HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

Master's Thesis

Regional Studies

Planning Geography

RESIDENT INTERESTS AND PARTICIPATION IN ENERGY REFURBISHMENT
PROCESSES

Aino Ropponen

2017

Supervisor:
Sami Moisio

UNIVERSITY OF HELSINKI
FACULTY OF SCIENCE
DEPARTMENT OF GEOSCIENCES AND GEOGRAPHY
GEOGRAPHY

PL 64 (Gustaf Hällströmin katu 2)
00014 Helsingin yliopisto

Faculty		Department	
Faculty of Science		Department of Geosciences and Geography	
Author			
Aino Ropponen			
Title			
Resident interests and participation in energy refurbishment processes			
Subject			
Regional Studies			
Level	Month and year		Number of pages (with appendix)
Master's Thesis	May 2017		116

Abstract

This thesis offers views on the resident interests and participation in energy refurbishment processes by qualitatively analysing nine thematic resident interviews.

Urban areas and buildings largely contribute to energy consumption and carbon emissions. The ageing building stock across Europe offers a window of opportunity for large scale energy refurbishments. Urban sustainability and participatory planning, the framework theories of this thesis, are both threaded by the lack of social focus, reflected in the lack of residential focus in housing refurbishments.

Residents' main interests include economic reasoning, quality of life, and energy and environment. Economic reasoning includes concern of costs, interest in energy bill savings and stable living costs, and property value increase, indicating a rising market demand. Quality of life includes building condition, comfort, visual aspects, ease of maintenance, interest in technology, and preference on either shared or private systems. Environmental motivations vary and seem to correlate with one's faith in the effect of individuals and communities in solving climate issues.

Good process practices facilitating trust include: activation of different information channels when refurbishments are approaching, personal and technical planning support, and a strong house strategy communicating residents the justifications and their areas of interest. Neighbourhood examples motivate residents and help them plan their own projects. As refurbishments make residents more proudly develop their houses and neighbourhoods, resident ambassadors can be used to replicate the experiences. Sharing and networking are already in place, but lack of promoting the sense of community may hinder such development.

Existing co-planning reflects residents' strong position as stakeholders. Differences in participation power are found between housing cooperative boards and other residents. The boards dominate planning, justifying it with technical expertise and the difficulty of including everyone. This is accepted if an open communication culture is on place, as house meetings offer other residents a place to get informed and participate in decision making. The idea of including residents into planning is emerging. Participation benefits include residents offering good ideas, gaining knowledge, and achieving a stronger sense of community. Information and inclusion make residents more engaged to the development, speeding up decision making. A process model for participatory refurbishments is presented.

Apart from the resident drivers active in house and neighbourhood levels, four challenging resident groups are identified: the unsocial, the objectors, the uninformed, and the unheard. Resident segmentation offers a good tool for identifying motivators to engage residents, as well as identify their needs as project participants.

Keywords	
urban sustainability, participatory planning, housing refurbishment, energy refurbishment, residents	
Where deposited	
University of Helsinki, Kumpula science library	

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

Tiedekunta/Osasto	Laitos
Matemaattis-luonnontieteellinen tiedekunta	Geotieteiden ja maantieteen laitos

Tekijä
Aino Ropponen

Työn nimi
Asukasintressit ja osallistuminen energiasaneerausprosesseissa

Oppiaine
Aluetiede

Työn laji	Aika	Sivumäärä (lähteineen)
Pro gradu-tutkielma	Toukokuu 2017	116

Tiivistelmä

Tämä Pro gradu-tutkielma käsittelee asukasintressejä ja – osallistumista energiasaneerausprosesseissa analysoiden kvalitatiivisesti yhdeksän asukkaan teemahaastatteluja.

Kaupungit ja rakennukset kuluttavat merkittävästi energiaa ja ovat osallisena hiilidioksidipäästöihin. Euroopan ikääntyvä rakennuskanta tarjoaa mahdollisuuden suuren mittakaavan energiasaneerauksille. Kestävää kaupunkikehitystä ja osallistavaa suunnittelua, tämän tutkielman johtavia teoreettisia viitekehyksiä, uhkaa sosiaalisen näkökulman puute, kuten myös asuntosaneerauksia asukasnäkökulman puute.

Asukkaiden pääintressejä ovat taloudellinen järkeily, elämänlaatu sekä energia ja ympäristö. Taloudelliseen järkeilyyn kuuluu huoli kustannuksista, kiinnostus energialaskujen säästöjä ja vakaita asumiskustannuksia kohtaan, sekä kiinteistön arvonnousu, viitaten kasvavaan kysyntään. Elämänlaatuun kuuluu rakennuksen kunto, mukavuus, visuaaliset aspektit, huollon helppous, kiinnostus teknologiaan, sekä joko jaetut tai yksityiset järjestelmät. Ympäristömotivaatiot vaihtelevat ja vaikuttavat olevan yhteydessä siihen missä määrin asukkaat uskovat yksilöiden ja yhteisöjen mahdollisuuksiin vaikuttaa ilmastokysymyksiin.

Luottamusta herättäviä hyviä prosessikäytänteitä ovat: eri tietolähteiden aktivointi saneerausten lähestyessä, henkilökohtainen tekninen suunnittelutuki, ja vahva talon strategia joka keskittyy perusteluihin ja asukasintresseihin. Esimerkit naapurustossa motivoivat asukkaita ja ovat apuna omien projektien suunnittelussa. Koska saneeraukset saavat asukkaat ylpeämmin osallistumaan talojen ja alueen kehittämiseen, asukkaita voidaan käyttää viestinviejinä kokemusten replikoinnissa. Jakamista ja verkostoitumista tapahtuu jo, mutta vähäinen huomio yhteisöllisyyteen voi hidastaa kehitystä.

Suunnittelu muiden osallisten kanssa kielii asukkaiden vahvasta asemasta osallisina. Osallistumismahdollisuudet kuitenkin vaihtelevat taloyhtiön hallituksen ja muiden asukkaiden välillä. Hallitukset johtavat suunnittelua ja perustelevat tätä teknisellä tietämyksellä ja vaikeudella ottaa kaikki huomioon. Toimintatapa hyväksytään, mikäli kommunikaatio on avointa, sillä yhtiökokoukset tarjoavat mahdollisuuden vastaanottaa tietoa ja osallistua päätöksentekoon. Asukkaiden ottaminen mukaan jo suunnitteluun herättää kiinnostusta, sillä osallistumisen etuina ovat asukkaiden hyvät ideat, tiedonsaanti sekä kasvava yhteisöllisyys. Tiedonsaanti ja osallisuus sitouttavat asukkaita kehitykseen, mikä nopeuttaa päätöksentekoa. Tutkielma esittää prosessimallin osallistavaan saneeraukseen.

Talo- ja aluetasolla aktiivisten asukasjureiden lisäksi tutkielmassa tunnistetaan neljä haastavaa asukasryhmää: epäsosiaaliset, vastustajat, informaation ulkopuoliset, sekä ne keitä ei kuulla. Asukkaiden segmentoiti tarjoaa hyödyllisen työkalun asukkaiden sitoutumisen motiivien ja osallistumistarpeiden tunnistamiseen.

Avainsanat
kestävä kaupunkikehitys, osallistava suunnittelu, asuntosaneeraus, energiasaneeraus, asukkaat

Säilytyspaikka
Helsingin yliopisto, Kumpulan kampuskirjasto

Muita tietoja
Osa Euroopan Union EU-MODER-projektia (H2020 EeB programme project: Mobilization of innovative design tools for refurbishing of buildings at district level)

Acknowledgements

Isälle,

Aino Ropponen,

Helsinki 28.04.2017

Table of contents

List of acronyms

DIY	Do It Yourself
EC	European Commission
EM	Ecological modernisation
EMT	Ecological modernisation theory
EU	the European Union
HCB	Housing cooperative board
HCM	Housing cooperative meeting
RQ	Research question
SB	Sustainable building
SD	Sustainable development
UN	the United Nations

1. Introduction

The thesis is part of the European Union EU-MODER (H2020 EeB programme project: Mobilization of innovative design tools for refurbishing of buildings at district level) led by an engineering consultant company Sweco Finland Ltd. The projects aims to offer innovative design tools for district level eco-refurbishing, this thesis providing a view on resident interests and participation in these processes. This work is designed to provide understanding of how the refurbishments could be more successful by better taking residents into account.

Urban areas are expected solve the environmental issues. Buildings represent 40 % of energy consumption and carbon emissions in Europe, and the ageing building stock across Europe is in need of refurbishments. This offers a window of opportunity to affect in a massive scale, making refurbishments move from marginal to the frontline of sustainable urban development.

The framework for the study is formed by two planning paradigms: urban sustainability and participatory planning. A timeline of the evolution of both will be presented, and concepts of sustainable development, ecological modernisation, and the eco-city discussed. Both concepts are threatened by the lack of social focus in a market and technology oriented context. The same problem is reflected in housing refurbishment, which is often seen as a mere technical process despite the influence it on already existing residential areas has on residents and residents have on it. This does not serve holistic sustainability goals, and therefore understanding resident interests and participation is important.

The resident interests and participation in refurbishment processes is approached with three research questions:

1. What are the residents' purposes to refurbish and end result goals?
2. How do the residents want the refurbishment process to be?
3. What is the role of residential participation in refurbishments?

To answer these questions, this study included nine thematic interviews of residents who had experienced an energy refurbishment. A qualitative content analysis was made by dividing the answers to themes corresponding the research questions.

The main resident interests are recognised to be the economic aspect, including cost, bill savings, investment and property value, as well as living quality, including the condition of the house, comfort, visual aspects, ease of maintenance, technology, and either shared or private systems. Environmental motivators were also found, but the residents' relationship with energy and the environment varied greatly, affecting whether they considered them with regard to the projects.

In the process, potential was found in house strategy and information provision, facilitating trust, and replicating the results. Residents gained information from many levels, and activating these channels at a time of approaching refurbishment need is found to be important. Trust between stakeholders and within the HCs played a significant role in the process, causing problems if it was lacking. Good examples were identified helpful in motivating residents and making of own plans. Refurbishments made residents more engaged to developing their house and the neighbourhood, which gives an opportunity to use resident ambassadors in promoting the replication of experiences. A process model of participatory energy refurbishment will be presented.

Residents' position in comparison with other stakeholders was perceived good, but there were differences between the HCB members and other residents with regard to participation power. Usually the HCB prepared plans, justifying it with its technical expertise. These plans were appreciated in case the residents were informed at an early stage about the justifications and their main interests, and residents could use power by attending HCMs to receive information and make decisions. In some cases, HCs were interested in involving residents already in the planning stage. Many participation benefits were found from good ideas to gained knowledge, pride and sense of community. The study confirmed that early information and inclusion made residents more acceptant towards and engaged with the project, speeding up decision making. The study will present a segmentation of residents into four challenging groups according to their participation position: the unsocial, the objectors, the uninformed, and the unheard.

Chapter two discusses the planning paradigms of urban sustainability and participatory planning. Chapter three will introduce housing energy refurbishments, its potential, and the residential aspect, including engagement, user behaviour, resident interests, and participation potential. Chapter four will describe the methods. In chapter five, results will be presented, analysed and discussed. Chapter six will conclude, and chapter seven present ideas for future research. The interview appendix will be found at the end.

2. Planning paradigms: urban sustainability and participatory planning

The two planning paradigms of urban sustainability and participatory planning have both become more and more theoretically discussed, as well as implemented in policy and practice, in the recent decades. These trends aim to answer the ever-prominent issues of urban living, more specifically its environmental and social aspects. In this section, I will introduce both planning paradigms and present a timeline describing their historical development to this day. Lastly, to connect these two planning paradigms, I will discuss the challenge of lacking social focus they are both facing.

2.1. Urban sustainability - sustainable development, ecological modernisation, and the eco-city

The globe is unarguably facing severe environmental problems: rise in temperature, environmental degradation and pollution, loss in biodiversity, and resource scarcity. In 2014, 54 % of the world's, and 73 % of Europe's population, was estimated to live in urban areas (UN 2014), and the urban population is expected to grow still. Urban areas also account for approximately 60-80 % of energy consumption and greenhouse gas emissions both globally and within the EU (UNEP 2012; UN-Habitat 2016). Cities have gained importance as leading international policy actors along nation states (Joss et al. 2013). It is mostly the human factors in urban areas that cause environmental issues, and it is the urban areas, as concentrations of wealth, innovation and governance capacity, where the issues are to be tackled.

New type of sustainable cities, or eco-cities, are seen as the solution to climate change (Joss 2011; UNEP 2012; Joss et al. 2013). Since the early 2000's, sustainable urbanisation has achieved consensus as an international policy priority and been increasingly promoted by municipal, national and international authorities, such as the UN, World Bank and OECD (Joss 2011; Joss et al. 2013; Fu & Zhang 2017). A variety of sustainable city development initiatives have emerged. The concepts of sustainable development (SD) and ecological modernisation (EM) have heavily influenced eco-city development. The following chapters will explain the concepts of SD, EM and the eco-city, as well as present a timeline of the evolution of urban sustainability.

2.1.1. Sustainable development

The concept of sustainability has been discussed already from the 1960's and especially in the United Nations Conference on Human and Environment (UNCHE) in Stockholm in 1972, which addressed the relationship between environment and development (Bayulken & Huisingh 2015a). However, the most recognised definition for sustainable development, and the one leading to its use as a globally influential policy term, is the one set in the Rio process's United Nations World Commission on Environment and Development (WCED, also known as Brundtland Commission) Brundtland Report (or Our Common Future) in 1987: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED 1987). At the end of the millennium, sustainable development became a guiding principle for human development. Ensuring environmental sustainability was set as one of the Millennium Development Goals, and in the new Agenda 2030 those goals have become ever more detailed, including the goal for sustainable cities (UN General Assembly 2000; 2015).

Sustainable development is most often understood in a tripartite form, presented with a triangle, or the three pillars or interlocking circles of sustainability – referred to as the triple bottom line (Figure 1). The model consists of environmental, economic and social dimensions. We can also speak of three P's: Planet, Profit and People, or three E's: Environment, Economy and Equity (Boström 2012). Sustainability is often defined as conserving the viability of natural resources and ecosystems over time while maintaining of human living standards and equity, as well as economic growth (Keiner 2005). It considers both intra- and intergenerational equity between the people of today, and between the present and future generations.
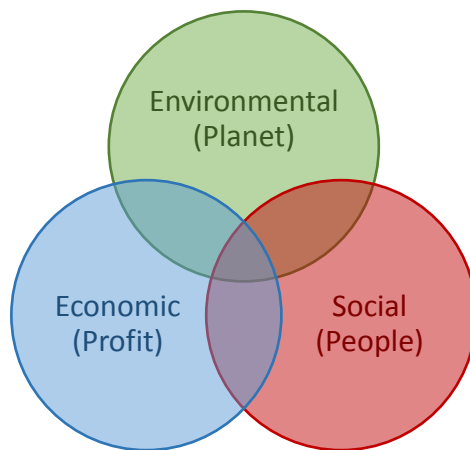
Figure 1. The tripartite model of sustainable development.

4

2.1.2. Ecological modernisation

Ecological modernisation theory (EMT) is a future-optimistic theory that suggests environmental issues caused by modernisation are possible to solve with further modernisation, and that economic growth and environmental protection are compatible. This view has become an increasingly central part of environmental discourse and eco-city developments, while the de-industrialist, capitalism critical tradition has lost most of its attraction in the environmental discussion (Mol & Spaargaren 2000; Baker 2007; Kovács 2009; Murphy 2012; Joss et al. 2013; Rapoport 2014). In the 1990's EM became visible in especially North-western European politics (Andersen & Massa 2000).

Modernisation and industrialisation from the early 19th century brought along huge changes – resource intensive production, scientific and technological development, economic growth with expanding markets, as well as globalisation, population growth and urbanisation with consumerist lifestyle (York et al. 2010; Bayulken & Huisingh 2015a). This newly established, fossil-fuel dependent form of urban human life proved unsustainable and contributed to increasing emissions and degradation of eco-systems, as well as caused social issues. Despite the deindustrialization trend and move towards service sector, consumerist societies and increasing ecological footprints are still causing environmental issues (Bayulken & Huisingh 2015a).

This explanation of the causes of today's urban and environmental challenges is mostly agreed upon. Yet, there have been two very different approaches to the issue. These two theoretical directions can be traced back to the two age-old opposing views on the relationship between the human and nature (York et al. 2010; Kovács 2009). Firstly, there are the environmental activists or catastrophists, and secondly, the technology optimists. The first group doubts the possibilities of technological innovations to solve environmental problems, whereas the latter see nature as unable to affect people's possibilities, as subordinate and separate to the culture and people who control it. Massa (2009) divides the environmental social theories into two corresponding groups: the theories anticipating the break of modernisation, and the eco-modernisation theories. The first ones have a pessimistic view on fixing the relationship between the society and the nature, and see it to require global societal changes with regard to modernisation and capitalism (York et al. 2010; Burns 2015; Massa 2009). The eco-modernisation theories also see environmental issues as a result of previous industrial and economic growth, but have an optimistic view on continuing on the path of modernisation in solving them. (Huber 2000) mentions sufficiency and efficiency – first one

referring to self-limitation of material needs and consumption, as well as alternative thinking towards free market economy, and the second meaning the adaption of more resource efficient and environmentally sound production forms to achieve further economic growth.

EMT is based on the ideas of Huber and Jänicke, working in the 1980's Germany, and brought to prominence in the 1990's by the Dutch Spaargaren and Mol (York et al. 2010). EMT can be seen as a return of the already abandoned, development optimist modernisation theory (Burns 2015; Massa 2009). It was a response to the failed environmental management efforts in the 1970's, as well as a counter-reaction to the anti-modernist environmental discourse of the time (Mol & Spaargaren 2000, 2009). Thus, it represented an optimist shift from dystopian thinking to utopian dreams and opportunities (Murphy 2015), and the focus from sole environmental degradation to environmental reform (Mol et al. 2014).

EMT implies the possibility to continuously grow the economy and increase living conditions without considerable environmental damage, challenging the previous discourse of the environment's tension between technology, competitive market, and economic growth (Blühdorn & Welsh 2007). The vision is that after an era of modernisation and economic rationality, a new environmental logic will be established and become incorporated into all aspects of society: cultural and social practices, institutional arrangements, research and decision making of nation states and companies, leading to cleaner production and consumption (Mol & Spaargaren 2009; York et al. 2010; Burns 2015). The existing institutions, when modified, are seen as capable to address environmental issues, thus not requiring fundamental reorganization of the social, economic and political structures of modern society (Andersen & Massa 2000; Blühdorn & Welsh 2007). What is required, is industrial upgrading – a transition to less resource intensive and polluting low-carbon economy (Burns 2015; Kovács 2009). The super-industrialized, post-modernist society will not suffer from environmental stress, as technological innovations serve the environment (Massa 2009). The environmental degradation and resource scarcity, in fact, offers businesses new growth opportunities in the field of technological innovations, and environmental productivity can replace labour and capital productivity as a source of growth (Burns 2015).

2.1.3. Eco-city

Joss (2011) recognises environmental challenges and socio-economic pressures, such as population growth and rapid urbanisation in both developing world and the fast-growing cities of Europe, to

be the key drivers of eco-cities. In addition, political leadership and business development – the opportunity to promote a valuable brand of green technological innovation, have led to partnerships between research organisations, private businesses and the public sphere, often internationally.

Especially in this decade, there has been a global expansion of, not only urban sustainability projects, but also different city concepts addressing urban sustainability, possibly reflecting the developing sustainability discourse (de Jong et al. 2015; Fu & Zhang 2017). Different concepts overlap, but their focus often differs with regard to the role of citizens, governance, natural environment and economy, thus affecting the theoretical and political understanding and the value choices between sustainability dimensions in practice. The "sustainable city" and the "smart city" are the most prominent and interconnected concepts, being the two umbrella terms under which the sustainable city literature has developed into distinctive directions (de Jong et al. 2015; Fu & Zhang 2017), the first often emphasising environmental and economic aspects, and the second economic and social sustainability. Whereas the sustainable city is a straight derivative of sustainable development, the smart city focuses on digital information technologies (Joss et al. 2013; Marsal-Llacuna 2017), aspiring to upgrade the performance of cities in fields of business networks, smarter homes, mobility, as well as participatory governance, social inclusion into services, and social capital (Caragliu et al. 2011; de Jong et al. 2015; Fu & Zhang 2017). Other less occurring, conceptually distinctive or interconnected city categories include "eco-city", "green city", "low-carbon city", "digital city", "knowledge city", "resilient city", "intelligent city", "information city", "ubiquitous city", and "liveable city" (de Jong et al. 2015; Fu & Zhang 2017). The leading concepts of "sustainable city" and "smart city" are mainly discussed in Europe and America, whereas the discussion, as well fairly prominent, on "eco-city" and "low-carbon city" are led by China, a new player in sustainable urbanism (Fu & Zhang 2017).

The term eco-city is widespread and recently used by many scholars as the key term for urban sustainability interventions. It is used to describe a variety of different urban projects, thus lacking a clear definition (Rapoport 2014). It is often understood to bring the concern of sustainability, environment, and climate change, to the forefront of urban planning policy and practice (Joss 2011; Rapoport 2014; Sharifi 2016). Physical urban sustainability is usually understood to include mixed land use and compact form, sustainable transport and energy, and green spaces (Rapoport 2014). Joss (2011) defines eco-cities as urban sustainable developments of substantial scale in terms of

area, infrastructure and innovation, taking place across several sectors such as housing, transport, energy, waste, water and land. These developments are formulated as, embedded in, and supported by, policy processes. Joss (2011), Rapoport (2014), and Sharifi (2016) see eco-cities as awareness-raising sites of innovation for technological solutions as well as management and governance processes, where a comprehensive, transferrable model of urban sustainability can be produced.

2.1.4. Timeline: the evolution of urban sustainability

The discussion on environmentally friendly urban development behind the variety of eco-city developments is an old one, and connected to the broader trends in environmental thought (Joss 2011; Rapoport 2014; Sharifi 2016; Opp 2016). According to Sharifi (2016), the sustainable neighbourhood initiatives are a continuation of urban planning trends that have since the early 20th century progressively included in different dimensions of sustainability in aiming towards liveable and environmentally friendly neighbourhoods. I use Sharifi's (2016) division of planning paradigms into the Garden City, Neighbourhood Unit, Modernism, Neo-traditionalism and Eco-urbanism, Joss' (2011) recognition of three phases in the development of the eco-city concept, as well as other literature, to form a timeline of the evolution of urban sustainability (Figure 2).

The first trigger to sustainable urban development is often seen to be Ebenezer Howard's Garden city vision from the beginning of the 20th century, influencing also later movements such as Modernism. It aimed to address urban overcrowding and other issues related to industrialisation by combining the best aspects of city and countryside. Characteristic to the Garden City were low density neighbourhood wards, abundant green space, radial roads and a rail connection to the city, cooperative ownership and active, socially mixed population. It resulted in mixed-use and mixed-income communities, but failed to provide a self-sustainable environment and has been criticized for causing urban sprawl, negative effects on environment and failing to address the equity needs.

