sustainability in households. International Journal of Consumer Studies 35(2), 117-121.

H

Harshaw, H. W., & Tindall, D. B. (2005). Social Structure, Identities, and Values: A Network Approach to Understanding Peoples Relationships to Forests. Journal of Leisure Research, 37(4), 426–449. doi: 10.1080/00222216.2005.11950061

Hidalgo, C. A. (2016). Disconnected, fragmented, or united? a trans-disciplinary review of network science. Applied Network Science, 1(1), 6. doi:10.1007/s41109-016-0010-3
Philosophy Papers. 13. 3-11. 10.1080/14487136.2015.1085688.

Hoving, R. (2020, April 6). Tweede Kamer bepaalt: Utrecht kan gasklevers niet dwingen elektrisch te koken. AD. Retrieved from https://www.ad.nl/utrecht/tweede-kamer-bepaalt-utrecht-kan-gasklevers-niet-dwingen-elektrisch-te-koken~abe7283d/

I

Irwin, T. & Kossoff, G. & Tonkinwise, C. (2015). Transition Design Provocation. Design Philosophy Papers. 13. 3-11. 10.1080/14487136.2015.1085688.

K

Kahneman, D. (2011). Thinking, fast and slow. New York: Farrar, Straus and Giroux.

Kaptein, M. C. (2012). Personalized persuasion in ambient intelligence. Technische Universiteit Eindhoven. https://doi.org/10.6100/IR729200

Kemp, R. (2010). The Dutch Energy Transition Approach. International Economics of Resource Efficiency, 187–213. doi: 10.1007/978-3-7908-2601-2_9

Kivimaa, P., & Kern, F. (2015). Creative Destruction or Mere Niche Creation? Innovation Policy Mixes for Sustainability Transitions. SSRN Electronic Journal. doi: 10.2139/ssrn.2743173

Klimaatakkoord (2019a). Klimaatakkoord. Retrieved from: https://www.klimaatakkoord.nl/

Klimaatakkoord. (2019b). Voorstel voor hoofdlijnen van het Klimaatakkoord - sector Gebouwde omgeving.

L

Lachman, D. A. (2013). A survey and review of approaches to study transitions. Energy Policy, 58, 269–276. doi: 10.1016/j.enpol.2013.03.013

Lavidge, R. J., & Steiner, G. A. (1961). A Model for Predictive Measurements of Advertising Effectiveness. Journal of Marketing, 25(6), 59. doi: 10.2307/1248516

Lockton, D. (2010). Design with Intent. Retrieved June 29, 2020, from http://danlockton.com/design-with-intent/

Lutzenhiser, L. (1992). A cultural model of household energy consumption. Energy, 17(1), 47–60. doi: 10.1016/0360-5442(92)90032-u

M

Marsden, P. V., & Friedkin, N. E. (1993). Network Studies of Social Influence. Sociological Methods & Research, 22(1), 127–151. doi: 10.1177/0049124193022001006

Maslow, A. H. (1970). Motivation and personality. New York: Harper & Row.

Milgram, N. N., & Tenne, R. (2000). Personality correlates of decisional and task avoidant procrastination. European Journal of Personality, 14(2), 141–156. doi: 10.1002/(sici)1099-0984(200003/04)14:2<141::aid-per369>3.0.co;2-v

MV Design. (2019). Social design voor de energietransitie. Retrieved June 22, 2020, from https://mvdesign.nl/projecten/social-design-energietransitie/

O

Ölander, F., & Thøgersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. Journal of Consumer Policy, 18(4), 345–385. doi: 10.1007/bf01024160

Ölander, F., & Thøgersen, J. (2014). Informing Versus Nudging in Environmental Policy. Journal of Consumer Policy, 37(3), 341–356. doi: 10.1007/s10603-014-9256-2

Osterwalder, A. (2005). Business Model Design and Innovation. Retrieved August 02, 2020, from https://web.archive.org/web/20061213141941/http://business-model-design.blogspot.com/2005/11/what-is-business-model.html

R

Rogers, E. M. (1983). Diffusion of Innovations. New York: Free Press.

S

Stappers, PJ., & Sleeswijk Visser, F. (2014). Meta-levels in design research: Resolving some confusions. In YK. Lim, K. Niedderer, J. Redstrom, E. Stolterman, & A. Valtonen (Eds.), Proceedings of DRS 2014: Design's big debates (pp. 847-857). Umeå: Umeå Institute of Design.

Steindl, C., Jonas, E., Sittenthaler, S., Traut-Mattausch, E., & Greenberg, J. (2015). Understanding Psychological Reactance. Zeitschrift Für Psychologie, 223(4), 205-214. doi:10.1027/2151-2604/a000222

T

Toxboe, A. (n.d.). Behavioural & Persuasive Design Cards. Retrieved June 29, 2020, from https://cards.ui-patterns.com/

Trotter II, R. T. (1999). Friends, Relatives, and Relevant others: Conducting ethnographic network studies. In Mapping social networks, spatial data, and hidden populations. Thousand Oaks, CA: AltaMira Press.

Trudel, R. (2019). Sustainable consumer behavior. Consumer Psychology Review, 2, 85-96.

V

Van Lieren, A. (2017). Rational Override; influencing behaviour beyond nudging: A service design approach towards creating behavioural interventions. Retrieved June 29, 2020, from https://repository.tudelft.nl/islandora/object/uuid:234307dd-42e4-43f3-80a8-210240d3325c

Van Rijnsoever, F. J., Van Mossel, A., & Broecks, K. P. F. (2015). Public acceptance of energy technologies: The effects of labeling, time, and heterogeneity in a discrete choice experiment. Renewable and Sustainable Energy Reviews, 45, 817-829.

W

Wilson, C., & Dowlatabadi, H. (2007). Models of Decision Making and Residential Energy Use. Annual Review of Environment and Resources, 32(1), 169–203. doi: 10.1146/annurev.energy.32.053006.141137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