The Neighbourhood Unit Movement was Clarence Perry's answer to urban social problems in the 1920's. The vision enhances walkability within the neighbourhood and offers physical planning as a key to strengthen social interaction and feeling of community. The movement has been criticized for not being self-sufficient, as well as overlooking social goals and heterogeneity of people. Rigid zoning and functional segregation, superblocks, and cul-de-sacs, have been argued to contribute to suburbanisation, increase car-dependency, and decrease walkability and social interaction.

Modernist planning ideas were mainly implemented in the 1960's and 1970's, leaning on ideas of Le Corbusier and Frank Lloyd Wright from the 1920's and 1930's. Modernism was inspired by technological advances in construction and transportation, and aimed to answer the social problems of crowded urban areas and to reunite humans with nature, using design of urban form. This form meant functional zoning, high-rise buildings and superblocks, abundant open space and modern, high-speed transportation. Modernism was characterised with functionality and physical and technological determinism. It lacked focus on people and caused damage to both humans and environment by displacing human scale and street life from the way of vehicles, and increasing social segregation. Bayulken & Huisingh (2015a) raise New Town development in the UK and abroad, having first been implemented with the Garden City in mind, as an example of carbon intensive development at the time of rapid urbanisation. They praise North-western Europe for having implemented a more progressive form of Modernism, following a more multidisciplinary approach and focusing on neighbourhood scale and social aspects.

Following unsustainable urban growth and the oil crisis, sustainability emerged in the form of rising environmental movement and alternative bottom-up grassroots movements in the 1960's and 1970's (Joss 2011; Bayulken & Huisingh 2015a). In this first phase of eco-cities Joss (2011), the peripheral, moderately sized and scoped eco-developments were characterised by anti-growth, social equity and community goals (Bayulken & Huisingh 2015b). Sustainability started playing a bigger role at the end of 1980's, when the Brundtland Report was released, and the environmental aspect started being normalised and integrated into different political and economic activities. Richard Register published his influential book *Ecocity Berkeley* (1987), eco-city conferences started, and there were examples of eco-cities collecting ideas related to sustainable urban living (Joss 2011). Neo-traditionalism (often specified as New Urbanism), started tackling suburbanization, sprawl, traffic congestion, pollution, and social problems of degrading inner cities (Sharifi 2016). Social change was pursued through physical design such as mixed land use and compact human scale, transit oriented development and walkability, active centres and aesthetically pleasing urban environment. The ideas of participatory planning, stakeholder collaboration, and transparent decision making emerged. It is still unclear to which extent the plans have succeeded in improving sustainability, but the developments have been criticized of being mainly suburban and car-oriented (Winston 2009), as well as causing gentrification (Sharifi 2016).

The Earth Summit or UNCED in Rio de Janeiro in 1992 paved the way to the publication of Agenda 21, a global action plan for nations to mitigate environmental impacts, and Local Agenda 21 and other local action plans and urban policies in European countries. The 1994 Charter of European Cities and Towns: Towards Sustainability, or Aalborg Charter, emphasised the need for stakeholder and citizen participation in decision-making and implementation, and the integration of people's needs, such as housing, with environmental protection. These actions resulted in some good practices in Europe, of which eco-towns are an example (Bayulken & Huisingh 2015a; Rapoport 2014). Kyoto Protocol on 1997 recognised the role of cities in reducing energy consumptions and emissions (Joss et al. 2013). Here Joss (2011) places the second phase of eco-city development, during which the concept was increasingly standardised by the policy framework of sustainability. Europe acted as a pioneer in the global emergence of early eco-cities, such as Freiburg in Germany and Växjö and Hammarby Sjöstad in Sweden (Joss 2011; Joss et al. 2013; Rapoport 2014).

Sharifi (2016) sees Eco-urbanism as the latest sustainable urbanism paradigm, having trended globally since the 2000's, corresponding Joss' (2011) third phase of eco-city development. Eco-city has moved from small-scale, locally focused bottom-up initiatives in the sphere of environment and equity, to a more global, geographically spread and internationally profiled, economically focused, technologically standardised, and politically supported phenomenon (Joss 2011; Rapoport 2014). The eco-initiatives share the goals of, in addition to all the previous challenges, making cities work for the sustainability through low-carbon development - reduction of cities' carbon footprint and decarbonizing the economy with green and smart technologies (Joss 2011; Joss et al. 2013; Sharifi 2016; Fu & Zhang 2017). To stimulate socio-economic innovation, clean-tech business development and cultural branding, the eco-city has included a larger variety of actors, partnerships and international knowledge transfer on political and business arenas (Joss 2011; Joss et al. 2013), reflecting EM and the compatibility of environment and economy as an approach towards sustainable development (Joss et al. 2013; Bayulken & Huisingh 2015a). There are now a variety of different networks and the knowledge transfer happens between cities, countries, international organisations, such as UN, OECD and the World Bank, and across private and public spheres (Joss et al. 2013). High profile policy support and initiatives have raised especially in China, but also in the European Union and its membership countries (Joss 2011; Joss et al. 2013).
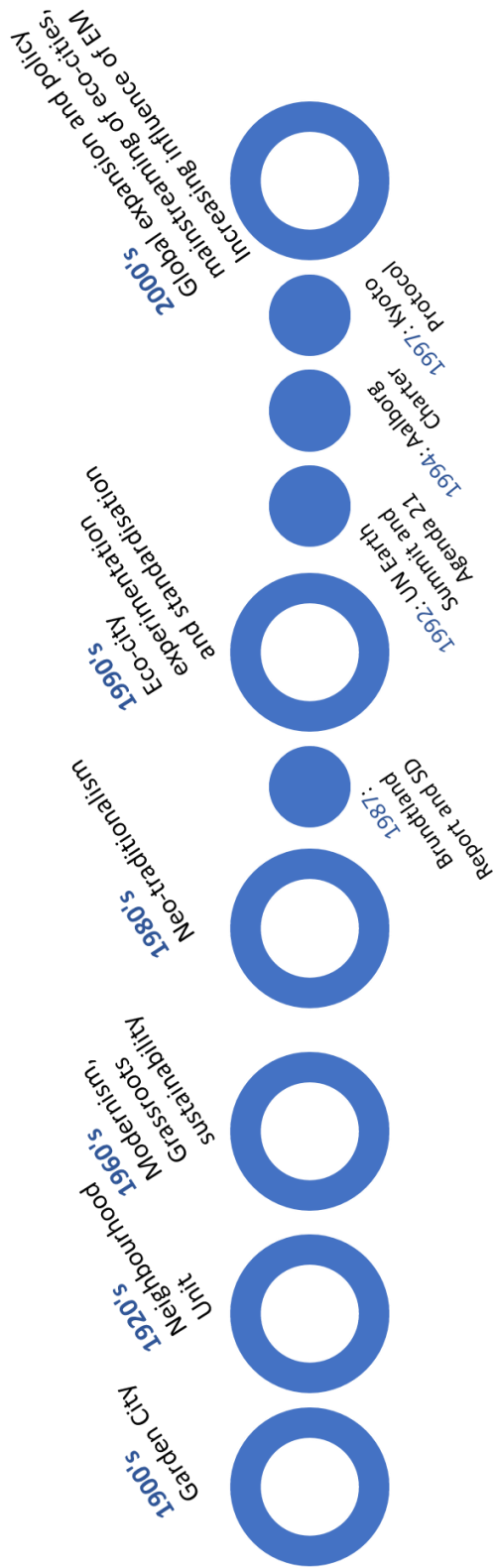
Figure 2. Timeline of urban sustainability. The bigger circles describe the general trend, the smaller ones certain events or documents. Main sources: Joss (2011), Sharifi (2016).

2.2. Participatory planning

Participation can refer to the belonging of a society or a community, participation in defining, developing and using the space, and the rights and responsibilities to be involved in decision making, initiated either by governments or citizens (Jauhiainen 2002; Koskiaho 2002). Participatory planning recognises the city to constitute mainly of its citizens, and sees them as active actors within their communities, instead of mere consumers, users of services, or protesters. The EU supports European citizenship and improvements in democratic and civic participation. Including different groups in decision making is hoped to enhance equity and the liveability of communities (Sharifi 2016). The benefits of participation will be discussed later in the context of the research problem. Below I will discuss participation as part of social sustainability, the question of power and legitimate knowledge, as well as the width and depth of participation, before moving to describe the evolution of participatory planning paradigm.

2.2.1. Social sustainability

Social justice is a primary goal of SD, and environmental sustainability a precondition for that (Langhelle 2000, Huber 2000). Despite the anthropocentric base of sustainability (Dempsey et al. 2011), the social aspect of it has been recognised to need much more attention (Dempsey et al. 2011; Vallance et al. 2011; Boström 2012; Murphy 2012; Janssens & Van Dorst 2012; Marsal-Llacuna 2017; Monfaredzadeh & Krueger 2015; Opp 2016). Social sustainability is directly linked to participatory planning as it calls for more participatory processes. The pluralism of sustainability not only requires all sustainability dimensions to be taken into account, but also engaging various stakeholders in planning and decision-making (Bond et al. 2013, cit. Sharifi 2016). Boström et al. (2015) divide sustainability into substantive (what) and procedural (how) dimensions, claiming that for the former to be realized, the latter is also required. This means that the very means of building social sustainability need to be socially sustainable. Different stakeholders should be effectively involved and informed in each development stage – especially early framing of issues, use and enhance stakeholders' capabilities, empower awareness, education and networking, consider power asymmetries, and be attentive to local context (Boström 2012; Boström et al. 2015).

There is a variety of definitions and criteria for social sustainability provided in the literature. Many of them relate to the physical qualities of buildings and area, such as access to green spaces, services, and public transportation, as well as walkability and preserving local characteristics and

attractiveness of the area. Apart from these physical qualities, the three categories of social equity, community and place making, and participation, are widely included in the definitions (Dempsey et al. 2011; Murphy 2012; Strandberg & Lerme 2014; Opp 2016).

Social equity means fair distribution of resources and opportunities, such as access to basic needs including e.g. affordable housing, employment, education, services, spaces, mobility, culture and recreation, as well as fair distribution of environmental goods and bads (Boström et al. 2015). Low-income areas may have less green and energy efficient living environments and disproportionate share of pollution and climate change effects, resulting in fuel poverty and health problems (Winston 2009; Dempsey et al. 2011; Murphy 2012). Social exclusion and its discriminative practices hinder economic, social and political participation (Dempsey et al. 2011).

The sense of place and community create the living environment impacting one's life chances and well-being (Opp 2016). Sustainability of community (Dempsey et al. 2011) concerns community's ability to sustain and reproduce itself as an inclusive, participatory, stable, identifiable and safe one, with an emphasis on collective aspects of life. Physical design can support sense of place and community, social cohesion, and interaction. A place not looked after might negatively affect the perceived and actual safety and trust within community, whereas improving housing quality and aesthetics can change the mental images of the area and its people (Strandberg & Lerme 2014). Some measures are to strengthen the connections between different districts and community networks by creating new meeting places, encouraging a mix of populations instead of segregation, resulting in more tolerance, trust, safety, solidarity, and participation in common affairs (Dempsey et al. 2011; Janssens & Van Dorst 2012; Murphy 2012; Strandberg & Lerme 2014).

Both social equity and sense of place and community are important results of, and prerequisites for participatory planning, since SS can build on already existing structures and capabilities (Boström et al. 2015). Social interaction relates to social capital, defined as the relationships and networks, knowledge and understanding, and trust, norms and values that facilitate collective action (Ghomashchi 2012; Opp 2016). Ghomashchi (2012) argues that social capital can enhance natural, physical and human capital of the community – in other words, sustainable development.

2.2.2. Power and knowledge

Despite the newly increased interest in participatory planning, it is related to the old question of public power, and what constitutes as legitimate knowledge (Bäcklund & Mäntysalo 2009).

Usually it is the politicians, officials, landowners and business actors who possess the power in urban development, whereas residents can be considered to be smaller, less powerful and less organised actors. Changing roles and processes may cause resistance from the experts and the currently powerful, and decision making system may find it hard to cope with new kind of information from new participants (Kettunen 2002). Participation can also be seen as a threat to unity, as well as costly and time-taking (Arnstein 1969). The adopted planning and democracy ideas affect the definition of the role of participation, who the participants are, and in which moments and ways they can participate, reflecting ideas of legitimate knowledge, the role of participants as information providers along representative democracy, as well as the openness of cities to different perceptions of good life (Bäcklund & Mäntysalo 2009).

The roles different types of knowledges are of importance when more participants, and thus more interpretations of the plans' effects on the environment, join planning (Bäcklund 2002). The potential as well as the challenge of residential participation lies in making the information flow both directions between different groups, and incorporating the local, experience-based everyday knowledge, coloured with memories, identities and social relations, into a planning system previously defined by so-called objective expert knowledge (Bäcklund 2002). In sustainability development in general, there is a challenge to treat all information providers and forms of knowledge, such as social knowledge as equally important (Boström et al. 2015). Healey (1992), who sees planning as a democratic enterprise promoting social justice and environmental sustainability, sees communicative planning as important to challenge the narrow scientific rationalism of technical and administrative machineries.

The distant understandings of decision makers and residents is related to the language in which planning is conducted – plans often consist of physical measurements, visionary pictures and different policies, forgetting the lived experience filling the physical spaces (Bäcklund 2002). This experience, even if presented by a knowledgeable resident, can be labelled as simple, down-to-earth, unrepresentative opinion instead of relevant argument (Lapintie 2002). The role of residents in participation has too often been to resist plans. The NIMBY-phenomenon (not in my backyard) has often been understood as citizens' interest on individual preferences instead of common good. Yet, real and justified concerns may become silenced with the NIMBY label (Niemenmaa 2002). According to Lapintie (2002), this resistance stems from residents' expectation of certain stability

in their living environment, to which a new plan introduces a disturbance. Likewise, residential participation in the planning system is a disturbance, making the lack of bridges between two worlds evident. The participation of new groups requires acceptance of different ways of speaking about the urban environment, different understandings of what are the problems in need of solutions, as well as multiple competitive identities alongside the "official" identity – only so can the participants access power in planning practice and decision making (Bäcklund 2002). Staffans (2002) points that the active "expert citizens" who are forming networks and creating competing planning knowledge, are now acting as a needed bridge. There is a possibility that this self-imposed knowledge creation brings forth new ideas that critically evaluate the present system, creates new networks and trains new kinds of professionals. The different knowledges are evident in the width of participation, whereas the power structures are reflected in the depth of it.

2.2.3. Width and representativeness of participation

The width of participation straight relates to the different knowledges, the importance lying in the amount of alternative views (Jauhiainen 2002; Niemenmaa 2002). Social sustainability requires everyone involved to have an equal access to participate in political processes (Opp 2016), but there are well-argued opinions both for including everyone and restricting participants to a smaller number. It is difficult to create space and time for everyone to participate (Suschek-Berger & Ornetzeder 2010), and often it is not possible or even ideal to include all stakeholders in all stages (Karlsson et al. 2016). A large number of participants is not a guarantee of quality or efficiency of participation (Gustavsson & Elander 2016), and individual experiences may help to understand wider phenomena. IEA (2013) advices to create a small but diverse group of selected participants, whose integrated, innovative and novel thinking can support commitment to collaborate.

When it comes to representativeness, the participatory process should involve people who reflect the needs and interests of other residents. The majority opinion is important, but so are minority views. Actors with well-known viewpoints are not necessarily the ones to be encouraged to participate (IEA 2013), although their point of view should certainly be included. There may be certain underrepresented and passive groups of people in need of encouragement to participate (Agyeman & Evans 2004; VTT & ITL 2016), such as renters, youth, immigrants or marginalized residents. The purpose of empowerment is to make socially excluded residents fully participate in the society (Koskiaho 2002), as these groups might have new, useful ideas (IEA 2013).

Amna (2010, cit. Gustavsson & Elander 2016) sees everyone as potential participants, "stand-by citizens", and recognises six reasons for participation – or looked from the other side, as reasons not to participate. Participation can be seen as: an obligation that one should do, something important that one has to do, something one can and is able to do, something one needs to do to answer a demand, something effective that works, and as something rewarding and meaningful. According to Arnstein (1969), the reasons for non-participation are resistance to and distrust towards power redistribution, paternalistic or discriminating attitude towards citizens on behalf of powerholders, as well as poor political socioeconomic infrastructure, knowledge base or organizing power. This may be the case especially in areas with long history in disempowerment. Something central to democracy and participation is also the right to not participate (Suschek-Berger & Ornetzeder 2010; Kettunen 2002), as participation for residents, unlike for experts, is voluntary.

2.2.4. Depth of participation

For Arnstein (1969), participation reflects power, and the participation of the governed in their government is an essential part of democracy. Participation without redistribution of power is frustrating for the participants and can cause them to lack trust towards powerholders. Thus, the resource consuming participation process should offer a reward to the participants in form of real impact and result – participation without realised plans is of no use. I will discuss the different degrees of participation with the help of Arnstein's (1969) ladder of citizen participation (Figure 3), which illustrates the degree of citizen power.

The first step of the ladder is non-participation, divided into manipulation and therapy. Manipulation refers to uninformed citizens being educated, persuaded and advised, making them mere rubberstamps for programs which often do not answer community needs. In therapy, the powerlessness of citizens is not seen as the result of discrimination, and they are directed towards adjusting their values and attitudes to the mainstream instead of focusing on solving the problems.

The next stage, tokenism, divided into information, consultation and placation, allows the citizens to have a voice without actual guarantee that it is taken into account. Information is often given in a late stage, in one-way manner, and with language not understandable for the people, resulting in people having no say on programs designed for them. In consultation, opinions are often invited in the form of surveys, meetings and hearings, and participants end up using their resources for being treated as uninformed statistical abstractions whose ideas have no guarantee of being taken into

account. Placation allows citizens to influence as it takes into account their advice, keeping the decision making for the powerholders. Problems may rise if citizen get easily outvoted or there is a lack of information about plans, rights and responsibilities, resulting in often already existing suspicion towards powerholders.

The last part of the ladder includes partnership, delegated power, and citizen control. In partnership, planning and decision making responsibilities are shared between citizens and powerholders. It requires leaders being accountable to the community, the community to have funds to hire its own help, and the focus on strengths and potentials in addition to weaknesses and challenges. In delegated power, citizens have dominant decision making authority over the program with majority of seats, and it is the powerholders instead of citizens who have to bargain. The highest step, citizen control, guarantees citizens full governance and managerial power.

3. Partnership	•3.3. Citizen control •3.2. Delegated power •3.1. Partnership
2. Tokenism	•2.3. Placation •2.2. Consultation •2.1. Information
1. Non-participation	•1.2. Therapy •1.1. Manipulation
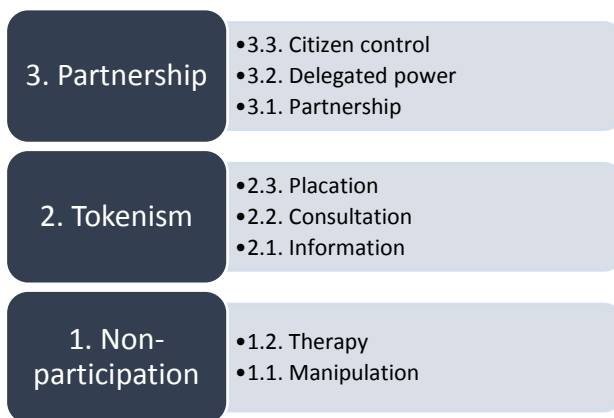
Figure 3. A modified presentation of the ladder of citizen participation (Arnstein 1969).

Related to the depth of participation is also the stage when stakeholders can participate. Healey (1992) argues a communicative approach to knowledge to imply that planning tasks cannot be predefined but discovered through mutual learning in the argumentation of different groups' interests, enabling a reconstruction of these interests instead of bargaining around predefined ones.

2.2.5. Timeline: the evolution of participatory planning

I will base my presentation of the evolution of participatory planning (Figure 4) mainly on the four-paradigm division of Bäcklund & Mäntysalo (2009; 2010), the stages being comprehensive-rationalist, incrementalist, communicative, and agonistic planning. This division is based on the Finnish context, but potentially applicable also outside of Finland.

The comprehensive rationalist planning theory influenced after the Second Word War, thus coinciding with Modernist planning. It was based on the positivist methodology, managing societal development with comprehensive data and factual, objective knowledge. The view to participation was that the educated planners possessed value-free knowledge, whereas citizens' knowledge was treated as opinions. Thus there was no need for residents' knowledge or discussion about power relations in planning. Citizens were targets of top-down planning for them rather than participants to plan with. The bureaucratic practices and trust in scientific knowledge from this paradigm are still visible, and even defended as necessary for the equal treatment of people.

Yet, the physically oriented expert planning did not seem to lead to the best possible results for all the urban people, causing urban injustice (Davidoff 1965). Planning was never free of political struggle or different values between interest groups, and the choices made did not reflect unquestionable facts (Lindblom 1959; Davidoff 1965; Häkli 2002; Pakarinen 2002). According to Horelli & Kukkonen (2002), participatory and interactive planning started to be discussed in the 1960's, simultaneously with the grassroots movement emergence. Citizens generally wanted a bigger say in the society, and among general protests, also planning started to be seen as something political (Horelli & Kukkonen 2002; Pakarinen 2002).

"The right to the city"-movement, led by Marcuse and Lefebvre from the 1960's, discusses citizens' rights to services and spaces, as well as urban democracy (Marsal-Llacuna 2017). Davidoff (1965) presented the idea of plural and advocacy planning. Plural planning, which focuses on the process, suggests that for effective democracy, instead of a mere yes-no choice of a unitary plan, the different interest groups should contribute to planning by making their own plans. In this context he also mentions neighbourhood associations' plans for renewal. Advocacy planning, focusing on planner's role, suggests the planners' to move from sole technical expertise to a more comprehensive understanding of the interrelated elements of urban communities, as well as make the values behind the plans more visible and advocate the interests of multiple groups, especially the traditionally silenced. Deriving from the ideas of Lindblom (1959), Bäcklund & Mäntysalo (2009; 2010) recognise the paradigm of incrementalist planning, influential after the growth of cities had slowed down, when adding small incremental changes to the infrastructure became suitable. The interest groups were to focus narrowly on their own interest, and the common good would be achieved through comprehensive representation and negotiations.

Still, there were concerns of conservative favourism of already well-organised and influential groups, as well as the lack of consensual dialogue. In the 1980's, communicative planning theory that increasingly recognised citizens' centrality to planning, became influential. It is based on the Habermasian theory of ideal communication unaffected by power relations, and rational, equal participants' best arguments leading to consensus and common good. Drawing from Habermas, Foucault, and Bourdieu, Healey (1992) defines communicative planning to interactively try to achieve common understanding to the extent possible, including all dimensions of knowledge and recognising and respecting the differences of communities – "living together differently through struggling to make sense together" (1992:240), while reflecting its own process. Simultaneously with the emergence of communicative planning, SD's social sustainability and the following sustainability planning emphasised collaboration, openness and participation. The communicative ideal has been criticized as unrealistic, as well as homogenizing participants in presuming a shared value base. Different conceptions of reality and a good city can be valid, meaning that participants see differently not only the problem solutions, but the planning problems. Preconceived and un-politicized planning questions reduce the participants as objects of planning. Agonistic planning theory emerged as an answer to this critique, recognizing the need to consider, accept and respect different realities and values between participants. Full consensus is not seen as possible or even necessary, as contradictions are always existing – what is important is to agree on the legitimate methods to deal with openly present and even incompatible disagreements.

Central to the increasing attention to participatory planning is the current turning point in democracy. Citizens across Europe feel more and more distant from representative democracy, reflected in lowering voting activity and trust towards traditional political institutions (Kettunen 2002; Jauhiainen 2002). This is materialised in the activation of movements outside traditional institutions and representative democracy, reflecting a need for a change towards wider and more direct democracy and citizen participation (Jauhiainen 2002; Kettunen 2002). The change from government to governance means increasing interaction between public authority, private sector and civil society (Sairinen 2009). Simultaneously, the goals of urban planning have become wider and now include new actors and participatory methods, both voluntary and set by legislation (Häkli 2002). It is important to think of the role of new, often more direct forms of participation, in relation to the present system – whether the system will change by incorporating new forms of participation, or whether these new forms will stay in the margins (Jauhiainen 2002).

According to Bayulken & Huisingh (2015b), citizen participation has been a core concept in North-Western Europe since the 1990's. It is praised in international, national and local levels, and seen as something that increases the legitimacy of the projects (Gustavsson & Elander 2016). The common understanding is that citizens should have the chance to participate in the early problem definition phases, making it more meaningful. The smart city technologies have offered new possibilities for participation in the form of communication platforms between like-minded people, and between citizens and authorities, as well as accessible co-design (Monfaredzadeh & Krueger 2015). Still, citizens cannot be treated as mere information sensors, but be placed in the centre of strategies, while using smart technology as a tool (Marsal-Llacuna 2017).

If the critique of Modernism's physical and technological determinism can be seen to have, step by step, led to the eco-city paradigm, so can the coincidental comprehensive-rationalist planning with its lack of interaction have led to the paradigm of participatory planning. The steps include recognizing the political nature of and traditionally silenced citizens' role in planning, aspiring to strengthen communication between different interest groups, first consensually and then recognizing the plurality of realities, as well as the recent need for more direct democracy. Citizen's position has changed from expressing an opinion about already made plans at the end of the planning process to more central position and even part of the problem definition in early planning phases. Bäcklund & Mäntysalo (2009; 2010) recognise the democracy idea to have shifted from aggregative, focusing on distribution of power between different interest groups, through the consensus-orientated deliberate, to agonistic view of politics as conflict between participants, as well as the decision making process to have become more and more emphasised alongside the content of decisions. Both the incrementalist and agonistic paradigms can be seen as realistic responses to more idealistic comprehensive rationalist and communicative planning theories (Bäcklund & Mäntysalo 2009; 2010). Bäcklund & Mäntysalo (2009; 2010) remind that the paradigms, although emerged as reactions to previous ones, have not changed seamlessly, but overlapping practices are still present.
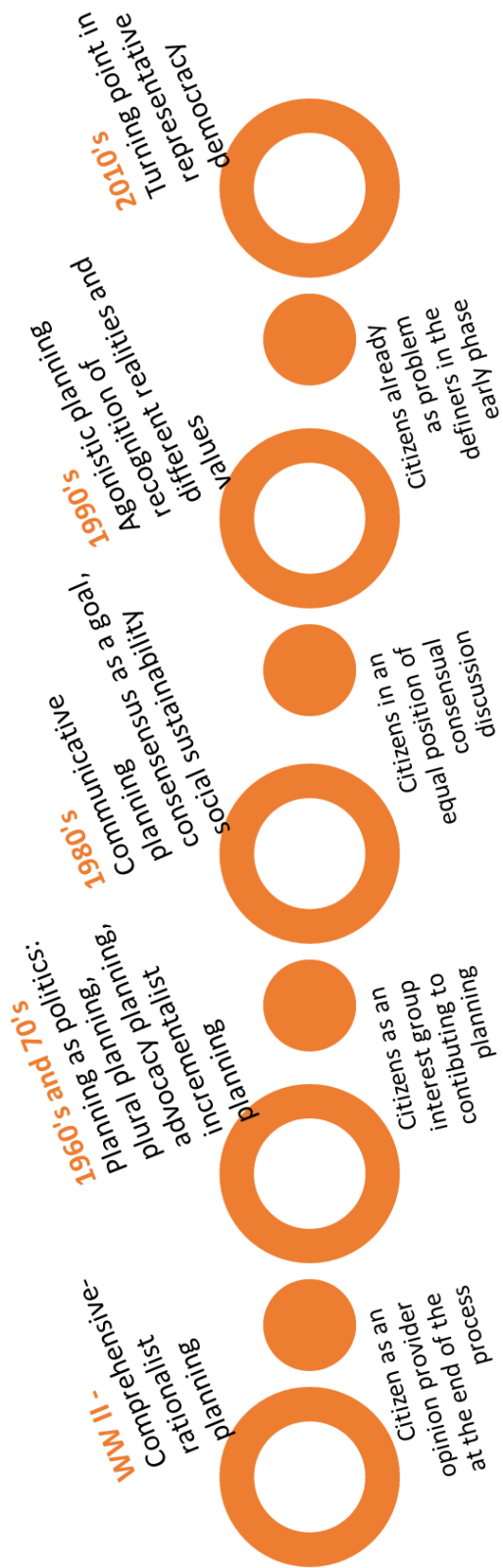
Figure 4. The timeline of participatory planning.

WW II -
Comprehensive
rationalist
planning

Citizen as an
opinion provider
at the end of the
process

1960's and 70's
planning as politics:
plural planning,
advocacy planning,
incrementalist
planning

Citizens as an
interest group
interest to
contibuting to
planning

1980's
Communicative
planning
consensensus as a goal,
social sustainability

Citizens in an
equal position of
consensual
discussion

1990's
Agonistic planning
recognition of realities and
different
values

Citizens already
as problem
definers in the
early phase

2010's
Turning point in
representative
democracy

2.3. Technocracy and neoliberalism challenging urban sustainability and participatory planning

Urban development of the 20th century has come up with a variety of ideas to cope with the environmental and social issues of fossil fuel and growth based production and lifestyle of the urbanising world (Bayulken & Huisingh 2015a). After Modernist planning ideals and environmental management, SD and EM became the two most influential paradigms shaping ideas and policies of urban sustainability (Joss et al. 2013; Bayulken & Huisingh 2015a; de Jong et al. 2015). The appeal of both concepts is their positive discourse change suggesting that environmental, social and economic development can go hand in hand, preserving both natural environment and growth. It has been easy for different interest groups to agree on these claims, and especially SD has served as an important magnet bringing together different stakeholders, some of whom might not have traditionally prioritised environment (Gibson 2006; Rapoport 2014).

Burns (2015) sees the policy recognition of SD in the 1980's to have brought along a whole new sustainability revolution, comparable to the Industrial Revolution, affecting production and consumption, science and technology, governance, education, ethics and lifestyles. Environment evolved from a mere sector interest to something non-controversial and tightly connected to other policy areas (Blühdorn & Welsh 2007; Lidskog & Elander 2012). Although there is no agreement on how exactly the triple bottom line is to be understood and implemented in urban context, it is a core principle of most sustainable city concepts (de Jong et al. 2015). The other side of the coin is that the all-encompassing nature of the concepts can be seen to make them vague and seemingly politically neutral (Rapoport 2014). Although sustainability is a recognised priority of urban policy, the understanding and practical applying of the three dimensions widely varies. This makes it rather a political concept than a precise scientific one (Burns 2015).

Blühdorn & Welsh (2007) instead claim that there is a paradigm shift to an era of post-ecologism, defined by politics of unsustainability. Radical and transformative environmental movements have been disempowered from the way of mainstreamed "techno-economic hegemony" (Blühdorn & Welsh 2007:186), in other words, EM, which trusts the sustainable technological innovations to stem from consumer capitalism. Problems include normalisation of environmental crisis in media, politics and business, and reinforcement of growth, competitiveness and consumerism, as well as post-political state's and corporate authority's power over civil emancipation. According to Schatz

& Rogers (2016), technocratic, neoliberal and participatory planning have both theoretical and practical tensions, each process potentially undermining important power structures of another. The technocratic government planning and representative democracy, market-centric neoliberalism of the private sector, and local participatory planning and direct democracy all reflect different theories of democratic governance and source of power, corresponding Bäcklund & Mäntysalo's (2009; 2010) discussion of power and democracy in participation.

Firstly, in governmental system based on representative democracy and technocratic expertise of professional planners, the decision making power of citizens is limited, creating a dilemma between professional expertise and democratic planning (Schatz & Rogers 2016). Changing roles between public and private sector and civil society, the state giving way to economic actors and the civil society becoming a more active partner with industry and state, is characteristic to EM (Mol & Spaargaren 2009; Lemprière 2016). Mol & Spaargaren (2009) argue stronger inclusion of non-state actors and establishment of new partnerships in environmental reform to increase legitimacy and transparency of decision making. Secondly, neoliberal governance extends power from politicians to markets, making it harder for citizens to participate, being neither technocratic planning experts nor financial shareholders. EM's economic focus, globalisation and neoliberalism pose challenges to participatory planning, as urban development and political inclusion are often subordinate to market mechanisms and capitalism (Checker 2011; Pakarinen 2002; Jauhiainen 2002).

According to Mol et al. (2014), it may be impossible to overcome the fundamental difference between EM and the critical tradition with regard to their view on capitalistic growth. Other issues of technological determinism, the role between state and market, and social equity, have instead been increasingly addressed (Mol & Spaargaren 2000; 2009). Even some critical voices recognise EM to have paid attention to equity and participation (Murphy 2012), as well as human well-being (York et al. 2010). Even if the role of markets is emphasised in EM, many EM scholars remind the state to have a major supportive role as a regulator and promoter (Andersen & Massa 2000; Mol & Spaargaren 2000, 2009; Jänicke 2008; Burns 2015). Christoff (1996) divides EM to weak and strong, the first focusing on market economy and technological solutions in developed countries, and the latter on democracy, participation and changing institutions, with international perspective. The division corresponds Hajer's (1995) techno-corporatist and reflexive EM, latter paying attention to democratic governance, social learning, and new institutional arrangements.

SD and EM have been seen as overlapping, but many scholars see EM to be, if useful, not sufficient for global SD, due to its weaker attention to global ecological interdependence (Langhelle 2000; Huber 2000). SD addresses a wider scope of global issues: intra- and inter-generational equity and social justice, global environmental problems, limits of growth, and promotes a wider set of actors and deeper structural change (Langhelle 2000; Baker 2007). For SD, there are wholly alternative concepts and models. The models usually include an institutional/ governance dimension, or see environment not as an addition to the system, but a base and a precondition to the society, and society to the economy, thus challenging the anthropocentric tripartite understanding of sustainability (Bayulken & Huisingh 2015a; Keiner 2005). A strong form of sustainability sees humans and nature as inseparable and calls for special protection of natural capital through democratic, transparent and participatory means (Mayhew 2009). A weak form of sustainability, instead, sees sustainability as a sum of environmental, societal and economic capital stocks, meaning that one form of capital can substitute for another (Keiner 2005; Mayhew 2009).

Sharifi (2016) claims that sustainability focus has progressively broadened with the emergence of new neighbourhood planning paradigms. Yet, the old problems, often social, have been inherited in new paradigms, leaving urban challenges unsolved – a case in point being Modernist housing blocks facing both social and energy-efficiency issues. Sharifi (2016) blames market influence and physical determinism – overreliance on physical and technological planning to answer social issues - to be behind the failure. Joss et al. (2013) find it risky to bypass the human dimension and judge eco-cities according to innovation and technology, as the green growth strategies tend to do. Bayulken & Huisingh (2015b) found multi-disciplinary, multi-actor, holistic planning to be as important as a good environmental plan in the success of comprehensive sustainability goals in eco-cities. It is evident that both urban sustainability and citizen participation are in a tough position in the current context of technocratic and neoliberalist system, and a more social focus is needed.

2.3.1. Technocracy

Sharifi (2016) states that Eco-urbanism suffers from the same over-reliance on physical design and technological development as the previous planning paradigms. Today's eco-cities heavily rely on technology in achieving their sustainability objectives (Rapoport 2014). Joss (2011) found three quarters of eco-city initiatives emphasizing technological innovation in the development, only one quarter having a more holistic approach to sustainability.

Technocracy stems from a technological utopia of people's creative capacity to master nature and create timely solutions to environmental problems (Murphy 2015). Kovács (2009) sees many uncertainties in scientific innovations resulting from capitalistic entrepreneurialism: environmental problems have to be noticed and recognised as problems, solutions or capacity to create them have to exist, along with societal consensus to quickly implement them. Technological and low carbon development are not necessarily tied together: technology may increase accessibility to fossil fuels (Burns 2015; Murphy 2015), and wealth created from technological development can be invested in environmentally unsound industries (York et al. 2010).

Increasing energy efficiency, if not coexisting with social change, may lead to rebound effect - increased consumption compensating for the achieved resource savings (Jänicke 2008; York et al. 2010; Kovács 2009). Thus, efficiency cannot be sufficient as itself (Andersen & Massa 2000; Huber 2000), although it is promoted by powerful fossil fuel based industries (Jänicke 2008; Murphy 2015). Huber (2000) suggests consistency - a combination of efficiency and sufficiency/energy saving. It combines sustainable value base and alternatives to materialistic happiness with the idea of more value creation with less resources.

2.3.2. Neoliberalism

There are worries of EM having been captured by business interests (Andersen & Massa 2000). Marketable solutions are believed to make environmental problem solving politically easier (Jänicke 2008). EM's critique includes its acceptance of market and growth-centred development, lack of global perspective, absence of social equity and democratic participation, and technocratic view on development. As EM's growth orientation and SD's economic sustainability play a clear role in eco-city discourse, the same critique can be found in eco-city literature (Rapoport 2014; Sharifi 2016). The neoliberalist system increasingly defines the approach from and the practices with which eco-cities are being developed, the private actor-led, growth-based context posing challenges (Rapoport 2014). The connection of eco-cities with mainstream policy and economy have been followed with a softening view on environmental sustainability. Even though various sustainable city categories share the underlying paradigms of SD and EM, not all aspects of sustainability are achieved in urban development as trade-offs are made (de Jong et al. 2015).

Beal (2014) argues that neoliberalism - the growing influence of market dynamics and restructuring of state – has made environmental sustainability politics entrepreneurially framed and more

ambiguous, leading to spatial selectivity and privileged areas of SD. A case in point is North-western Europe, where Bayulken & Huisingh (2015a) and Murphy (2015) see environmental policy goals, prosperity, democracy and equity having been achieved through the adoption of SD and EM. Yet, economic growth is argued to correlate with ecological footprints (Blühdorn & Welsh 2007; York et al. 2010; Joss et al. 2013; Burns 2015). Lidskog & Elander (2012) recognise a gap between EM rhetoric and practice in Sweden, a country considered a forerunner in sustainability. Economic growth, social welfare and environmental values support each other in policy discussion, but increasing domestic consumption of products from abroad increase its ecological footprint, allowing the wealthy country to externalise its environmental impacts while keeping a green image through unequal trade relations (York et al. 2010; Lidskog & Elander 2012). Baker (2007) sees EU's commitment to SD to be empty rhetoric, enabling its inner integration and image of a global supporter of SD, while actually it is supporting the economic gains promised by EM.

The reason cities focus on smart growth is the increased competition for business opportunities and talented people, as well as dependency on private funds and investments (Rapoport 2014; de Jong et al. 2015). Global positions as eco-technological innovation leaders are aspired, universally replicable model eco-cities being branding tools. This may lead to ignorance of local context, environmental justice and social equity, such as high-end ecological enclaves inaccessible to lower socio-economic groups (Joss et al. 2013; Rapoport 2014; de Jong et al. 2015; Gustavsson & Elander 2016). In the often state-sponsored environmental gentrification (Checker 2011), the seemingly politically neutral and consensus-based sustainable planning subordinates equity to technocratic, profit-minded development. It is difficult to fight the tendency to choose near-term economic benefits instead of mitigation of long-term environmental issues, but the fact is that the absolute amount of emissions must be lowered. The rate of success will define whether we can speak of ecological modernisation or merely economic modernisation (Murphy 2015).

3. Housing energy refurbishment

Energy refurbishment of housing offers an increasingly global and widespread opportunity for enhancing urban sustainability. There are already many examples in practice, and the potential is growing as major renovation needs and policy support emerge. Refurbishing housing has two dimensions included – the technical aspect focusing on the building, and the social focusing on the resident and his/her interests, lifestyle, and participation. The latter will be of my focus, as it is clear that a more social focus on urban sustainability is needed. Residential participation in energy-efficient housing refurbishment represents the two planning paradigms of urban sustainability and participatory planning, energy refurbishment aiming towards sustainable urban environments, and residential participation towards increasing residents' decision making power. The technical aspect of housing refurbishment, as well as the often economically themed barriers and interests of the residents, reflect challenges related to both urban sustainability and participatory planning. I will first introduce energy refurbishment of housing and its potential, and then discuss the residential aspect in more detail, including participation benefits, residents' engagement in refurbishments, user behaviour, resident interests, and the concept of community-based energy refurbishments.

3.1. Introducing housing energy refurbishment

According to Eames et al. (2013), urbanism now faces the challenge of a system transition of the existing buildings and infrastructure to zero carbon, while taking into account the entire ecological footprint of cities, as well as economic and social sustainability. Much of the eco-city development happens by retrofitting existing housing stock, transportation infrastructure, energy and waste systems, or as in-fill developments, such as regeneration of brownfield sites (Joss 2011; Joss et al. 2013). New development is rarer, especially in the slowly growing Europe. This means that the majority of eco-city developments takes place within different historical, cultural and governance contexts, affecting the suitable planning solutions (Joss 2011).

Refurbishment is a form of renovation, modernisation, retrofit, restoration or rehabilitation, terms referring to actions beyond maintenance, measures and targets of different projects varying (Meijer et al. 2009; Fawcett 2014). Energy performance of housing is locked in during design and construction, but times of renovation and urban renewal provide a window of opportunity for simultaneous energy improvements and establishment of more sustainable paths (Meijer et al.

2009; Karvonen 2013; Gustavsson & Elander 2016). Refurbishing is experiencing a paradigm shift from re-establishing the original condition to energy improvements (Suschek-Berger & Ornetzeder 2010). Energy-related costs constitute a fairly small amount in comparison with maintenance and modernisation costs (IEA 2013). Housing refurbishment is influenced by SD and EM - it uses marketable technological innovations in mitigating climate change with energy and cost efficiency. Apart from a focus on technological development and economic growth, residential housing sector's strong connection to the residents' identity and quality of life enables a strong focus on the social aspect of sustainability in the form of residential satisfaction and participation.

It may be questioned whether it is reasonable to place emission reduction burden on the building sector, housing and homeowners, or focus on other emitting sectors such as infrastructure, transportation, industry or agriculture (Gram-Hanssen 2014; Galvin 2014). Nevertheless, the building sector is widely considered to be one of the most cost-effective sectors for reducing energy use and carbon emissions (Sunikka 2006; Levine et al. 2007). Housing constitutes a significant industrial and economical sector, contributing to environmentally, economically and socially sustainable development throughout its life cycle in construction, design, management, maintenance, use and demolition phases (Winston 2009). Buildings, residential sector dominating, are estimated to be the largest energy-consuming sector, representing up to 40% of energy consumption and carbon emissions both globally and within the EU (European Commission 2008; UNEP SBCI 2009; OECD/IEA 2013). The greatest refurbishment need in Europe concerns energy-inefficient, mainly suburban post-war housing stock built in the era of rapid urbanisation of 1960's and 1970's, where Holopainen et al. (2016) estimate 200 million Europeans to live. Trends of growing population, shrinking household size and rising income level suggest that the sector's impact will grow still (OECD/IEA 2013).

The main strategies in energy refurbishments include increasing the share of renewable energy and reducing energy consumption through either increased efficiency or decreased consumption (Häkkinen & Belloni 2011; IEA 2013), reflecting the two camps of environmental discourse. The energy consuming in buildings mostly constitutes of space and water heating, as well as electrical appliances, lighting and air conditioning. The characteristics of SBs include efficient recycling management, energy efficient materials and electrical appliances, upgraded thermal insulation of building fabric and heating equipment, smart solutions such as apartment specific metering, as well

as clever maximization or minimization of heat gains and losses e.g. in placing of windows (Baird 2015). Buildings in the future are likely to play a bigger role in the energy system by not only using energy, but also storing it and locally generating it for the smart grid (IEA 2013).

There are advantages of refurbishing existing housing stock instead of improving energy efficiency through demolition and new construction. Firstly, the longevity of buildings means that existing inefficient buildings will continue to represent lion's share of building stock, especially in slowly growing developed countries, demolition and new construction having little influence to the overall situation (Power 2008; Meijer et al. 2009; Vlasova & Gram-Hanssen 2014). Secondly, new construction uses more energy and materials than refurbishment, which focuses on reusing and preserving resources (Power 2008). Thirdly, not only is the price of new SBs (sustainable building) becoming comparable with conventional new construction, but also energy refurbishment seems to result in only slightly higher costs than conventional renovation (IEA 2013). Compared with demolition, refurbishing is usually faster and cheaper (Power 2008). Fourthly, demolishing has harmful social consequences: loss of homes and established community networks, temporarily reduced housing capacity, and decline in property values and investments (Power 2008).

There are widespread policies supporting ecological housing refurbishment, including building regulations, certifications and labels, financial incentives, e.g. taxation, grants, subsidies and loans, energy audits, and information campaigns and training (Häkkinen & Belloni 2011; Wilson et al. 2015). The EU 2020 climate & energy package sets a target of 20 % reduction in carbon emissions compared to 1990, 20 % share of renewable energy supply, and 20 % increase in energy efficiency (European Commission 2017). The emphasis is on old building stock, along with transportation and manufacturing industries. One of the most important policies in the EU to increase energy efficiency of buildings' is the 2010 Energy Performance of Buildings Directive (Directive… 2010).

Housing energy refurbishment has not reached its potential (Achtnicht & Madlener 2014; Reames 2016) due to multiple macro level barriers. The comprehensive nature of housing refurbishment makes it insufficient to apply simple individual policies, posing huge challenges to the fragmented refurbishment and housing sector, policy organisations, actors and ownership structure of housing (Häkkinen & Belloni 2011; Golubchikov & Deda 2012; Bartiaux et al. 2014). As Gustavsson & Elander (2016:2) put it, "What we have, and must live with, is patchwork of partly overlapping assemblies, located at different levels and sectors, thus representing different spheres of authority".

The construction industry is conservative and in need of knowledge (Virtanen et al. 2005; Golubchikov & Deda 2012; Persson & Grönkvist 2015), reflected in the inability to offer adequate services and advice clients and occupants in energy efficiency (Häkkinen & Belloni 2011; Karvonen 2013). Fears of high adoption, maintenance, and other hidden costs, and too long payback periods, are related to short-term emphasis of initial capital costs over life cycle thinking (Sunikka 2006; Häkkinen & Belloni 2011; Golubchikov & Deda 2012; Persson & Grönkvist 2015), which may lead to smaller energy demand reduction that is technically possible (IEA 2013). When it comes to cost, there is potential for more government support for financing technologies not yet cost-effective (Sunikka 2006; Häkkinen & Belloni 2011). On the other hand, too rigid regulation may hinder smaller scale innovation adoption (Häkkinen & Belloni 2011; Golubchikov & Deda 2012). Many policies are still directed at new buildings instead of refurbishment, lagging behind technological development and climate goals (Meijer et al. 2009; Häkkinen & Belloni 2011; Persson & Grönkvist 2015). Yet, future building regulations are recognised a major driver in preparing for future demands in the Swedish construction companies (Persson & Grönkvist 2015).

Risk aversion means old proven alternatives and conventional routines being preferred because of lack of knowledge and experience, as well as uncertainty and negative assumptions of new solutions, technologies, processes, and return for investment (Häkkinen & Belloni 2011; Golubchikov & Deda 2012; Persson & Grönkvist 2015; Webber et al. 2015). Current structures, institutions, task distribution and stakeholder roles may be challenged (Häkkinen & Belloni 2011), facing resistance from powerful industries (Persson & Grönkvist 2015). The lack of data and information about energy efficient housing (Meijer et al. 2009; Häkkinen & Belloni 2011; Golubchikov & Deda 2012; Persson & Grönkvist 2015; Webber et al. 2015) causes lack of interest among occupants, clients and professionals (Häkkinen & Belloni 2011; Golubchikov & Deda 2012; IEA 2013; Karvonen 2013; Webber et al. 2015).

3.2. Benefits of housing energy refurbishment

Apart from reducing energy use and emissions, energy refurbishment can result in other significant benefits, especially related to economics and comfort. Achieved environmental goals result in long-term benefits for national economy (Häkkinen & Belloni 2011) and contribute to energy security by increasing energy self-sufficiency, as well as decreasing vulnerability to rising energy prices (Sunikka 2006; IEA 2013; Webber et al. 2015). Sustainable refurbishment can rebrand the area,

attract investments and stimulate local economy, and including local people in the process can contribute to socio-economic development, employment, and social cohesion (Power 2008; Roininen & Oksanen 2011; IEA 2013; Webber et al. 2015). Achieved energy efficiency may result in reductions in energy bills, making payback periods for investments reasonable (Sunikka 2006; Häkkinen & Belloni 2011; IEA 2013; Webber et al. 2015; Aravena et al. 2016). Refurbishing improves the condition and performance of the building prolonging its lifecycle, increasing its value, and providing healthy and comfortable living conditions (Mickaityte et al. 2008). Gains in indoor temperature, air quality and ventilation, lighting, noise and acoustics, comparable to the level of new buildings (Baird 2015), increase residents' well-being and satisfaction (Sunikka 2006; Häkkinen & Belloni 2011; Webber et al. 2015; Baird 2015; Aravena et al. 2016). Both reduction in energy bills and increase in comfort are related to the issue of fuel poverty - refurbishment can contribute to make it affordable for low-income families to achieve comfortable living conditions (Golubchikov & Deda 2012; Hernández & Phillips 2015; Webber et al. 2015).

Social deprivation is often concentrated in certain areas (Reames 2016), matching those with run-down housing. Refurbishing this housing stock has the largest potential to become more energy efficient and attractive, as well as intervene in territorial equalities – these areas often face the need of also economic and social uplift (Power 2008; Golubchikov & Deda 2012; Neuvonen et al. 2014; Buhr et al. 2016; Gustavsson & Elander 2016; Reames 2016). They may suffer from segregation and stigma when the city has not been developed as a whole with e.g. city structure and mobility in mind (Strandberg & Lerme 2014; Buhr et al. 2016; Gustavsson & Elander 2016). In Latvia, where cold winters, energy-inefficient housing stock and fuel poverty provide huge potential for betterment (Bartiaux et al. 2014). In Sweden alone, there are estimated to be 300 000 of apartments in need of thorough refurbishment, remnants from the Million Homes Programme (Gustavsson & Elander 2016). Public and social housing sectors are called to step forward as forerunners and spaces for the markets to mature as the implementation is easier in situations with less owners (Meijer et al. 2009; Häkkinen & Belloni 2011; Chahal et al. 2012; Golubchikov & Deda 2012).

As this housing stock and its' population are fairly similar in such big masses, even small pilots have the potential to contribute nationally and internationally (Buhr et al. 2016; Gustavsson & Elander 2016). Even in the problematic areas across Europe look fairly similar, it is important to pay attention to the context. Standardized solutions and identical measures may encounter different

reactions from occupants (Tweed 2013). There are also large differences between countries in climate, building and occupancy types, economic and technological development, legislation, organisational structures, as well as historical and cultural practices and trust towards innovation, requiring a variety of approaches (Meijer et al. 2009; Golubchikov & Deda 2012; IEA 2013; Tweed 2013; Wilson et al. 2015). Specific local issues include aspects such as Eastern Europe's change from socialist to market system resulting in dispersed ownership structure, the amount of accepting occupants needed for refurbishments and potential rental increases, and an abundance of historically valuable protected buildings in some areas (EU-MODER 2016). In disadvantaged areas, the attention needs to be on the lower income residents' ability to cope with energy standards and regulations (Sunikka 2006; Galvin 2014; Golubchikov & Deda 2012), and offering social support and local support services for e.g. housing management(Winston 2009).

Larger developments make the tasks and decision-making more complex, but are generally accepted by residents, if well justified (Roininen & Oksanen 2011). District level refurbishment, in comparison to focusing on one building at a time, can result in cost savings due to one-off implementation costs and larger scale technological installations, and the return of investment may be better secured (IEA 2013; EU-MODER 2016). More people together can allocate more resources to better technologies and expert knowledge, and social learning offers a possibility for quality increase of the project (Roininen & Oksanen 2011). Service providers are usually more interested and committed to larger projects, disturbance occurs only once in the area (Roininen & Oksanen 2011), and shortening development timeline can accelerate energy refurbishment development (IEA 2013). District level approach also offers a chance to look at the development more holistically, taking into account different development aspects such as affordability, trust and security, mobility, as well as the attractiveness, value and viability of the area (IEA 2013).

The aforementioned benefits are sometimes called co-benefits, but actually often integral parts of comprehensively sustainable local development. Many of them benefits have potential, if emphasised, to make energy refurbishments more mainstream and accepted (Karvonen 2013; Bartiaux et al. 2014; Vlasova & Gram-Hanssen 2014). Mickaityte et al. (2008) see refurbishments to inherently consist of multiple dimensions, including technical, social, economic, architectural and cultural. Refurbishment reasons and goals vary from project to project, sometimes being energy reductions, sometimes social sustainability (IEA 2013). One dimension can trigger other

aspirations, such as district-wide urban renewal leading to simultaneous energy refurbishments (Sunikka 2006). It is important to integrate refurbishment to other socials issues (IEA 2013), such as long-term and financially sound housing company management (Gustavsson & Elander 2016).

Seeing the SB as a "combination of disciplines – a necessary package deal to prevent us from trade off effects" (Janssens & Van Dorst 2012) reflects the idea to recognise SD's different sustainability aspects and its requirement of inter-pillar linkages in solving sustainability issues (Gibson 2006; Murphy 2012). The sustainability aspects are interdependent and complementary, meaning that the true sustainability is found when these different aspects are integrated, and multiple, mutually reinforcing gains are found instead of trade-offs (Gibson 2006). Interconnections also often lead to secondary effects, making it important to treat sustainability aspects together (Gibson 2006). Ecological design measures can drive social aspects and vice versa, such as sun protection in housing linking to both thermal control and privacy regulation, or courtyard design affecting water control, recreation, safety, and interpersonal contacts (Janssens & Van Dorst 2012; Murphy 2012). Strandberg & Lerme (2014) suggest prioritising actions that support both environmental sustainability and general housing environment, such as urban farming. This reflects the purpose to, instead of using co-benefits as extra justifications for refurbishments, or making trade-offs between different development benefits, to link the interwoven dependencies in a bigger framework of urban renewal, housing policy, and the broad context of sustainability (Mickaityte et al. 2008; Golubchikov & Deda 2012; IEA 2013; Webber et al. 2015). The complex system behind refurbishment never was to be solved with simple explanations and policies (Karvonen 2013).

3.3. The residential dimension of housing refurbishment

Technological barriers are not the only, or even the most important barriers for sustainable refurbishing. Institutional and social barriers are more pressing, e.g. organisational difficulties in adopting new methods, stakeholders' lack of knowledge, and lack of commitment to a shared vision (Häkkinen & Belloni 2011; IEA 2013). This makes energy refurbishment more than a mere technological process, hence it cannot rely only on technological solutions (Golubchikov & Deda 2012; Gram-Hanssen 2014). The oversimplification of a complex challenge has led to unsuitable measures both from residential and environmental perspective (Gram-Hanssen 2014).

Refurbishments include multiple stakeholders with different access to power, as well as different skills, interests, and time perspectives (IEA 2013; Gustavsson & Elander 2016). Firstly, decision

makers with executive power span from the EU level to national, regional, municipal, and district level, including planners working in the public sector. This group is interested in long-term development in the fields of service provision, satisfactory and attractive development for business actors and citizens, and climate targets, making them an important stakeholder for the eco-efficiency goals of refurbishments (Kyrö et al. 2012). Secondly, the projects are backed up with institutional or private financial parties and investors. The private sector can include project developers and managers, consultants, designers and engineers, construction companies and contractors. Their interests lie in profitable business opportunities and experience gathering. Thirdly, there are local interest groups, such as environmental organisations and neighbourhood associations, and landowners and local businesses. Owners can be commercial, public, or private owners and residents. They are interested in cost-effective development of good living conditions. Lastly, the residents can be owner-occupiers or renters, tenure type affecting their interests and position in refurbishing processes. Residents can be represented by their housing cooperatives (HCs) and property managers, and often have a key role in the initiation, decision making and communication of the projects (Suschek-Berger & Ornetzeder 2010; Stambej & Linna n.d.).

Holistic planning requires the integration of different interests, practices, visions and goals between and within stakeholder groups (Gibson 2006; IEA 2013; Bartiaux et al. 2014; Neuvonen et al. 2014; Boström et al. 2015; Sharifi 2016) through cooperation, networking, communication, and effective management and leadership (Häkkinen & Belloni 2011). According to Häkkinen & Belloni (2011), new forms of communication and early involvement of all parties are in fact the most important changes when moving from traditional buildings to SBs. Gibson (2006) sees residents as committed to solve integrated problems of local development, uninterested in separating sustainability pillars. As refurbishments claim to consider sustainability in its comprehensive form and address multiple important social aspects, participation of residents is an integrated part of sustainable refurbishments projects (Suschek-Berger & Ornetzeder 2010).

Bartiaux et al. (2014) recognise four interdependencies in the context of refurbishments: technologies, institutionalised knowledge and rules, know-how and habits related to the works carried out in the buildings, and engagements of residents. To simplify, a refurbished house can be seen to constitute of the technological aspects related to the building itself, and the residential aspect focusing on the ones who inhabit the building. The latter is especially important in the

context of housing, which, being so closely connected to the quality of life of the people, has many social functions, such as providing shelter and being equally accessible to the lower income groups (Golubchikov & Deda 2012). Often the ones living in the house before, during and after the retrofit, are the same people, requiring attention to the human dimension (Gram-Hanssen 2014). For the resident, if anyone, the apartment is a home - not a technical artefact (Jensen et al. 2012).

There are at least two major reasons to not only focus on technological solutions - residential behaviour both in the adoption and use of refurbishment measures (Chahal et al. 2012; Brown et al. 2014; Gram-Hanssen 2014). Firstly, one reason to lower than potential implementation of refurbishments is its low acceptance among residents. This leads to some projects not being implemented at all, and low residential satisfaction in implemented ones (IEA 2013). And, according to Baird (2015:82), "buildings that perform poorly from the users' point of view are unlikely ever to be sustainable". Secondly, domestic energy use is to a large extent affected by residents' behaviours and practices. Users' improper operation of the building results in higher than expected energy usage and environmental impact, referred to as "performance gap" (Tweed 2013; Baird 2015). Residents have to be placed in the centre of the processes related to these two aspects (Chahal et al. 2012), but cannot be considered homogenous in either one. Individuals' energy use practices differ, as well as their attitudes towards and needs in refurbishments. Yet, many common, shared realities do exist, enabling research on the usual resident interests in refurbishments.

3.3.1. Engagement in refurbishments

Residents are an important stakeholder group. They might be positively or negatively affected by refurbishments, as well as positively or negatively affect them by bringing innovation, or trying to oppose the projects (Virtanen et al. 2005). Operating in the context of existing housing stock, the large amount of different owners may prove challenging when refurbishment needs to be accepted. Home is a very personal space, renovations thus being prone to conflicts with the residents when working on and in their homes changes the way they are used (Roininen & Oksanen 2011; Brown et al. 2014). A typical reaction from local people towards changes is negative, making it important to increase early participatory methods and acceptance of development. As (Lapintie 2002) puts it, the starting point for developments often is that changes are perceived as a disturbance to the residents, and residents' comments and complaints are perceived as a disturbance to the planners and decision makers. As seen in the context of urban sustainability and participatory planning,

Modernist and comprehensive-rationalist viewpoints on suburban planning have later been heavily criticized. The current refurbishment of these very suburbs can also lead to such aftermath, if the already existing residents are not taken into account in the process (Roininen & Oksanen 2011).

There are differences in local conditions and residents' attitudes towards refurbishing (Tweed 2013). Especially challenging from the residential acceptance point of view is owner-occupied housing with multiple different owners and opinions (Wilson et al. 2015), representing 70% of the housing stock and including more than half of the population of the EU (Eurostat 2014). When it comes to the needed resident acceptance rate, as well as the tenants' power, the legislation varies country by county. When refurbishing on a district level, the number of residents and different stances grows ever still (Kuronen et al. 2011). Planning legislation can significantly delay projects, if local actors and residents powered with complaint rights oppose plans (EU-MODER 2016).

Stieß & Dunkelberg (2013) outline different dimensions affecting residents' acceptance and engagement towards refurbishments: condition of the building and suitable occasions, sociodemographic situation and phases of life, attitudes towards housing and lifestyles, financial, technical, legislative, and information resources, and attitudes towards the process and end results of refurbishment. Similarly, Virtanen et al. (2005) discuss the level of stability such as plans to move away, sensitivity to changes and interests with regard to their house, and economic means and knowledge about refurbishments. The economic situation may vary greatly between an elderly, retired homeowner and an investor, and the interests with regard to the house may be different between a renter and one that has oneself built the house (Virtanen et al. 2005). Any special situation in life that takes the resident's energy and attention is likely be an obstacle for renovation interests – one going through a divorce, illness or job loss is likely to be much less interested than someone with abundant free time and savings (Virtanen et al. 2005).

Unawareness among unprofessional residents about the benefits of refurbishments, and prejudices against the affordability, reliability, and user comfort of new solutions and technology is a major barrier for refurbishments to be carried out (IEA 2013; Achtnicht & Madlener 2014; Aravena et al. 2016). More information is needed to raise awareness, knowledge, interest, acceptance and informed choices (Häkkinen & Belloni 2011; Persson & Grönkvist 2015; Aravena et al. 2016). Golubchikov & Deda (2012). Gustavsson & Elander (2016) remind that a negative reaction from residents may be more of a sign of badly conducted argumentation and discussion rather than a bad

idea. In their, as well as in Blomsterberg & Pedersen's (2015) study, the negative response from residents led to an architecturally more modest renovation, indicating that a badly communicated and prepared idea may lead to trade-offs. GM LCEA 2011 (cit. Chahal et al. 2012) raises information as a big barrier for individual's understanding of climate change and its solutions, specifically, the lack of interest and clear channels for information, and the provision of too much, inaccessible or conflicting and untrustworthy, locally irrelevant information. The critique towards information provision includes its limited effect on the ones already interested in reducing their energy use, requiring extra attention on the more challenging groups.

After residents understand the benefits, their perception are likely to change towards more positive (Miezis et al. 2016). The likelihood to choose ambitious energy refurbishments increased when residents were satisfied with information provision (Aravena et al. 2016) or the measures were introduced by a professional energy adviser (Stieß & Dunkelberg 2013; Achtnicht & Madlener 2014; Kastner & Stern 2015). Persson & Grönkvist (2015) found an increasing amount of people to be interested in energy and sustainability issues, and the passive house, once they were provided with information – a sign of a more conscious market emerging. Regulations such as eco-labelling, and economic incentives are ways to increase attention to refurbishments (Häkkinen & Belloni 2011; Karvonen 2013; Bartiaux et al. 2014; Aravena et al. 2016). Information hubs and training centres with educational programmes and qualification courses can be organised (Mickaityte et al. 2008; Meijer et al. 2009; Golubchikov & Deda 2012; Karvonen 2013). Authorities can be part of establishing the knowledge infrastructure and institutionalised knowledge can support residents' and contractors' know-how – still, social practices cannot be changed with laws or directives, but need sustaining common routines (Bartiaux et al. 2014).

Residents' acceptance of refurbishments vary according to their involvement in project decision making, higher involvement deepening the information processing (Kastner & Stern 2015). In a literature review about successes of eco-cities, Bayulken & Huisingh (2015b) found early and continuous, wide and deep stakeholder involvement and empowerment to result in participants' increased awareness of their impact and responsibility, as well as motivation and commitment, and more consensus on the environmental plan. Housing cooperative boards (HCB) need guidance in these challenging decision making processes (Chahal et al. 2012; Hauge et al. 2013). Residents'

acceptance is of key relevance to the success of major renovations (Blomsterberg & Pedersen 2015), and thus understanding homeowners needs, motivations and drivers, is crucial.

3.3.2. User behaviour and domestic energy use

Most refurbishment policies and building sustainability rating tools focus on the adoption of technological measures instead of sustainable occupant behaviour (Meijer et al. 2009; Gupta & Chandiwala 2010; Vlasova & Gram-Hanssen 2014; Baird 2015). Lemprière (2016) criticizes England's failed zero-carbon home agenda to have represented a weak form of EM, leaning on top-down control and focusing on technological solutions instead of behavioural change among homeowners. Residents are at the centre of energy consumption, it being largely affected by culture, individual lifestyles, everyday practices, behaviour and routines (Glad 2012; Karvonen 2013; Gram-Hanssen 2014; Vlasova & Gram-Hanssen 2014; Allouhi et al. 2015), as well as household size and occupancy patterns (Gupta & Chandiwala 2010).

Identical technological solutions in identical homes do not result in identical energy consumption, reflecting the context-specific interaction between the building and the resident (Gupta & Chandiwala 2010; Tweed 2013; Vlasova & Gram-Hanssen 2014; Baird 2015). This co-production of technology with its end-users combines the macro perspectives of energy efficiency goals with the micro perspectives of the households, and has to seek balance with regard to changing routines (Jasonoff 2004, cit. Glad 2012). Technologies may result in either increased or decreased control for residents (Blomsterberg & Pedersen 2015). Problems may be related to the ease of use, responsiveness, automation, reliability, maintenance, and guarantee, affecting feeling of personal control (Kastner & Stern 2015; Baird 2015). Residents and other stakeholders may have differing understandings of the extent of needed control, reflected by unsuitable technologies from residents' point of view (Blomsterberg & Pedersen 2015). Therefore, even before installation and teaching residents how the technologies are to be used, it is important to choose solutions that support residents' lifestyles, do not disturb routines or cause usability problems (Virtanen et al. 2005).

An important form of performance gap is the rebound effect, with energy savings smaller than expected as residents adjust their energy consumption after renovations by e.g. rising indoor temperature for comfort (Sunikka-Blank & Galvin 2012; Gram-Hanssen 2014). This reveals a problem of energy use overestimation before and underestimation after refurbishment. Calculations ignore user effect, as well as fuel poverty or energy insecurity - spending a high share of housing

income for essential energy services, resulting in lower than comfortable indoor temperatures especially in energy inefficient, low-income areas (Golubchikov & Deda 2012; Sunikka-Blank & Galvin 2012; Gram-Hanssen 2014). Unaware usage of and prejudices against technologies may also compromise their effect (Chahal et al. 2012; Lemprière 2016). Brown et al. (2014) found energy system and simultaneous practice change to result in apathy, resistance and discomfort especially among the elderly, who saw new technology as mysterious. These people often trusted their family members, friends and neighbours, instead of experts, in helping them with the new technology, and did not like being made to feel like a novice in their own home. Instructing residents with technology and sharing the experiences is important, as the stories and rumours of technology not working properly damage project outcomes and diffusion (Brown et al. 2014).

An example of a failed introduction of new technology to residents and a missed chance for social learning between professionals and tenants is the introduction of a new heating, smart metering and billing system in Ringdansen neighbourhood, Sweden (Glad 2012). The housing company did not support maintenance professionals, who were unable to advise residents about their behaviour, instead relying on technical fixes or dishonest tricks to make residents satisfied, revealing unsustainable communication practices. The technologies did not meet user requirements – they were difficult to find and residents did not know how to use them. Many did not know about an online feedback system, available in hard-to-understand technical terms in Swedish despite half of the tenants having another language as their mother tongue.

New energy saving technologies need to be more often implemented with the understanding of end-users' role (Jensen & Gram-Hanssen 2008; Gupta & Chandiwala 2010; Chahal et al. 2012; IEA 2013; Brown et al. 2014). Solutions to socio-technical questions need to be found in cooperation, requiring efficient communication between professionals and residents, as well as owners and tenants (Jensen et al. 2012; IEA 2013; Vlasova & Gram-Hanssen 2014). Residents offer an important expert view on their own apartments and energy use, strengthening innovation process for accepted and user-friendly solutions (Häkkinen & Belloni 2011; Baird 2015). Vlasova & Gram-Hanssen (2014) call for a process where residential practice shapes renovation practice and vice versa, instead of one-sided information flow typical to the techno-economic paradigm. Yet, even though homeowner-initiated DIY refurbishment fulfils this requirement, competing interests such as conventional practices and high norms of comfort may keep energy consumption

high. Attention needs to be on context-specific everyday practices combined with aspirations of lower consumption, such as facilitation of everyday practices with technical feedback.

One aspect is to address the issue of many people finding the concept of energy abstract and difficult to grasp (Chahal et al. 2012; Glad 2012) by making electricity more visible to the consumers by giving more feedback of the effect of their behaviour in comparison with others (Häkkinen & Belloni 2011; Golubchikov & Deda 2012; IEA 2013; Reid et al. 2015), for example through web-based smart metering systems or detailed billing (Stieß & Dunkelberg 2013). Glad (2012) suggests to start the communication from easy and visible energy saving aspects, such as water usage. Feedback instruments provide information of consumption, but personal energy advise incorporated into refurbishments provides information of how to reduce it (Stieß & Dunkelberg 2013). In district-wide refurbishment where some houses are left physically untouched, focus can be on harmonising existing practices towards more sustainable. Since the interest on energy issues remains low, preventing full potential of energy-saving measures to be realised, it is important to use the opportunity of energy retrofits to raise the energy awareness of the residents and promote behavioural change towards sustainable lifestyle (Allouhi et al. 2015).

3.3.3. Resident interests

The currently pressing renovation need serves as an opportunity to reconfigure the relations between residents and built environment (Karvonen 2013). Things important to residents in refurbishments are often unrecognised by other stakeholders and absent in the process (Tweed 2013). Understanding resident attitudes, motivations, interests, aspirations, perceptions, experiences, and practices of energy-related housing refurbishment before and after upgrades is needed in order to track the elements of success in relation with both residential engagement and sustainable outcomes of projects (Chahal et al. 2012; Bartiaux et al. 2014; Gram-Hanssen 2014).

There is critique towards the economic science perspective of residents as rational decision makers, unaffected and in isolation of the rest of domestic life. Rational choice perspective produces policies, regulations, incentives, and information provision focusing on the economics - possibly successful among already engaged residents but unlikely to result in wide changes due to the lack of attention to complex everyday decision making (Karvonen 2013; Gram-Hanssen 2014; Kastner & Stern 2015; Wilson et al. 2015; Reames 2016). Behavioural science has paid more attention to lifestyle, values, norms and habits (Bartiaux et al. 2014; Kastner & Stern 2015). Social practice

theory focuses on everyday collective social approaches to and practices of energy consumption (Tweed 2013; Bartiaux et al. 2014; Webber et al. 2015). It emphasises houses as homes and energy renovations as home improving (Wilson et al. 2015). Refurbishments compete with other desires people have for their homes, making it on one hand related to everyday lives (Gram-Hanssen 2014; Wilson et al. 2015), and a rare investment on the other (Kastner & Stern 2015).

Energy refurbishments can be promoted with environmental goals, but the residential perspective gives us insight of other more embraced priorities (Karvonen 2013; Stieß & Dunkelberg 2013; Bartiaux et al. 2014; Brown et al. 2014; Vlasova & Gram-Hanssen 2014; Aravena et al. 2016), often also important for sustainable development. These often directly experienced non-energy benefits (Blomsterberg & Pedersen 2015) may define residents' energy-related behaviour, giving insight of the trade-offs happening on the residential level of energy refurbishments. Studies have found residents emphasising different benefits, Kastner & Stern's (2015) review discussing them comprehensively. Regulations and policies, as well as surrounding social norms, create the context for decisions making. Social climate, norms, habits, values, and concern of social and ecological consequences affect people's awareness and attitudes towards environment and energy related questions, such as consumption and energy refurbishments, and thus the spread of refurbishments (Chahal et al. 2012; Bartiaux et al. 2014; Persson & Grönkvist 2015; Aravena et al. 2016). People have a tendency to act like others (Chahal et al. 2012; Hauge et al. 2013), and thus information, social learning, positive experiences, and social support play a role in energy investments.

Demographic factors are found to play a relatively small role in energy investments, in line with Aravena et al. (2016). Housing condition and location instead seem to be more significant variables. Decision maker dispositions include e.g. environmental attitudes, technical skills and experience, manner of decision making such as information seeking, and investment-related dispositions, such as awareness of energy saving potential and knowledge of the topic. Some residents may themselves be especially interested in the new technology refurbishment brings (Achtnicht & Madlener 2014), or be enthusiastic DIY renovators themselves (Bartiaux et al. 2014). Residents are mainly interested in how the solutions support their everyday life (Virtanen et al. 2005). Maybe the most important aspect is the belief about refurbishment consequences for the household, such as financial costs, operational and thermal comfort, independence in energy supply, installation effort, social consequences, house aesthetics, and health.

On the process side, residents are interested in communication and disturbance. Fear of disturbance, as well as related stress, are found to cause residents decide against refurbishments (Brown et al. 2014). Most residents feel that the renovations cause longer lasting and greater disturbance than imagined (Virtanen et al. 2005; Blomsterberg & Pedersen 2015). Instead of mere information provision, it may be useful to speak of communication, as it often forms a major problem in refurbishments (Stambej & Linna n.d.; Virtanen et al. 2005), affecting residents' adaption to changes. Roininen & Oksanen (2011) claim residents to appreciate information and broader interaction already as itself. Communication should not flow merely from top to bottom, but also from bottom to the top, as well as horizontally between and within the stakeholder groups. The HC has, as the representative of residents, a large responsibility in providing information and consider residential opinions in meetings and decision making situations (Virtanen et al. 2005).

3.3.4. Why participation?

Residential participation is often seen as time-consuming with many objections, reducing housing companies' or contractors' willingness to include residents in different phases of refurbishments (Suschek-Berger & Ornetzeder 2010). Yet, there are many justifications for involving residents. According to Gustavsson & Elander (2016), they follow two lines of thought, one focusing on governance, democracy and power, and the other on social capital, cohesion, and inclusion. The benefits are here divided to good governance, good ideas, empowerment, and community and identification, following the structure of Lawson & Kearns (2010).

Firstly, participation is considered a part of good governance (Lawson & Kearns 2010), as legislation often requires citizens to have a say on matters concerning them. According to Lawson & Kearns (2010:20): "Community engagement should both demonstrate democracy and contribute to democracy". Broad inclusion of social groups in decision making increases the accountability and legitimacy of decisions (Suschek-Berger & Ornetzeder 2010; Murphy 2012). It is believed that governance is more effective when implementations are based on supported shared visions of committed parties (Bayulken & Huisingh 2015b) instead of decisions coming from outside. Participation can lead to increased interaction and cooperation between municipalities, other stakeholders and residents, helping to make residents feel that they are listened to, and resulting in more self-confidence, trust in the system, and engagement in the developments (Lawson & Kearns 2010; Buhr et al. 2016; Gustavsson & Elander 2016; Holopainen et al. 2016).

An important challenge is to clarify the ambiguous tasks, roles and responsibilities of all actors, making power structures transparent (Stambej & Linna n.d.; Virtanen et al. 2005; Dargan 2009; Lawson & Kearns 2010; Glad 2012; VTT & ITL 2016). Resident participants need to know what is expected from them and how their contribution is going to affect. In a Swedish case, the housing company was both providing energy for resident clients, and expecting energy savings from them, (Glad 2012). Lawson & Kearns (2010) found the members involved in both housing committee and regeneration group to struggle with distinction of their dual roles. In Dargan (2009), community-based regeneration was negatively affected in form of hostilities and delays, as the resident members on participation boards had very different ideas on the purpose of residential participation. The study concludes that as different ways to participate do exist on range from aggressive confrontation and disruption to rationally and constructively conducted harmonious collaboration, they should all be accepted. Also Mouffe, (cit. Bäcklund & Mäntysalo 2009) emphasises the need for channels for passionate viewpoints to be expressed in a democracy.

The second aspect are the good ideas and sometimes unconventional innovations the residents bring. Residents of an area see it very differently compared to outsiders, and perceptions between residents also differ, as residents do not represent a homogenous group (Gustavsson & Elander 2016). Being experts of their own apartments and living styles, residents can point out their needs, resulting in well-informed planning where most suitable refurbishment solutions are being chosen (Virtanen et al. 2005; Suschek-Berger & Ornetzeder 2010; Chileshe et al. 2013). This results in more satisfaction and avoided costs, as non-working solutions are identified and usage of solutions can start faster (Holopainen et al. 2016). Local solutions take the area's characters and community benefits better into account than standardised ones (IEA 2013), but suitable scale needs to be kept in mind so that local needs work towards larger goals and not against them. Apart from local, experience-based knowledge, residents may also have related expertise that can contribute to the refurbishments (Virtanen et al. 2005) and communicating it to other residents. Bayulken & Huisingh (2015b) recognised "catalytic agents" coordinating stakeholder interactions, informed and engaged residents, as a success factor for eco-cities. Professionals and locals with connections to local networks can act as trusted activators and integrators between experts and residents, as well as carbon reduction goals and everyday domestic life (Karvonen 2013), and bring important local information to the process (Roininen & Oksanen 2011; Strandberg & Lerme 2014).

Thirdly, empowerment concerns residents' ability to have a real influence on plans and implementation, better understand the process, and trust the changes (Lawson & Kearns 2010). Apart from the process itself, there is potential to go beyond and ensure durability by developing locals' self-confidence, skills and networks (Lawson & Kearns 2010), sense of responsibility, and knowledge of how to influence one's surroundings (Gustavsson & Elander 2016). This can happen by introducing wider decision making processes an forums (Lawson & Kearns 2010), activating unemployed and teaching immigrants language skills (Gustavsson & Elander 2016), increasing awareness of relevant issues in the area (Holopainen et al. 2016), and offering chances for self-expression (Holopainen et al. 2016). There is potential especially in disadvantaged and disempowered areas. Gustavsson & Elander (2016) highlight the importance of strengthening the situation of locals instead of improving the area's image by only bringing in more affluent people.

Lastly, community and identification may increase by participating in the planning of one's living environment, and promote social inclusion, people's feel of home, and the pride of their house or neighbourhood (IEA 2013; Buhr et al. 2016; Gustavsson & Elander 2016). This is important for maintaining and creating sustainable communities that endure and are embraced after projects (Lawson & Kearns 2010). Many areas face the influx of immigrants, or otherwise are combined of a varied group of residents, and their interaction, mutual solidarity, and recognition of each other's needs can create social and community cohesion. Yet, regeneration is often seen rather as a threat for the sense of community in areas where it already exists, as people are not clear of the social changes and are afraid of displacement (Lawson & Kearns 2010).

3.3.5. Community-based energy refurbishment

An overly technological approach misses the point of early eco-cities to address the still prevalent social issues through participatory planning, civic empowerment and local democracy (Baker 2007; Rapoport 2014; Sharifi 2016). In early eco-cities, residents were often the developers, builders, and operators, whereas now the roles have dispersed to multiple actors (Jensen & Gram-Hanssen 2008). Jensen & Gram-Hanssen (2008), Chatterton (2013) and Boyer (2016) see possibilities in learning from the early eco-villages now that sustainable buildings (SB) are becoming mainstream. In Denmark, this mainstreamisation has resulted in the "eco" features being invisible to the extent of "ordinary" residents being unaware of living in a SB (Jensen & Gram-Hanssen 2008). EM implies and seems to enable sustainability to be pursued more widely in urban

environments rather than in small and rural niches powered by subsidies or engaged residents (Jensen & Gram-Hanssen 2008). The mainstreamisation is indeed desirable, but the issue of techno-economic paradigm paying little attention to the connection between environmental and social sustainability, participation, and education of residents remains, raising a question whether the developments can be considered truly sustainable (Jensen & Gram-Hanssen 2008).

The existing focus on efficiency improvements is insufficient to realise deep changes, turning attention to community-based projects with holistic, local, and participatory approach (Hielscher et al. 2011; Karvonen 2013). Firstly, the holistic approach combines activities such as energy advise and establishment for energy-saving culture, follow-up and resident evaluation, and events to share experiences, fostering collective support (Hielscher et al. 2011; Karvonen 2013; Reames 2016). Secondly, the local context is important for geography and legislation, but also with regard to the social side, such as people's experiences, expectations, abilities, practices, and the existing communication culture within the HCs (Suschek-Berger & Ornetzeder 2010; Karvonen 2013). Barriers are different in each case, and community-based, experimental, flexible and tailor-made approach can bring out otherwise overlooked solutions (Suschek-Berger & Ornetzeder 2010; Karvonen 2013; Reames 2016). In Lawson & Kearns (2010), residents felt the regeneration to even prevent the local issues of poor living conditions and social problems from being addressed. Thus it is important to gain acceptance from residents by addressing the immediate issues of the area (VTT & ITL 2016). By using local knowledge and promoting local networks and ownership of the projects, especially in disadvantaged areas, there is potential to empower locals (Hielscher et al. 2011; Reames 2016). Thirdly, the participatory approach, based on social cohesion and trust, helps to create a unified vision (Hielscher et al. 2011; Reames 2016).

The key aspects of early eco-cities and community-based refurbishments are focus on civil society rather than market economy, and social and environmental motives instead of profit (Hielscher et al. 2011). Alternative values and varied partnerships are also typical (Hielscher et al. 2011). Early eco-cities aimed for functional and social mix and self-sufficiency by using local sustainable materials (Jensen & Gram-Hanssen 2008). Sharing resources such as housing and appliances (Jensen & Gram-Hanssen 2008) in collectively managed systems instead of trying to affect individual attitudes and consumption on household level, was pursued with the support of strong communication and transparent conflict resolution, an important quality in planning practice as

well (Chatterton 2013; Boyer 2016). Communal forms of living and flexible apartments may offer solutions now that the average housing space and energy used per person is growing (Power 2008). Cooperative design and place-making support the creation of places that foster communal interaction and sense of community, and local ownership and self-determination support strong participation and empowerment (Jensen & Gram-Hanssen 2008; Chatterton 2013).

The difficulties to adopt social sustainability into projects emerge among all stakeholders, including residents. Social sustainability objectives often relate to people's experiences in long-term time spans, and can be affected by other external effects outside the scope of individual projects (Karlsson et al. 2016), making it difficult to shift the attention from the relatively tangible aspects of environmental and economic sustainability (Koch & Buser 2015; Marsal-Llacuna 2017). Koch & Buser's (2015) study finds that large Swedish contractors are willing to include social sustainability and participation into their functions, but struggling with limited understanding of SS in the midst of competing priorities such as profitability, failing to make it a business strategy.

Sustainability goals should be framed so that people see them as consistent to their valued way of life. Vallance et al. (2011) divide social sustainability into development, bridge, and maintenance sustainability. Development sustainability concerns equity, social capital, and access to decision making. Bridge sustainability encourages behavioural changes in transformative (e.g. change from suburban to compact living) or non-transformative forms, the latter not requiring fundamental changes between people and the environment (e.g. hybrid vehicles, renewable energy, double-gazed windows), reflecting the two environmental schools. Maintenance sustainability discusses the resistance people show when defending practices they want to see sustained or improved. There are tensions between different sustainabilities: between bridge and maintenance sustainability people's "wants" and environmental good, between development and bridge sustainability people's "needs" and the environment – here lies a potential to combine both in sustainable housing. A socially sustainable city is one where people want to live, and the sustainability project, especially transformative changes, might be seen threatening the preferred ways of living. In an eco-village, Boyer (2016) recognises transition in meanings, illustrated by the understanding of cars as components of community-scale transportation system instead of a private vehicle. Sharing economy is no alien term in contemporary urban settings either, and Boyer (2016) believes the key to sustainability to lie in collective resource management with cooperation and empathy.

4. Methods

To get an overview of the two paradigms forming the framework of the study, as well as the residential aspects of refurbishments, I conducted a systematic literature search using Scopus database for peer-reviewed literature, such as journals, books and conference proceedings. In addition, I used the bibliographies of relevant literature, as well as the recommendations of reference manager Mendeley and different publishers to find more literature and relevant documents. All my material has been accessible through the Helsinki University user account. The topics I searched, both individually and using different combinations, synonyms and related concepts, were: eco-cities, sustainable development and social sustainability, ecological modernisation, participatory planning, refurbishing and housing. I have focused on mainly new literature, and have deliberately searched for literature published after 2000 apart from some classic works. To limit the amount of literature found, I have in some cases focused on literature from the fields of Earth and Planetary Sciences, Social Sciences, Environmental Sciences, Engineering, and Energy, all fields of science defined by Scopus. I have restricted the territory to limit the amount of results when it served a contextual purpose, such as in the case of eco-cities that are multiple, but somewhat different, in Asia than in Europe. All material is written either in English or Finnish.

The research aimed to answer following questions:

1. What are the residents' purposes to refurbish and end result goals?
2. How do the residents want the refurbishment process to be?
3. What is the role of residential participation in refurbishments?

Following the principles of participatory planning, residents who had experienced an energy refurbishment, were regarded as knowledgeable of their situation, leading to choosing resident interviews to be the research method. The respondents in thematic interviews need to be chosen somehow else than randomly, and I required all the respondents to have experienced an energy refurbishment. Many types of energy refurbishments were accepted, ranging from energy improvements as part of pipe repair, to the installation of solar panels or geothermal heating, and cases where multiple energy-relevant interventions were implemented. I did not focus on any

particular residential group, such as HCB chairmen or members, but allowed any resident as respondents as I believed anyone would be able to offer important views on their experiences.

Altogether 9 interviews were conducted, each lasting approximately one hour, ranging between 45 and 75 minutes. Seven interviews were conducted on the phone, one through Skype, and one face-to-face. Two of the respondents (R1, R9) were contacted personally via email by the writer, and others were reached with the help of a person working in Tampere municipality and the EU-GUGLE project, via the property managers or HC chairmen. Just like in the study of Virtanen et al. (2005), it is possible that the respondents represent largely the ideas of people interested and active in HC work and refurbishments – the so-called lead users, who may represent future development trends. Although a small amount of interviews is not suitable for making statistical generalisations, they can provide deep understanding of specific cases, and give insight to larger structures of refurbishments. All respondents were introduced the topic of research and its status as a Master's thesis work for Planning Geography in the University of Helsinki, as well as a contribution to engineer consultant Sweco Finland Ltd.'s share in the European Union EU-MODER (H2020 EeB programme project: Mobilization of innovative design tools for refurbishing of buildings at district level) project. Respondents were aware of the confidential and anonymous nature of the information, and everyone agreed to recording and use of quotes.

The interviews followed the structure of a thematic interview (Saaranen-Kauppinen & Puusniekka 2006), in which the discussion does not flow completely freely, nor are the questions fully pre-decided, but still follow a loose structure built around different themes emerging from the literature. The suitable themes were formed on the basis of a large amount of literature. In case of less talkative respondents, the interview may have to some extent resembled a half-structured interview, as I leaned to questions written beforehand. There were some main sources that I used to form the research questions (Virtanen et al. 2005; Gupta & Chandiwala 2010; Bartiaux et al. 2014; Aravena et al. 2016; Holopainen et al. 2016; Miezis et al. 2016).

The questions were divided into four categories: firstly, background information of the respondent and house, secondly, the refurbishment including e.g. motivations, worries, stages and final result, thirdly, participation, e.g. information provision, width and depth, and fourthly, environmental attitudes. There was a large list of questions under each theme, but not all questions, or the same

questions, were asked from all residents. The order of the questions loosely followed the order described above, but exceptions were made when residents themselves moved to another theme.

The background information did not include details about the socio-economics of the respondents, as other things were thought to have a more significant importance in refurbishments, based on the literature, and as the focus was on the refurbishment process. The interview started with easier questions that aimed to get to know the situation of the respondents, as well as their relationship with the area and the house. The questions about environmental attitudes were placed at the end to avoid them influencing people's explanations of reasons to refurbish, just like was done in Bartiaux et al. (2014), as well as for the reason that value questions might be perceived as difficult to answer.

The audio-recorded interviews were transcribed and done analysed with Atlas.ti software, meant for qualitative content analysis. The themes used in the interviews, although not straight corresponding the research questions, helped to group the material under codes 1-3, corresponding the research questions. Under theme one, the residents' different motivations and goals considering refurbishments' end results, were first grouped in detail into bad condition of the building, savings, value increase, investment, comfort, visual aspects, easiness of solutions, technology, shared versus own systems, and energy saving. They were then further divided into three larger themes of economic reasoning, quality of life, and energy and environment. Under theme two, process phases compiled from literature were used in coding, and further codes merged under these process stages included different aspects of interest, such as disturbance, replicability, and strategy. Under theme three, further codes included e.g. residents' participation in HCMs and other social activities, but the main codes were different residential types, such as the old, renters, and women. These residential types were often discussed in relation with challenges, which helped to form four challenging resident types. As the goal of the study was to form a process model for successful refurbishments, with special focus on residential participation, the themes discussed under each research question were included to a process model for successful participatory refurbishments. The data will be illustrated by resident respondents' quotes.

5. Analysis and discussion

5.1. Basic information about interviewees and housing cooperatives

The nine respondents were from five HCs in three municipalities. Each respondent was an owner-occupant living in an apartment house. Five were retired, two employed, one unemployed and one on a long sick leave. There were two HC chairmen, one vice chairman, three HCB members, one vice member, and two non-members, one having previously been a chairman. Four respondents were active in their locality, ranging from membership of the Finnish Real Estate Federation to energy expert training, promotion of infill building, and activity in the local entrepreneurship organisation and resident regeneration workgroups. Five respondents were men and four women. The building year of the houses varied from 1928 to two being built in the 60's, one in the 70's, and one in 1980, mostly fitting to the era of rapid housing construction. Seven interviewees were part of EU-GUGLE, a project that funded parts of energy refurbishments. One interviewee belonged to Climate Street project, and one was not part of any project. This information, as well as the exact energy measures conducted in each house, are presented in Table 1.

EU-GUGLE (EU-GUGLE 2017) conducted energy refurbishment in eight buildings inhabited by 560 people in Tampere, Finland, aiming to 40% reduction in primary energy consumption. The project has paid attention to sharing results between the residents, municipality, contractors, and experts, resulting in hundreds of visitors in pilot houses. The energy expert training organised by many actors includes education about e.g. heating systems, ventilation, solar energy, electricity and water consumption, waste, as well as refurbishment, joint building and infill building. The Climate Street project (Ilmastokatu 2017) in Helsinki and Vantaa, Finland, is organised by both cities' environmental departments, Green Building Council Finland, Helsinki Region Environmental Services Authority and Aalto University, and partly funded by the European Regional Development Fund. The project has been inspired by similar examples in Amsterdam, Cologne and Copenhagen. It aims to use the opportunity of district refurbishment to promote environmental aspects in housing and business in the area, in cooperation with local residents and enterprises. The project emphasises its experimental nature in trying out new energy and cooperation solutions, examples including solar electricity, green yards, small innovative energy solutions, energy auditing, experience sharing, and strong participatory focus with local workgroups.

Table 1. Basic information about respondents and housing cooperatives.

Respondent	Housing cooperative	Municipality	Employment status	Position in housing cooperative	Residential activity	Year of construction	Project	Content of refurbishment
R1	HC A	Akaa	retired	chairman	member of Finnish Real Estate Federation	1966	no	2014: Change from oil heating to geothermal heating, 2010: new windows and balcony doors 2015-2016: Pipe repair, electrical work and telecommunications, new front doors and car shelter doors, possibly heat recovery, 2009: facade renovation with insulation, new windows and balcony glasses
R2	HC B	Tampere	employed	no	no	1973	EU-GUGLE	Heat recovery, heat centre updates and balancing, new windows, front doors and car shelter doors, insulation of car shelter roof, LED lighting and motion sensors to hallways and car shelter, timers for car heating, 4 points for e-car charging. Further plans for geothermal heating, solar electricity, sewage heat recovery, individual cooling, new ventilation valves, selling heat to the grid first in Finland
R3	HC C	Tampere	retired	chairman	infill building of the area, in the board of Finnish Real Estate Federation, energy expert	1980	EU-GUGLE	heat recovery, new windows and balconies, facade renovation and insulation, new car shelter doors, motion sensors for lighting in hallways
R4	HC D	Tampere	sick leave	no, previous chairman	no	1968	EU-GUGLE	
R5	HC C	Tampere	retired	vice chairman	energy expert	1980	EU-GUGLE	HC C
R6	HC C	Tampere	retired	member	no	1980	EU-GUGLE	HC C
R7	HC C	Tampere	retired	member	no	1980	EU-GUGLE	HC C
R8	HC D	Tampere	unemployed	member	no	1968	EU-GUGLE	HC D
R9	HC E	Helsinki	employed	vice member	Local entrepreneur organisation, resident working committee of the project	1928	Climate Street	In apartment: motion sensors for lighting and plans for shower timers and water compressors, in house: solar panels, in area: energy aspect present in the renewal of the street

5.2. RQ 1: What are the residents' purposes to refurbish and end result goals?

It was clear that not all residents saw refurbishments, let alone energy refurbishments, as something that was needed or useful. Still, refurbishments were conducted and the interviews revealed many different interests regarding the motivations, here divided into economic reasoning, quality of life, and energy and environment. Only R9 saw increasing participation and sense of community as a clear goal and benefit, revealing a need to more strongly connect participation with refurbishments in the minds of residents. The variety of different interests proves that it is useful to conduct research about them in each locality in the beginning of refurbishments, and thus open a dialogue between different stakeholders and provide residents an opportunity for input (Hauge et al. 2013).

5.2.1. Economic reasoning

The themes of savings, investment, and value, were grouped under economic reasoning, a topic emphasised especially in economic science. As R7 says, heating costs are a large part of living expenses in the northern latitudes. Monetary savings resulting from decreased usage of district heating were the main experienced benefit of refurbishment in HC A and HC C, achieved with geothermal heating and heat recovery. In HC C, the usage of district heating had dropped by 70 % and heating costs by 50 %, and all the respondents mention savings and the effect on living expenses to have been a major motivation to refurbish. R7 says that money talks, and appreciates the fact that savings have enabled relatively low living costs in the neighbourhood. R5 tells that he, as a stingy man, is extremely happy with the unexpectedly good results.

R5 continues to explain how the savings have enabled the HC to keep the maintenance cost stable and collect funding for planned further refurbishment, and in HC A a similar situation enables to loan to be paid back with savings. Especially R1 and R6 talk about the monetary savings as investments. R6 points out the necessity of such actions to stabilise living costs in the time of constant increases in electricity and water prices, and considers this cost-efficiency to be the main benefit of the refurbishment. The findings reflect previous studies, where strategic refurbishments are found to have the potential to result in savings in utility bills and stability in maintenance and living costs (Virtanen et al. 2005; IEA 2013; Gustavsson & Elander 2016), and the will to lower increasing energy expenses (Gram-Hanssen 2014) to often be the most important motivation for residents to refurbish (Achtnicht & Madlener 2014; Aravena et al. 2016).

R2 has become more interested in cost savings as a result of the feedback provided by individual water billing. One's own situation can greatly affect the interest to savings – R6 has found energy saving to be a great way to save money after her unemployment. The effect of savings needs to be waited for (R1, R4, R8 and R9), and therefore it is necessary to include other concrete benefits to increase residential satisfaction. This is especially clear in HC D, where both R4 and R8 are looking forward to the savings, as not many other benefits have been achieved as a result of the refurbishment. Galvin (2014) warns that claiming refurbishment to always be economically viable can be overestimated, resulting in unnecessary blame for careful homeowners. Overestimations exist due to ignorance of building characteristics, full refurbishment costs, rebound effect, and long-term investment risks related to changes in life situations. Galvin (2014) calls for focus on other motivations and refurbishment promotion with economic viability only when they truly are viable, such as simultaneously with other renovations.

R1 mentions that a house buyer saw it as a good investment to buy a refurbished house with geothermal heating. Similarly, R4, who is currently looking for a new accessible home, has been pleased with the way HCs are paying attention to energy efficiency, its savings, and stable maintenance costs. In HC C, respondents mention the line of people asking for apartments on sale in their house, reflecting increased desirability as a result of refurbishments. It seems that energy refurbishments might have become a selling point for houses, as Hauge et al. (2013) and Persson & Grönkvist (2015) believe to eventually happen. Yet, R2 believes that refurbishments do make selling the apartment easier, but the investments cannot be fully added to the selling price. She is suspicious of the potential of energy refurbishments ability to affect the desirability of the area, as it already is the place where people want to move.

> *"It is not like the fact that the windows have been insulated and there's better doors will make the area desirable as it is already."* – R2

The rising value of the apartments is a considerable benefit for R6 and R9. R4 had heard from familiar real estate agents about value increase, and R8 believes that investors can increase rents as a result of refurbishments, and that improved looks can enhance the building's desirability as it stands out from its un-renovated surroundings. R9 refers to research showing value increase as a result of solar panel installation, and considered refurbishment to be an image lift for the HC, supporting a claim that social consequences such as status and image play a role in refurbishments

(Stieß & Dunkelberg 2013; Kastner & Stern 2015). R9 wonders why people are not more interested in the biggest investment of their lives – the apartment.

An aspect not very visible in the interviews, possibly due to lack of renters as respondents or focus on other than disadvantaged areas, is the other side of development. Fear of increasing living costs due to rising rents, utility bills, or maintenance cost, is an important refurbishment barrier (Brown et al. 2014). Refurbishments should be profitable to be implemented, as well as increase living quality, but on the other hand respect housing as a citizen right (Strandberg & Lerme 2014) and keep living costs competitive in the area (Virtanen et al. 2005) and affordable for existing residents (IEA 2013). The issue is connected to environmental gentrification, where low-income locals paradoxically resist sustainability enhancements and regeneration in the area fearing to be replaced (Lawson & Kearns 2010; Checker 2011). Certain areas should not be developed at the expense of others to avoid segregation (Strandberg & Lerme 2014), and low-income area development needs to be sensitive to the aim of increasing property value and risk of sacrificing current residents' local identity with displacement (Strandberg & Lerme 2014; Gustavsson & Elander 2016).

The cost of refurbishment, although related to the process rather than end results, will be discussed here as it is so tightly connected to the investment aspect. Residents are often financially unable to invest in major refurbishments, and worried of unpredicted costs or not getting return for their investment (Karvonen 2013; Achtnicht & Madlener 2014; Aravena et al. 2016). They find it difficult to connect with abstract long-term targets, preferring short-term focus and short payback periods, especially in case of older residents (Kyrö et al. 2012; Achtnicht & Madlener 2014). Residents may be put off by unavailable credits and complex funding structures, needing more flexible funding options and information about subsidies and grants (Virtanen et al. 2005; IEA 2013; Achtnicht & Madlener 2014; Aravena et al. 2016). Aravena et al. (2016) find that after experiencing e.g. comfort benefits, the importance of economic variables as motivation lowered. Renovations and refurbishments are necessary sooner or later, and the costs of not addressing issues in the living environment may be much higher than investing now (Buhr et al. 2016).

The costs caused, if not resistance, many questions, in most HCs. When a loan was taken, residents could either pay their share straight away or bit by bit. HC E, due to the house's status as a company rather than a HC, was able to get state funding – a practice R9 suggests to be extended to HCs. HC E also had a possibility for free energy check in the Climate Street project. Most houses were part

of the EU project, enabling them to get a large part of the investment sum payed back by the EU – a considerable driver for the houses participating. In HC C, there were differing opinions about the necessity of EU funding – the chairman driver was sure they would have done it anyway, another respondent believes some solutions came as an extra through the funding, and two others believed the costs would have otherwise been too high or that the technology still served its purpose. Especially in HC A, the costs were bargained in many instances – by demanding discount for delays, and by becoming a reference spot for the contractor. Residents wish predictability, and in HC C, there was distrust towards the major funder, the EU. HC A partly chose the contractor because of their fixed price. An interesting option considered in HC D was to use infill building to create capital for refurbishments, a suggestion made also by Virtanen et al. (2005).

Some respondents mentioned the expertise to sometimes drive over the wish to save in costs, a result also found by Roininen & Oksanen (2011), in whose study the residents wanted a professional, domestic contractor to avoid black market and to achieve a beautiful final result. HC A spent more money on an experienced property manager, and more resources on gathering information themselves, to not hire an outside planner. HC D chose a more expensive domestic contractor, which they later were happy about as a building refurbished by another contractor was later found to be mouldy, and demolished. R1 tells about a neighbour, who did the same change to geothermal heating, but saved in a wrong place – a worse contractor brought along problems in the start. They themselves chose the most convincing, yet not the cheapest, contractor.

5.2.2. Quality of life

Themes considering necessity to renovate due to bad condition of the building, comfort, visual look, easiness, technology, and own versus shared systems all relate to a larger aspiration of better quality of life. In two HCs (HC B, HC D), the building condition was so bad that deep refurbishments had to be done, a fairly common reason to refurbish according to Stieß & Dunkelberg (2013), who found two thirds of researched residents to refurbish due to necessary maintenance work. R2 tells they had already experienced water cuts due to leaking pipes, and latest by the time old pipes were visible on the yard it was clear they needed to be replaced. In R8 tells the condition check of the house revealed the building to be in much worse condition than expected.

> *"The balconies were in such bad condition that we could only use them with special permission. - - Even the contractor was terrified of them about to fall apart."* –R4

R8 became convinced of the refurbishment need when told about the weakness of the concrete.

> *"It came to my mind that we are located on the same rock they are exploding now with the tunnel construction. How long will the building restrain? I have never seen a collapsed building but since I have a wild imagination…"* –R8

Refurbishments aim to affect indoor air temperature, humidity, draughtiness and freshness, as well as lighting, security, noise and acoustics (Baird 2015). The interest of comfort seems to appear more in connection with real or potential problems than pre-existing motivations to conduct refurbishments. R2 is an exception, and she appreciates the possibility to install more sockets to ease modern life full of technical appliances, as well as the new bathroom that corresponds modern standards with its new shower, ceramic tiles and lighting. Also R4 is happy with the new windows that insulate sound traffic, which has increased as a result of the construction of a new car tunnel. In Tweed (2013), new triple-glazed windows were appreciated by residents, not mainly for their environmental-friendliness, but the security their sound insulation provided, reflecting the importance of immediately experienced benefits.

R1 mentions comfort as a key resident interest apart from costs and savings, and considers expertise in technological planning to be of importance to ensure heating and warm water. During the first winter before automation, the system could not keep up with dropping temperatures, affecting thermal comfort. R1 also mentions the noise from compressors that has now reduced to a level that does not disturb. Most respondents from HC C mention solved problems related to thermal comfort. R7 tells that after refurbishment they had some discomforts regarding temperature balancing, but that they have now been solved. R5 mentions the benefits of heat balancing, but believes some elderly people would wish for a warmer home that they have to get with their own means as the house will not be heated overly warm now for cost and health reasons. As Blomsterberg & Pedersen (2015) point out, the understanding of what constitutes a good indoor environment may vary between housing company and residents. R6 has had larger heaters installed for her apartment which has increased her thermal comfort. The chairman of HC C, R3, believes elderly residents are mainly interested in the apartment staying warm and that the life keeps moving on normally.

Comfort is an especially important topic in HC D, where the refurbishment has caused major discomfort, ventilation system causing cold air in some apartments, draughtiness, noise and as a

result of trying to solve the problem with decreased air-conditioning, also stuffy air – a problem recognised also by Blomsterberg & Pedersen (2015).

> *"And as I have stayed days at home and cannot move, so for example when sitting on the sofa I feel really cold. Then one day I got angry and decided to put our digital thermometer on the spot in the living room. It was a few degrees sub-zero and wind came from the south and it was blowing air of 5 degrees inside."* –R4

> *"The ventilation system on top of the windows is moaning – one old granny says it is playing the organs of the underworld."* –R4

> *"When the first north wind came in the autumn, I was sitting with a down coat on, working on the computer in the corner of the bedroom."* –R8

> *"Sometimes I feel like I cannot get oxygen and I rush to the balcony to gasp air. The laundry does not dry in a night and sometimes when I come home there is a wall of stuffy air waiting. If that could be fixed… I have chalked it up to my sickness, bronchitis and sinusitis. I did not use to get the smell of neighbours' cooking but now in a few evenings my eyes have smarted from the garlic odour."* –R8

In case of R9, comfort is a major part of the renewal and facelift of the Climate Street, as residents try to create a nice and safe walking street with delivery traffic only on one side of the street, and plan the location of rubbish bins, benches, lighting, tiling, plants and urban farming.

The visual aspect, especially important in case of historical buildings, is discussed by R4 and R8, who praise the new beautiful looks of the house, a reason for good feedback from neighbours. Both R4 and R8 recall the colour options given to the residents in the planning and decision making stage, and R4 mentions that the colour of the façade was something they could not affect, and that they even argued about it at home, reflecting the importance of visual looks in refurbishment. Although R4 is now happy with the beautiful house, she states that you cannot make old become new, possibly referring to the undesirable end results with regard to indoor comfort. R8 remembers how a neighbouring house was standing out from its environment after refurbishment and wishes the same for her own building. This corresponds the finding of Hauge et al. (2013), that residents are curious of other projects in the neighbourhood, and want the same quality and value for their houses. The good looks of the work are also praised by R1, as his house works as a reference site.

"Before our house looked like it was built in Yugoslavia, old as it was. It looks much nicer now from outside." –R4

"I dare to show the good work to anyone. Last time when the fellows came and I opened the door they said it's like coming to a laboratory. The place is almost shining now that it has been painted." –R1

The ease of maintenance of new solutions is praised by R1 – a service man only needs to visit once a year, and R9, who tells that the only and easily solved worry of the residents was how the solar panels are cleaned of snow. R1, R5 and R9 speak about the automatization of systems and web-based remote control, which affects the easiness and speed of temperature control. R4 and R9 mention the possibility to observe the boiler room and energy production systems online from own computer. R9 also wishes for a digital information screen in the hallways to spread this knowledge. The two chairmen respondents (R1, R3) were both interested in the technology in the field of energy efficiency and housing, and both recognised the new possibilities that technological development offers for energy refurbishments.

From the point of view of participation and sense of community, an interesting aspect of residents' interests regarding end results is the wish for either own or shared systems. R1 preferred to have their own geothermal heating centre instead of a shared oil heating with neighbours, as the social network made it difficult to agree on maintenance. R9 on the other hand sees it as a benefit increasing the quality of living that the future yard renovation will combine the resources of three houses with common recycle room and bike shelter, and hopes that on Climate Street level the combination of people's resources with regard to waste management will reduce the traffic on the street. R8 also mentions to have noticed neighbours enviously holding onto their own renovations, which could be a barrier for district-wide common engagement.

5.2.3. Energy and environment

Even though environmental motivations are a recognised driver for households to refurbish, they are of relatively little concern compared to economic and comfort motivations (Chahal et al. 2012; Achtnicht & Madlener 2014; Blomsterberg & Pedersen 2015; Aravena et al. 2016). Residents do not clearly differentiate energy renovations from standard ones (Blomsterberg & Pedersen 2015), and may not have specific interests or skills, leading to ignorance or resistance of related information (Gram-Hanssen 2014; Chahal et al. 2012). This reflects the role of energy in everyday

lives – often discussed only in relation to the comfort it enables or the price it costs (Tweed 2013). Environmental motives may not be enough to accept refurbishments, but concrete benefits in living environments are more acceptable justifications (IEA 2013; Blomsterberg & Pedersen 2015). In Reames (2016), direct connections between environmental goals and the socio-economic concerns of a low-income community were made by making environment the baseline, but quality of life the emphasised factor. The following results are in line with previous literature, although respondents also included very environmentally aware residents committed to the energy goals.

There is no sign of compromises at the expense of energy efficiency in the HCs interviewed. HC A, HC C and HC E were pioneers in energy efficiency solutions, all of them either already planning or keeping the options open for further solutions. Although HC C had many types of residents, from R7 being interested in energy matters solely for the bills he has to pay, to R6 for whom renewable solar energy was a motivation as itself, all respondents were aware of planned future refurbishments. In HC E, environmental friendliness is at the core of many solutions in apartments, house, and Climate Street, and R9 is hoping to reduce carbon footprints and emissions. The goals are reflected in the personal energy advice offered for the residents, which in the respondent's house included installing motion sensors on lighting, and discussing recycling and planning timers on showers, as well as water compressing solutions. In no case were the energy matters the only motivations or benefits in refurbishments, reflecting the insufficiency of energy aspects alone to motivate residents, or refurbishments always bringing along also other attractive benefits.

Infill building is often linked to compact and energy efficient urban form, and although not separately discussed, it came up in several interviews (R2, R3, R8). R8 mentions that the EU funding was preferred by residents instead of through infill building. R2 appreciates the spacious surroundings in the neighbourhood, and mentions that the city cannot do much for infill building as it does not own the plots. R3 instead is active in promoting infill building.

Each resident has different attitudes towards energy and environmental questions, here discussed as environmental profile. It is difficult to divide respondents into groups representing strong or weak stances to sustainability, but I will discuss them in an order that describes whether the environmental aspects have been the main interest of the refurbishments, following the logic of Stieß & Dunkelberg (2013), who formed "standard" and "energy" groups. The standard group was more pragmatic in their aspiration for a nice and functional home, whereas the energy group had

more comprehensive motives including savings in heating energy and related and operational costs, install new technology, increase property value, as well as climate reasons, which Kastner & Stern (2015) have recognised to include many aspects, such as feeling of responsibility to protect the environment, level of climate pessimism, and connectedness with nature.

To start with the group resembling the above-mentioned energy group, there are R6 and R9, who have actively been promoting solar energy in their houses. They both think about energy a lot, R6 refraining from useless use of TV and computer, and R9 talking about it daily at home, turning off lights after children and planning family trips with his electronic car. R9 thinks a lot about what kind of an environment we will leave to following generations, and advises friends who do not sort their waste. They actively follow environmental discussion in different medias, and R9 is worried of the political direction the climate policy has taken after Trump's victory, sharing his worry with family and neighbours. They both strongly believe in individual's effect on environmental matters, and R9 especially emphasises the power of a community with a shared goal. R9 thinks anything else is an excuse, and emphasises the importance to try things, and even fails sometimes.

R1, R3, and to some extent R5, represent technically skilled, strong drivers in their HCs, with significant positions as chairmen, or as members of HCB. All of them were very interested in monetary savings, but greatly contributed to energy goals as well. R3 and R5 are trained energy experts, actively thinking of solutions for their house and advising residents in water usage and ventilation. R1 says that in energy refurbishments, one has to think of one's own stand on how energy is being saved, but finds the question about environmentally sound living difficult and not relevant for himself. R3 sees his work in energy refurbishment to be connected to the everyday relationship with and interest on energy. R3 also sorts his waste and tries to walk instead of using the car, and has a strong nature relationship judging from his mentioning of fishing trips. R3 says energy has become an obvious, yet not so discussed, part of everyday life for his family, and he aims to live saving the environment. R1 sees following environmental discussion as general knowledge, R3 is especially interested in technological aspect, and R5 pays attention to local environmental and energy matters – something easier to grasp than abstract problems out in the "world" (Hauge et al. 2013). All three believe in individuals' and community's power to have an effect. R1 and R3 say that sometimes ones individual effect may feel small but that everyone has to do their bit and especially communities can have a concrete and fast effect.

Other respondents resemble the standard group. R2 and R4 were committed to energy saving goals just like other residents, R2 reminding it was a requirement for the EU funding. Both R4 and R8 pay great attention to sorting waste, R8 also lecturing friends who do not, as well as her mother about constantly turning lights on. R8 has a humble lifestyle apart from her car, and after unemployment, she tendered electricity companies and changed her lamps to energy saving ones. R4 mentions the new hybrid cars as unreachable for normal consumers. R7 mainly thinks about energy in the form of the bills he needs to pay. R2 does not uselessly keep lights on or drive her car, and individual water billing has made her a more conscious water consumer, proving the potential of energy consciousness and conservative consumption when bill savings are possible (Hernández & Phillips 2015). R4 and R8 do not specifically follow nor avoid environmental discussion, but R4 has paid attention to the positive development of HCs attending energy issues. R2 instead follows environmental discussion on a general level as she has studied a related degree, and R7 clearly links the refurbishment to reductions in district heating consumption and carbon footprints, things people are now more aware of due to constant media attention considering the state of the environment. R4 and R8 believe in individuals' and communities' effect, R8 referring to small streams becoming big rivers, and everyone having to do their bit like ants carry straws to their nest. R2 and R7 are more pessimistic, R7 saying everyone can have an effect on their small part, and R2 believing individuals to have a limited effect but bigger factors lying somewhere else.

It seems that the strong confidence on climate action plays a role in residents' positive attitudes towards refurbishments, like Hauge et al. (2013) suggest. It is also clear that the residents for whom energy saving is not the main goal, can be acceptant towards refurbishments for their other benefits, or because of requirements related to funding. The environmentally friendly practices seems to be a complicated topic – respondents less interested in environmental protection may live a modest life or be strong drivers of technical energy refurbishments – possibly with a strong nature relationship. In fact, it rather seems that there are many ways to be committed to energy reductions, with some respondents finding the effect in everyday life gestures such as sorting waste, and others rather from promoting large refurbishments. For this latter group of mainly strong and technically skilled (male chairmen) residents, the idea of refurbishments as building engineering may be easier to handle than requirements to change their behaviour. This evokes an idea of dividing residents into segments, further discussed in the context of challenging residential groups.

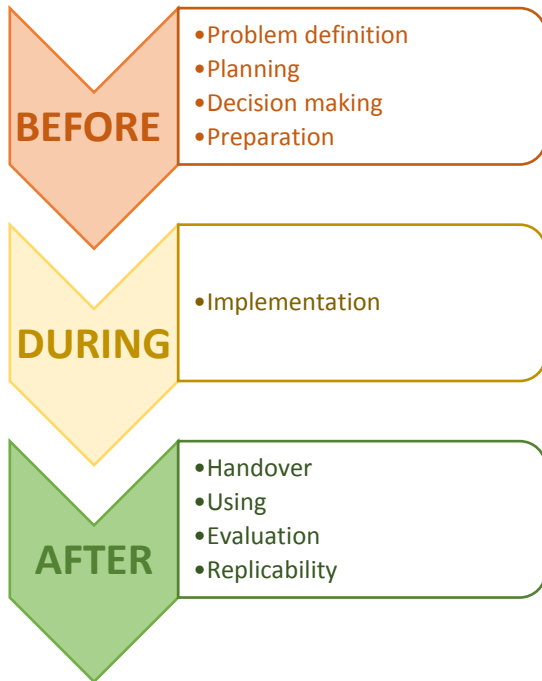## 5.3. RQ 2: How do the residents want the refurbishment process to be?

Figure 5. Phases in refurbishments.

In this chapter, resident interests regarding different process stages will be discussed. The issues of residents not accepting refurbishments, not feeling like they have a chance to affect them, and not being satisfied with the end results, are all related to the stages before, during, and after refurbishments. Refurbishment processes, especially district-wide, may be complicated and anything but linear, and the amount of stakeholders may vary in different phases, requiring flexible methods of co-creation (Holopainen et al. 2016). Still, clearly built phases help communicating residents what is going to happen in the process (Stambej & Linna n.d.).

The stages (Figure 5) have been compiled with the help of literature, but include more detailed description of the phases after refurbishment, as this was often completely missing (Stambej & Linna n.d.; Virtanen et al. 2005; Mickaityte et al. 2008; Suschek-Berger & Ornetzeder 2010; Olsson et al. 2015). As residents are mainly interested in affordable, disturbance-free refurbishments with good results regarding their living environment, the implementation phase is often the focus. Yet, Olsson et al. (2015) note the early phases, as well as the follow-up, to be the ones where refurbishments most differ from new construction. It is during these stages, especially ones before refurbishments, where resident interests can be set as goals and the participation potential realized.

5.3.1. Problem definition

When it comes to motivating examples, many respondents, especially in HC A and HC C, had been actively following the real estate and refurbishment field, therefore being aware of approaching refurbishment needs. The needs were also clear for R4, who had heard of houses in the municipality having had refurbishments postponed so that they eventually had to be demolished. R9 referred to other similar European examples in carbon footprint and emissions reductions, but the EU project members where ahead of other countries and could not therefore use examples within the same

project. In HC A and HC C, the contractor's previous sites were heard through the Finnish Real Estate Federation or visited, and the EU project members in the neighbourhood had visited also each other's houses. R2 had followed her son's detached house renovations, R1 had gotten the idea for geothermal heating from his mother's house, and R6 and R9 referred to their own or relatives' good experiences with solar panels. These examples reflect the importance of trusted, informal knowledge networks as refurbishments relate to not only technology, but also trust and friendship (Karvonen 2013; Stieß & Dunkelberg 2013; Bartiaux et al. 2014).

In case of HC D and HC B, the refurbishment was preceded by a condition check and a free energy efficiency check, respectively. In HC B, residents had already experienced water cuts due to leaking pipes, making refurbishment need obvious. In many cases, active informants in the area, such as Tampere municipality (R8) and the Finnish Real Estate Federation (R5) seemed to have raised interest, especially by informing residents about the possibility for EU funding – in HC C's case, the energy experts happened to be in the right place at a right time.

In HC C, there had been an outside expert interviewing residents about their development needs, but other houses seemed to have missed the opportunity to use residents as problem definers. In the problem definition phase, information for planning needs to be collected. Residents as experts of their own apartments are an excellent help in stock check and can provide suggestions with regard to a wide range of locally relevant sustainability aspects (Suschek-Berger & Ornetzeder 2010; Roininen & Oksanen 2011; Holopainen et al. 2016). Information can be collected with surveys, interviews, apartment visits, soft GIS, workshops and focus groups, panels and committees, or diaries and neighbourhood walks (Holopainen et al. 2016), and discussed together in HCMs. This pre-occupation evaluation can be later used as a baseline for measuring change, help residents better understand their behaviour, offer ideas for suitable solutions answering real needs, and the first moment for resident dialogue (Gupta & Chandiwala 2010).

Some interviewees (R1, R2, R5) mentioned the strategic plans they have regarding future renovations, helping to better plan e.g. needed loans, and as they were discussed in HCMs, also helping residents to prepare economically and mentally for the future. HCBs are no professionals, it is challenging to move from a short-term approach to strategical housing maintenance. Yet, clear HC goals and visions communicated within the house enable easier planning and decision making, and produce residents engaged to house maintenance (Virtanen et al. 2005).

When asked about the preference of one-off or incremental refurbishments, answers were scattered, and clearly connected to the condition of the building. The respondents whose building had been in a really bad condition, explained that there was no other option than deep refurbishment, making it a good occasion to combine other works to reduce disturbance. Also R9 hoped for the future street renewal to manage to combine different works, so that it would not remain as a worksite for many summers to come. Phasing renovations so that they can be conducted quickly and many at once (Roininen & Oksanen 2011) may become ever more important when whole neighbourhoods are being refurbished. Other benefits of one-off approach were seen the one-time occurrence of potential after effects (R7) and effort needed from the side of residents (R4, R8), as well as using functioning technology as long as it served its purpose (R5).

Incremental approach was especially promoted by R1 and R6. They saw it as a good strategy to not let everything get to bad condition, and R1 was sceptical of the trend in the area to keep low living costs and later having the burden of large loans at once. R1 and R3 speak of the possibilities offered by technological development and dropping costs (R1), and the legalisation of geothermal heating in the area (R3), and both had or will have new technologies added incrementally. Although one-off approach might have been the best option for HC D at the time, the necessity to have strategical thinking and potentially incremental approach in HCs is clear. The interviews clarify that most refurbishments have been conducted when it has been a necessity, and that the EU funding was thus a major driver to make things happen. There seems to be almost an ideological difference between houses in focusing on what must be done, and what could be done.

Utopian visions in urban planning have throughout history had problems being implemented (Rapoport 2014; Sharifi 2016), raising the worry of the eco-city being yet another utopian vision. Utopian projects may result in dystopias, but on the other hand, they can reveal the limitations of existing societies and inspire partial change. Partial, as "the perfect can indeed be the enemy of the good" (Murphy 2015:322), meaning that sometimes incremental, even clumsy, reforms might result in better progress than unrealistic visions. Incremental refurbishments, instead of one-off approach, might better serve resident needs with regard to cost and disturbance, and result in similar level of energy savings as well as give time for residents to enjoy the achieved benefits and get excited about further measures (Fawcett 2014). Incremental small-scale nature of ongoing repair effectively replaces and renews building stock in constant reinvestment process, simultaneously

with normal upgrading of homes that residents engage with (Power 2008; Fawcett 2014). Galvin (2014) calls for flexibility in regulations instead of fixed idealistic views and hopes for imperfect, but also more affordable upgrades on the way to sustainable refurbishments.

The time dimension of refurbishments should also focus on supporting homeowners at the change of ownership, as well as when other works are being conducted, these moments being clearly the ones when energy refurbishments are most being considered and different professionals engaged with (Stieß & Dunkelberg 2013; Achtnicht & Madlener 2014; Fawcett 2014). As the interviews show, there seems to be a growing hunger in HC A and HC C to continue refurbishment, so support in planning further measures should be offered after the process.

5.3.2. Planning

R2 and R6 praise the well-made plan to have sped up moving to implementation and successfully conduct the refurbishment, making planning a key phase. Here refurbishment content, methods, budget and schedule, as well as smaller details, are decided (Stambej & Linna n.d.). Eames et al. (2013) introduces a checklist of questions to ask in the beginning: what, who, why, and how – including identifying targets and all possible technical and financial options (Stambej & Linna n.d.; Virtanen et al. 2005), key stakeholders and networks, as well as drivers and expectations. Bayulken & Huisingh (2015b), with regard to eco-cities, recognised clear, realistic goals established in the beginning and accepted by all stakeholders to result in supported and successful projects.

Planning in different households differed greatly. In HC D, there was a hired planner, but HC A and HC C did a lot of planning work with help of experts such as an experienced property manager (HC A), the Finnish Real Estate Federation (HC A, HC C), VTT (HC C), and Tampere municipality (HC C), as well as the tendered and chosen contractors (HC A, HC C). The results seem to support Stieß & Dunkelberg's (2013) finding that more energy concerned residents use a broader range of informants in planning. R1 with another HCB member visited exhibitions, attending lectures and getting to know contractors, and was happy about the willingness of all tendered contractors to come on site and share their knowledge. Visiting previously refurbished sites was also perceived useful and convincing (HC C), also recommended by Mickaityte et al. (2008) and Suschek-Berger & Ornetzeder (2010). A lot of information was needed, and although HC A and HC C respondents refer to the technical knowledge within HCB, the co-planning help was greatly praised as no one was an expert of this particular field. The expertise was needed e.g. in deciding the size of the

installed systems (R1, R9). In HC A, the contractor took the HCB well into account, actively asking questions and opinions. In Climate Street workgroups, the city departments were present in helping locals with city bureaucracy. The presence of different stakeholders early on is important to gain all available expertise and get to know options (Stambej & Linna n.d.; Häkkinen & Belloni 2011). Yet, R1 and R8 especially doubt the expertise of hired planners:

> *"We are ourselves quite well aware and the property manager has an iron experience. We rather pay a bit more to the property manager than hundreds of euros to someone who comes from a planning to office to make the papers – and is it any better after all?"* –R1

Residents may find it difficult to get an overview of plans, resulting in confusion of what is going to happen and disappointment in results different from expected (Blomsterberg & Pedersen 2015). Information provision should be open and transparent (VTT & ITL 2016), focusing on benefits and uncertainties (Häkkinen & Belloni 2011), as well as intentions and reasons (Blomsterberg & Pedersen 2015). Coherency (Bartiaux et al. 2014; Chahal et al. 2012), accuracy and reliability (Achtnicht & Madlener 2014; Persson & Grönkvist 2015), vividness and visuality (Virtanen et al. 2005; Hauge et al. 2013), practicality and local relevancy, and understandable language and user friendly form (Golubchikov & Deda 2012; VTT & ITL 2016) are important to not make refurbishments seem too complicated. The technical content of information was sometimes seen as an issue, a common problem leading to uncertainty of what refurbishments include and a feeling that professionals control the process (Virtanen et al. 2005). R1 says that the terminology could have been hard to understand if they had not gathered so much information beforehand, and R5 felt a need to ask technical terms to be explained with more understandable and practical language. Also the demonstration and illustration of plans was sometimes seen as problematic. In HC D, R8 tells about difficulties to establish a common view between planners and residents – plans did not seem to describe what was coming, and colours were hard to see correctly when reflected to silver screen. There was a clear need for models – R2 tells about residents visiting each other's finished bathrooms to get example for their own decisions. Here, a model bathroom may have been helpful.

Many respondents recognised the difficulty to listen to everyone's suggestions, especially in big HCs. In HC D, the planner and contractor organised open planning events for all residents. In workgroups regarding Climate Street regeneration, there were groups of residents and entrepreneurs, each discussing different topics. Suggestions were taken from other residents in

most houses, and in HC C there was even a plan to include other residents in decision making. Holopainen et al. (2016) suggest e.g. focused workgroups, workshops, idea competition, scenario creation, visual storytelling, and dialogue meetings, to get the best ideas out of residents.

Although respondents were mostly unanimous about residential satisfaction with ready-made plans by HCB members and experts, the need to inform residents about plans is a key aspect of the planning phase. Different phases need information to be communicated through different channels, and to different scales such as individual residents or HCs (Virtanen et al. 2005; Roininen & Oksanen 2011). In HC C, an extra information session and HCM were arranged to convince the residents, recommended also by Virtanen et al. (2005). A presentable plan was seen as a key for convincing (R5, R7) and forming a shared view (R6). In many houses, written information about the content of refurbishment was put on information boards and delivered to individual apartments, and in HC D, the EU project did a questionnaire about residents' understanding of the project. R9 emphasises the length of planning processes, for which reason it would be good to get an immediate and concrete communication tool, such as an information board, on the street to make sceptics and grassroots level get excited about the project. Hauge et al. (2013) describe an almost identical example as HC A, with long-term information provision helping initially cost-concerned residents prepare and look forward to refurbishment benefits.

> *"For me the best feedback is when they become accepting after you explain in detail, they understand, and there is nothing left unclear. Then the feedback is favourable and they are excited about it, wait when it's coming, and when we will start the action." –R1*

The extent to which participation will be beneficial depends on how the communication process is organised (Suschek-Berger & Ornetzeder 2010). An open and equal communication culture will help to define common goals, whereas secrecy and discrimination can lead to "yard parliaments" and formation of a strong opposition (Stambej & Linna n.d.; Virtanen et al. 2005). The HCB plays a crucial role in creating this environment. Residents expect predictability, especially with regard to budget and timing, getting scared and distressed of ambiguity regarding their money, homes, and future (Stambej & Linna n.d.; Virtanen et al. 2005). Changes, and especially inability to communicate them, causes frustration (Vlasova & Gram-Hanssen 2014). In planning stage, communication channels, roles and responsibilities should be defined (Virtanen et al. 2005; Roininen & Oksanen 2011; Blomsterberg & Pedersen 2015; Holopainen et al. 2016), interview

examples including the role between property manager and HCB, planner and HCB, and residents' participation power. This way, issues such as whose decisions will be implemented, can be solved.

5.3.3. Decision making

Decision making by HCB and residents is needed before refurbishments, such as when deciding to conduct the refurbishment, and in many bigger and smaller details (Stambej & Linna n.d.), such as the depth of refurbishment, contractor choice, or deciding between colour options. All respondents appreciated consensus in decision making, and all houses achieved or nearly achieved it in the decision about refurbishing. There was strong consensus that the more and earlier residents outside of HCB were provided justifications and information about their key interests (benefits, cost, and schedule), the more acceptant they were towards it, and consensus was easier to achieve. R5 believes that their long-term work in advising residents with energy matters helped residents trust the refurbishment decision, and R1 believes resident's trust to HCB's decision making is based on long-term chairmanship and many well-made renovations. Time is needed for residents to become knowledgeable, let decisions mature, and develop a feeling of ownership towards the project, instead of feeling persuaded (Virtanen et al. 2005; Roininen & Oksanen 2011; Hauge et al. 2013). Keeping information increases uncertainty and fears, and too early voting often results in a failure, requiring good organisation, consistency, shared vision, and transparency from the HCBs (Roininen & Oksanen 2011; Hauge et al. 2013).

> *"It is a good practice to inform early so that residents get used to the idea they will have to pay at some point, and prepare the money. If you just announce in the HCM that there will be this kind a work and bill in three months, it will for sure not go through. You have to prepare and talk with time. That helps."* –R1

In HC C, there was lack of trust towards the EU as an institution – some residents were worried of it collapsing before they could get the funding. Many HCs had outside experts in HCMs to convince residents, and R4 trusted her technically skilled husband. Technical expertise inside the house was either a driver for trust (HC A, HC C), or a hoped addition (HC D). In HC A and HC B, residents needed to be convinced about affordability and trustworthiness of savings and funding, in HC B and HC D about the depth of refurbishment, and in HC D about the need to refurbish in general.

Residents' previous experiences may affect their attitude towards refurbishments. Many have experienced or heard stories about pipe refurbishments, and are afraid of them due to unavoidable

disturbances. Many have heard good stories about refurbishments, and self-experienced well-conducted refurbishments increase positive attitude – R1 believes this to be the biggest reason the residents dare to give the HCB the mandate to do more. R9 has experience of grassroots activities in the local entrepreneur organisation already from before, noted also by the mayor, possibly lowering the threshold to engage into participatory district renewal.

In HC A and HC E, it was the HCB helped by property manager or R9 himself who chose the contractor, and R9 brought the contractor to HCM to convince residents in decision making. In HC C, options decided by the HCB helped by VTT, were brought to the HCM for common decision making, as was in HC D. The expertise of contractor was of key importance – in HC A and HC D, it was not the cheapest but the most convincing contractor who was chosen. HC A, HC B and HC C got to know the previous projects of the contractors, and HC D decided to support a domestic contractor. R4 mentions a failed project of one of the options, and R1 considers the neighbouring house to have saved money in the wrong place by hiring a less skilled contractor. In HC B, they took no risks and played it safe by doing a refurbishment the contractor had done many times before, and not experiencing with new things. Trust in contractor was important, as reference lists were checked and expertise preferred over cheap cost. Some other decisions including all residents were the acquirements in HC B, leading to fighting about details.

Residents wish for individual choices supporting their needs, lifestyles and preferences (Stambej & Linna n.d.; Virtanen et al. 2005; Roininen & Oksanen 2011). These can include e.g. depth of refurbishment, paying options, colour choices, and technical solutions. Yet, the HC model, focus on price, understanding refurbishment as a technical process, and lack of service attitude in the field, encourage common solutions despite increasing individuality of housing and lifestyles (Stambej & Linna n.d.; Virtanen et al. 2005). Residents could be offered individual price-tagged options regarding style, quality and degree of solutions (Virtanen et al. 2005).

5.3.4. Preparation

Sufficient time for preparation is important in refurbishments creating major disturbance or costs (Stambej & Linna n.d.). R1 emphasises the habit of HC A to inform residents well beforehand so that they have time to economically and mentally prepare for the refurbishments, a practice related to strategical thinking within HCs. R7 was happy that the decision did not too fast despite the EU project schedules. R4 says there was more than enough time to prepare, as the decision making

was going back and forth for several years. In HC B, the refurbishment started half a year earlier than planned – a critical situation, which the chairman handled by personally visiting everyone whose apartments were to be renovated first.

For R2 the schedule was of critical importance as she needed to temporarily move away, to inform workplace about holidays, relatives about visits, potentially inform investment apartment renters about their need to move, and to return on time for her child's school start. In HC D, some residents had even thought there was a need to move away, reflecting the importance to clarify refurbishment stages and disturbances. It was also important for R2 to know beforehand the important dates of individual apartment checks, as she did not live in the apartment during the refurbishment.

5.3.5. Implementation

For residents, an unnoticeable, quickly implemented refurbishment without disturbance to everyday life, is the ideal (Vlasova & Gram-Hanssen 2014).

> *"I happened to go there when they were installing. I asked when we can shift to geothermal heating, and they had already closed the previous system in the neighbouring house and told it could be done right away, turned the handle, the compressor started working, and that was it."* –R1

This was the lucky case in HC A, HC C (apart from some drilling and half a day water cut) and HC E, but certain types of refurbishments cause more disturbance. In HC B and HC D refurbishments caused significant disturbance to everyday life, in HC B the pipe repair to the extent that moving temporarily away was a necessity. Drilling is an especially disturbing aspect. In HC B and HC D, the access to car shelters was sometimes blocked, and there was a need for emptying the car shelter or certain areas of the apartment for better access. In HC D, there were sometimes weeks when workmen visited the apartment every day, a perceived threat for the safety of property and a nuisance to pet owners. R6 has a previous experience of workmen creating a mess in her apartment, and R2 appreciates the fact that the worksite was kept clean at all times. In HC D, the contractor's actions caused disturbance – residents needed to run after their equipment during a storm, and there were problems with un-functioning TV stations and hallway lights being left on.

Apart from communicating with residents, the actors also need to communicate with each other so that residents do not need to worry about communication issues unrelated to themselves. R9 had

got frustrated with the difficulty of communication between different municipality departments. In HC D, this was an issue, as many contractors sometimes came to do same works at the same time. R5 was happy with the good supervisor who was understanding and took care of the residents' interests, and R4 underlines the need for such a supervisor after less than satisfactory end results.

Residents' own situation affects their experience of refurbishment disturbances, and even weather has an effect. R4 needed to ask the workmen to change windows fast as it was the worst pollen season, causing her allergy. R6, on the other hand, was not happy with the window change during a cold, dark season. The schedule was especially important for R2 as she needed to get back to the apartment in time not only because of her work but because of her child's school. The disturbance was especially rough for one respondent, who had just widowed and was alone in a hot apartment, windows covered, opening doors all the way outside to get some fresh air. Here the service attitude, flexibility, and relationship skills of contractors become important (Virtanen et al. 2005).

The residents' satisfaction and adaption highly depends on contractors' or project coordinators' communication skills (Stambej & Linna n.d.; Virtanen et al. 2005; Roininen & Oksanen 2011). Predictability – refurbishments going as planned and agreed without surprises, was important also regarding costs and schedule. For R4, the budget was a worry, as they are usually just estimates. R1 chose the contractor partly because of fixed cost. In HC B, the schedule held perfectly, everyone knowing already before implementation the exact date for the meeting with contractor where individual work were to be discussed. In HC D, balcony works were late due to windy conditions.

Timely and continuous information (Blomsterberg & Pedersen 2015), and the predictability of disturbances, clearly made things easier for residents. In HC A, even deliveries were informed, so R1 could take them to shelter. In HC B, long-lasting drilling was bearable as it happened during office hours, and HC D respondents were happy about weekly updates. In HC B, late information about closed access or need to empty the car shelters was a tolerated inconvenience. R2 was happy with clear instructions about apartment preparation, but R4 told unclear instructions to cause extra effort – residents were asked to empty a whole room, when only limited access was needed. Some residents (R1, R3, R7) were of the opinion that everyone got well informed, but R9 suspects that information dissemination is a problem for most HCs. Info boards in hallways especially divided opinions. R1 and R3 saw them as sufficient channels to inform contents and schedule, but R4, R8 and R9 said that it was hard to keep it updated and that it was not a followed channel - information

needed to be directed into individual apartments in written or spoken form. R9 hoped for a digital intranet, and R2 had good experiences of personal information delivery: the chairman personally approached residents especially in potentially difficult matters, such as the first apartments on line when starting day was made earlier, and when information about car shelters came with short notice. In some cases, meeting by chance on yard was a way to provide information.

Personal contact on site was appreciated with informants, co-planners and contractors, and a clear contact person, also during holidays (R4), was seen as important. R2 was happy that the contractor was always on site and acknowledged residents' questions, complaints and wishes, although the contractor's strong position meant that any other renovations needed their permission, costing money. Familiarity with other stakeholders, especially the worksite manager and workmen, was seen to be a positive thing, and made it easier to handle things during refurbishments in HC A and HC B. R2 tells that she was often observing the progression of refurbishment, chatting random things with the worksite manager, and that the electrical works were easy to handle as she was familiar with the people already from before. Suschek-Berger & Ornetzeder (2010) recommend on-site offices to lower the threshold of the residents to approach contractors.

> "We talked with my daughter that it's a pity they left, who do we now greet in the mornings? They had breaks in our hallway, basically for the whole time we could see them there. It felt like our own neighbours had left when they were not there anymore.". -R2

R2 and R4 mention that residents need to understand the special circumstances of refurbishments and have responsibilities, such as taking the action to empty car shelters or driving the car outside when necessary. R8 adds that since people know about the renovation, it should not be a surprise things may happen fast, and cannot demand information about everything two weeks beforehand. R8 and R5 emphasise residents' responsibility to follow information channels. R2 tells about taking good care of the contact numbers delivered and putting effort in covering her apartment to avoid dust, as well as taking time to carefully think and communicate her personal wishes. R4 personally ensured that HCB decisions were communicated to the contractor by being on site in the mornings.

It is important to notice that in many HCs, decision making continued to implementation. In HC A, the contractor suggested a better and cheaper solution after decisions had already been made, and especially in long refurbishments of HC B and HC D, the HCB members tried to be present on worksite meetings to get more information. In HC B, additional works for individual apartments

were systematically decided during the works. Everything went well apart from a delay with one apartment with different solutions, raising a question of what would have happened if many households had wished changes. The risk of delays is also reflected by R2's example about her demand to change the direction shower doors opened, and the workmen's wish that she would not tell anyone else about it. Stambej & Linna (n.d.) recommend works in individual apartments to be agreed already in the planning stage, and making as many decisions before as possible is supported also by the many problems in HC D, related to the roles of HCB and planners in decision making.

Trust was an important aspect also during the refurbishments. It was important between the residents – in HC B, residents provided each other with car shelter space, and in HC D, R8 would have happily taken care of the other residents' pets during workmen's visits, if they would have trusted them to her care. Workmen's visits were seen by some as a threat to the safety of their property in HC D. Personal communication was perceived as positive, and R2 was happy of the chairman's habit of personally delivering information in urgent or difficult matters. Contractors received trust for their professionalism and working morale (R2) if they conducted their work as planned, communicated with their subcontractors, provided timely information, handled complaints, were always on site making it visible that things were proceeding, and kept the worksite clean. A clear and easily approachable contact person and a supervisor guarding the resident interests were seen as creating a feeling of safety and trust (R4, R5, R6), and Virtanen et al. (2005) and Roininen & Oksanen (2011) recommend a single information source.

5.3.6. Handover

In the handover phase, proper finishing of the works was perceived as important, to the extent that HC A managed to reduce the final bill after a delayed finishing of the yard. R2 praises good cleaning of the apartments, enabling her to move back to a dust-free home. R1 is happy of well-finished work in the boiler room, beneficial for the house's status as a contractor reference site. Also Virtanen et al. (2005) and Roininen & Oksanen (2011) found residents to get frustrated if finished works needed to be fixed afterwards. HC A had a topping up party, in which the residents actively took part in, and managed to positively surprise the workmen with coffee. HC C happened to have a birthday celebration for the house at the same time the refurbishment finished, so a big party was organised. HC C will also have a topping up party in summer.

It seems that many problems possible to address in previous stages are only noticed later. As indoor comfort problems emerged in HC D, R8 presents a doubt that maybe she cannot use the system. It is of central importance to advice residents in the correct usage of solutions in the handover phase to ensure confidence in correct operation (Virtanen et al. 2005; Brown et al. 2014).

5.3.7. Using

In the using phase, the major themes were, firstly, the residents' need for support also after the refurbishments, and secondly, the need to present the less tangible benefits for the residents. After an electricity cut, R1 got instructions on the phone so that he could himself turn the system back on, and the contractor was always ready to come to check things during the guarantee period. In HC D, many problems related to indoor comfort had emerged, but as residents did not know where the problem was, everyone suspecting a different contractor, they were unsure of who to contact. No one, including the contractors, planner, and property manager, did not seem to have taken the responsibility at the time of the interviews, making residents feel left alone with the problems.

> *"The HCB has decided to get the planner to a vice and squeeze out the information about what should be done now."* –R8

Other actors should remain until the durability of solutions has been ensured. R4 wishes a clear contact person for residents, who would take things further to correct instances, so that not each resident would need to call the contractor. She says this person does not need to be any of the existing actors, such as the property manager or maintenance service, but a new one taking care of communication. R9 says that after neighbourhood renewal, the Climate Street could depart at a point where there are tangible results and working systems that residents can maintain themselves.

Many respondents mentioned the need to wait for monetary savings to become tangible. Apart from the need to include more concrete benefits in refurbishments, there also is a need to present these less tangible benefits to residents. R6 is sure that the numbers of dropped heating costs presented in HCMs have increased satisfaction, and R9 suggests the solar panel energy production to be shown on digital info screens in addition to the already existing possibility to follow it online.

R7 seems to have become convinced about the refurbishment benefits only after finishing, a phenomenon also noticed by R1 in previous renovations. R1 and R3 see it as a positive thing that

nothing changed to the residents in their everyday life as a result of refurbishments, so that they do not need to worry and can keep living their lives normally.

5.3.8. Evaluation

Most respondents did not mention any systematic feedback collection, but instead informal talks with residents that had shown satisfaction with the results. In HC B and HC D, there had been an immediate check of small things to be fixed in the handover phase, and a more systematic feedback was expected to be collected sometime after refurbishment. In HC C, residents had themselves given negative, acknowledged feedback about temperature balance problems. In HC D, there had not yet been any systematic feedback, but VTT had done a follow-up temperature check as part of the project. The HCB members themselves created a feedback form about indoor comfort and process as comfort problems emerged, and this was sent forward to the instance responsible of ventilation. There had also been an EU questionnaire of residents' energy use habits, a theme that should be asked also before to find the solutions most suitable for specific houses.

There seems to be a need to systematise resident feedback about the process and results, so that it is not only on residents' responsibility to give or collect it when problems emerge. This can reveal hidden satisfactions and dissatisfactions, creating important knowledge for future refurbishments. In Hernández & Phillips (2015), a division into direct and indirect benefits, negative consequences, and unattended issues, was made, the last aspect giving ideas of how future refurbishments might broaden their scope. Of central importance is the evaluation focusing on residents, instead of only professionals, who at the moment define the follow-up criteria (Roininen & Oksanen 2011)

5.3.9. Replicability

Hauge et al. (2013) raise exemplary projects and role models in the neighbourhood as one of the most effective ways to promote positive attitudes towards refurbishments. As both good and bad examples were an important factor in convincing residents about refurbishment needs and benefits, as well as in providing information for planning their own projects, it is also important that these houses share their experiences, promoting replication of the projects. The HCs had indeed engaged in such activities and recognised such need. In HC C, the EU expects them to share experiences, and HC A managed to get discount by promising to be a reference site for the contractor.

Some residents have faith in refurbishments working as a driver to get more engaged in the developing of the house and the area (R3, R5, R7). The EU project houses have had common

information events organised by the municipality, and there has been a possibility to visit each other's houses to observe results and share experiences. The geothermal system of HC A had been replicated in the neighbouring house with which they previously shared a common heating centre, as well as by many detached house owners. The solar panels of HC E have been replicated in the neighbourhood, and they had received calls also elsewhere from Helsinki. HC C respondents tell houses in the neighbourhood to have been interested in their experience and all the buildings in the vicinity to now have heat recovery. Hindrances to district-wide development and cooperation include the resistance to infill building (R2, R3), and envy among neighbours (R8).

The experiences were often shared on site. HC C had had visitors locally, nationally, and even internationally, and it cooperated with the local university of applied sciences by providing a case for thesis work. The visitors had wanted to see how systems look, resulting in R9 to climb on the roof to show solar panels, and R1 being happy with the presentable looks of their compressor room. Especially R5 and R2 had recommended the contractor, R2 posting her experience on her Facebook page, feeling the need to share a rare positive story of a pipe repair. This is a good example of what Brown et al. (2014) mean with a positive, experience-based narrative told from home to home, fighting the prejudices formed by stories, and possibly rumours and misinformation.

Hauge et al. (2013) and Reames (2016) recommend using local, enthusiastic, and trusted people in marketing the project in the community. As many residents have gained more knowledge and skills during refurbishments, replicating the results offers a great chance for residents to act as ambassadors and create presentable content themselves, such as the young men in HC D filming a presentation video with a flying drone to be shown to the visitors.

5.3.10. Lessons regarding the process

The interviews revealed that each project stage supports the next ones, underlining the importance to focus on the first phases. Different residents also experience the stages differently. I will discuss three themes emerging from the interviews with regard to the refurbishment process, including information and communication, trust, and wider scale neighbourhood development. Table 3 at the end of the next chapter will return to the process, with participation aspect added.

A good information and communication culture seems to be based on a good HC strategy, which, when discussed together, helps to establish an attitude of doing what can be done, instead of merely what needs to be done, among residents. The informants that HCBs engaged with included

municipalities, the Finnish Real Estate Federation, VTT, planners, and contractors. The other residents engaged mainly with the HCB, and in some cases also the planners and contractors, as well as family members and friends. This reveals the many levels of information – following the field, the vicinity, and one's close circle. There were examples of information flow also from bottom to the top in form of co-planning with the HCB or even all residents, and the property manager, planners and contractors. Yet, the lack of systematic residential evaluation after refurbishment, let alone in the problem definition phase, reveals a potential development point in some HCs: on-going residential evaluation. This means evaluation of the agenda, planning, decisions, implementation, and results, in other words, the whole process (Roininen & Oksanen 2011). Communication does not stop after the refurbishment, as results need to be informed and residents supported in their new living environment. Communication channels for everyone, and on-site presence and personal information are especially important in potentially difficult matters. Proper communication between relevant stakeholders can significantly reduce residents' suspicion, worry and stress, enabling them to be engaged and satisfied with the process.

Good communication before, during, and after refurbishments leads to the second aspect, trust. As a key component of social capital, trust is essential for cooperation (Hielscher et al. 2011). As refurbishments deal with people's homes and personal space, they may easily become prone to conflicts (Virtanen et al. 2005; Roininen & Oksanen 2011). Refurbishment planning and decision making are hindered because of the lack of trust between and within different stakeholder groups, and even for the lack of trust towards technology. This can be prominent in disadvantaged areas where feelings of abandonment and exclusion have created suspicion and mistrust towards outsiders and the ones in power, as well as among people with previous bad experience of regeneration (Dargan 2009; Reames 2016). The interviews revealed the importance of trust between residents (mutual help during refurbishments), residents and HCBs (long-term transparent and skilled work), and trust towards informants (scientific institutions, municipalities and one's close circle, clear contact person), planners (experienced property manager and communication with professional planners, contractors (convincing, experienced, domestic, service attitude) funders (well-established institutions), supervision (someone defending the residents).

Lastly, residents associating refurbishments with wider neighbourhood development, recognised to be rare by Roininen & Oksanen (2011), seems to have developed among the cases. Some

residents believed that the projects made them more engaged to develop both the house and the area, some residents being already active in such work. The replication of projects seemed to be a great source of pride for the pioneering houses. Hielscher et al. (2011) explain transition theory to show examples of regime changes through niches, when they have been provided a safe space to experiment, fail, network, and innovate. These niches have first been unconnected, but then started networking, learning from each other, and finally become more organised in form of e.g. conferences, workshops, and journals. All the interviewed houses were at least in the inter-local phase, having started to network and share their experiences with the houses in the vicinity by acting as reference sites, accepting visitors, and recommending contractors to their friends and neighbours. Local demonstration houses are a good way to communicate successful examples (Meijer et al. 2009; Golubchikov & Deda 2012; IEA 2013; Karvonen 2013; Persson & Grönkvist 2015). Media, in form of success stories, developer and contractor advertising and marketing (Häkkinen & Belloni 2011; Persson & Grönkvist 2015; Webber et al. 2015), public awareness campaigns (Golubchikov & Deda 2012), are important factors in awareness-raising. Positive media coverage is found to promote residents' awareness of being part of something good, increasing their sense of pride and self-respect, as well as seeing the importance of the projects (IEA 2013).

5.4. RQ 3: What is the role of residential participation in refurbishments?

In this chapter, I will discuss how the participation appeared in the interviewed HCs from the point of view of the width and depth of participation, different groups of residents, as well as the benefits participation offered. One way to promote participation is to develop present systems by connecting a participatory element to each process stage (Horelli & Kukkonen 2002). My suggestion for this is found at the end of the chapter in Figure 3.

5.4.1. Width and depth of participation

Residents often feel subordinate to the refurbishment process, unable to affect it (Virtanen et al. 2005). Chileshe et al. (2013) notice a tendency to make projects for residents rather than with them, them being consulted but not included in decision making and project management. When asking residents' views, it needs to be clear to which extent they will be taken into account and what the scope of the particular project is (Virtanen et al. 2005; Blomsterberg & Pedersen 2015). Residents should be asked concrete questions and offer concrete and visible solutions of their interest, be it bill savings, modern bathrooms, or safe neighbourhoods (Gustavsson & Elander 2016), requiring

openly listening to different viewpoints (VTT & ITL 2016). According to Suschek-Berger & Ornetzeder (2010), participation means residents being part of the whole process regardless of the extent to which they use the opportunity. The literature agrees on the importance to include residents as participants early on and throughout the process. Virtanen et al. (2005) point out user-centred design, in which the resident is involved from planning to the evaluation of the final commodity, defining the process principles, targets and assessment criteria (Arnstein 1969; Roininen & Oksanen 2011; IEA 2013; Blomsterberg & Pedersen 2015; Holopainen et al. 2016).

As Finnish HCs have the HCB taking care of house matters, a key aspect related to participation is the division of residents to HCB members and the residents not part of HCB. The members of HCB have a better access to planning and decision making, but need major decisions to be accepted in HCMs, thus requiring the ones willing to participate to attend these meetings. Thus, with regard to both the width and depth of participation, one needs to take into account the two levels – not only the relation between residents and other stakeholders, but also the relation between HCB members and other residents. Kyrö et al. (2012) also points that it is misleading to speak of "people" as one, but divides them into housing management, more interested in project and energy costs, and individual occupants, interested in the living quality of their neighbourhood and apartments.

A good collaboration model between public, private and residents is possible if common aims benefitting everyone, and based in everyone's own interests, can be formed (Kyrö et al. 2012; IEA 2013). Respondents see the position of the house, including the residents and especially the HCB, to be in a good position compared to other stakeholders. Yet, as R5 mentions, in order to have the last word on their needs, the HCB needs to have an understanding of the refurbishment. The examples of planning difficulties in HC D also reflect issues of placation (Arnstein 1969): the HCB had made a decision about windows, but suddenly the yard was full of windows that had been chosen by the planner without asking the HCB. This made the HCB feel they did not have their say, and worry of getting wrongly blamed if the windows would not prove to be good. R9 also gives an example of property managers who treat houses as their own, do not communicate with the HCB, and make their own decisions. R9 emphasises that the marching order is important – property manager is a hired person, and HCB has the last word.

As R4 summarises, including residents is important since they are the ones affected by and paying the refurbishments. As both clients and investors, they cannot be regarded as non-experts (Galvin

2014). The role of HCB was seen by R5 to promote resident and HC interests, but as R6 says, there are more opinions in the HC than in HCB. R9 says that the HCB should be active instead of a mere rubber stamp, and have a face and interact with residents. The interaction with residents seemed to happen mainly through informing and getting HCB plans and decisions approved in HCMs. In HC C, R6 mentions they have plans to include residents outside of the HCB to join the planning of future refurbishments in order to get a broader range of ideas and suggestions. She believes this to reduce residents' suspicion towards the project, possibly speeding up the decision making process. When participation moves away from mere information provision, it is important to educate the residents of yet unknown participatory processes (Miezis et al. 2016).

It was positive to find a level of co-planning among HCBs and contractors, planners, property managers, other informants, or members of the EU project or Climate Street. Especially in HC A and HC C, planning and communication with outside experts was considered as fruitful, the HCBs views were asked about, and other stakeholders provided good suggestions. It was mainly the HCB who was in contact with other stakeholders, but in most HCs (HC B, HC C, HC D, HC E) there was a contractor present in HCMs to answer technical questions, which created trust among residents. In HC D, there were municipal representatives to explain the EU project, planning meetings organised together with all residents, the planner, and experts of different fields. In HC E, it was mainly R9, a resident outside HCB, who was in touch with the contractor, and has also been engaged in the area development and therefore in contact with the Climate Street stakeholders.

Generally, HCB members met often before refurbishments, defining goals, attending information events, and being in charge of planning and many related decisions. R3 and R5 mention that it is a good principle to listen especially to the technically skilled residents with constructive views, and sometimes a few residents outside of HCB attended information events and excursions out of interest. In HC A, HC B and HC C it was mainly the chairman, and in HC A and HC C, also another HCB member, who were the drivers in control, partly justifying it with their technical experience. One of HCB jobs was seen to convince residents about the importance of refurbishments (R4, R6).

R2, R5, R8 and R9 all mention difficulties in including all residents to planning and decision making. R5 recognises it might not be right to exclude residents, but considers difficult residents and bigger groups causing lack of consensus. R2 and R8 describe it "nuts" and "a senseless chaos" to try to include all the opinions and suggestions in big HCs. Therefore, it was seen by almost

everyone as a good thing that the HCB and other stakeholders first make plans, and then inform the layman residents. To conclude, the reasons for HCB's strong control were seen to be the difficulty of including all the opinions, as well as the often existing technical expertise in the HCB, revealing that the refurbishments are seen to a large extent as technical processes. The finding corresponds Roininen & Oksanen (2011), who found residents to usually be pro participation, but mentioning the difficulty to combine many opinions, as well as the trust towards expertise.

Virtanen et al. (2005) discuss two types of leadership. Firstly, the HCB, property manager or chairman can bring ready-made plans to HCMs to be accepted *pro forma,* leading to resistance, in-fighting and schedule changes. The second type focuses on information provision and communication, where other residents can comment plans before next phases. In most HCs, the respondents feel that residents appreciate pre-made plans as long as they get well-informed about the content, benefits, costs and schedule. Information provision was seen to positively affect residents' understanding of and acceptance towards the refurbishment (R3, R1, R4). R4, R6 and R8 mentioned other residents' possibility to make suggestions in information sessions and HCMs, praising the habit of free discussion from which good ideas evolve. R1 says residents' trust in HCB is based on good experience of previous renovations during his decades-long chairmanship. Therefore, they give the mandate to the HCB and do not participate in planning with own ideas, yet still demand information. In HC C, residents were carefully informed about plans, with extra information events and HCM organised before decision making. R7 sees the benefit of far-reaching HCB planning to be that residents' questions, sometimes critical, can be answered with facts.

> *"You have to inform the residents well before the refurbishment starts. If not, the HCB is certainly begging for a bloody nose and will hear about it afterwards. If you inform well enough there will be no problems."* –R1

A Finnish HC is a non-profit organisation consisting of apartment owners controlling their apartments and sharing house management costs. HCM is the decision making organ that chooses the HCB, which chooses the property manager, neither of them able to make decisions about measures affecting living costs without a democratic HCM decision. It is therefore impossible for the owners' position to remain merely as receivers of information (Arnstein 1969), although problems did emerge with regard to HCM attendance, understandable information, and information channels. The decision to refurbish is the most fundamental point for residents to exercise their

participation power. In HC C and HC D, work needed to be done to reach a consensus, but in HC A, HC B and HC E it was immediate.

Another important decision is choosing the contractor. In HC A and HC E, it was mainly one driver who made the decision, but in others the decision was made together in HCM from a selection the HCB had prepared. R8 mentions the inability affect the subcontractors, a cause of resentment when problems with them emerged. In HC B, residents could decide about additional works in their own bathrooms, such as closets, tiles, taps, and sockets, as well as some common area arrangements and acquiring a mangle. In HC B HCMs, discussions about individual details were also tried to silence so that focus could be on common things, reflecting a need to define the level of discussion. In HC D, a planner had a ready-made model, and residents were offered three colour choices – not including the façade, which R4 saw as something people would have probably wanted to have a say on, and about which she had also had arguments at home. Some of these choices residents had a say on, seemed fairly insignificant, typical to consultation (Arnstein 1969), and R8 has a viewpoint on this:

> *"The owners stay happy when they can seemingly have an effect, at least they feel like they can."* –R8

Holopainen et al. (2016) call for residents' ownership of the project, and IEA (2013) notes the importance of presenting the successes as a result of collective efforts. In Climate Street working groups, R9 feels they can really have their say in a broad range of concrete things, and the goal is to have lasting results residents can themselves manage. This reflects even the last stages of Arnstein's (1969) ladder of participation – partnership, delegated power and citizen control. According to R9, planning is the time where residents can to the biggest extent have their say, and later it is difficult to take their opinions into account. Also R5, when speaking about relevant resident opinions, says they should be taken into account when they still can. Active proposals of some residents (R5, R8), should therefore be allowed space already in planning stage.

Critical participation moments were identified to be the HCMs and extra information sessions, where residents have access to information, possibility to ask questions, make suggestions, and present criticism, as well as join decision making. Yet, there is the problem of non-participation, which will be discussed later in the context of challenging resident groups. In even earlier stages,

it is important to pay attention to the house strategy and include residents in the discussion about future renovations, as is the practice in many HCs.

5.4.2. Challenging residential groups

The chairmen respondents R1 and R3, as well as R9, were clearly the resident drivers of refurbishment projects, acquiring information and making plans and decisions. Both chairmen were technically skilled and had a similarly technically skilled key helper from the HC by their side, R5 being this for R3. Despite being only a vice member of the HC, R9 was the main driver of the solar panels in his house, and also participates on the Climate Street residential working groups and entrepreneur activities in the area. Activity in real estate, neighbourhood development, energy, or entrepreneurial matters outside of the HC was common to all these resident drivers.

There are also other somewhat easy groups. With regard to deciding to refurbish, R2 experienced the investors to be acceptant, and R8 believes that they were very interested about the possibility to raise rents afterwards. With regard to encouraging environmental values and energy saving, children are mentioned by the respondents who themselves have small children. R9 tells that it is quite easy to teach children about environment and energy related things as they do not have such prejudices the adults do, also found by (Brown et al. 2014). In his family, recycling was specifically talked about with the children. The daughter of R2 has become a very conscious user of water as a result of individual consumption based water billing, and reminds also R2 of the cost of water.

Meijer et al. (2009) suggest categorising buildings not only by their physical terms, but also according to their stakeholder structure. One can go even further by forming different resident segments, as no stakeholder group forms a homogenous entity (Arnstein 1969). These segments are important not least because of the fact that there may not always be any underlying shared idea of a community (Dargan 2009), and it might need to be created. Residents differ both with regard to their interests and roles (Roininen & Oksanen 2011), needing segmentation and tailor-made strategies (Kastner & Stern 2015) to both inform and convince them about refurbishments, and involve them in the participatory process. As environmental behaviour is affected by different motivations, interventions need to address all kinds of motivations people have due to their experiences, circumstances and personalities (Hauge et al. 2013). In the persona-based study of Haines & Mitchell (2014), residents were divided into segments according to their motivations and

attitudes, including e.g. ideals, motivations, willingness to hire outsiders or conduct the work themselves, as well as preferred timing for refurbishments.

Table 2 presents my categorisation of residents with regard to things limiting their participation. The different challenging groups include those who are not familiar with other residents and present in social activities, those who do not agree about the refurbishment need, those who have difficulties getting information, and those who do not participate in planning and decision making in the HCMs or HCB. These groups will be discussed considering different residential groups prevalent in the interviews: the old, the young, renters and owners, HCB members and non-members, and women. It is important to understand that even these groups are not homogenous, and for example elderly people can be anything between a recently retired person willing to actively use free time, to a very old and tired one.

Table 2. The challenging residential groups in refurbishments.

The unsocial	The objectors	The uninformed	The unheard
•**Do not know other residents or attend social activities** •Temporary residents, often young and/or renters •The young and busy •The oldest and most tired •New residents	•**Not agreeing to refurbish** •Elderly •The "difficult residents" who always resist • Less affluent	•**Have difficulties accessing information** •Elderly •Renters •The ones that have bad relationship with HCB members	•**Not present in participation moments** •Ones not joining HCB, often young •Ones not joining HCMs, often "the difficult residents" •Women or people with little technical expertise •Renters

5.4.2.1. The unsocial

Firstly, those who do not know people in the house are generally recognised to be the temporary residents, often young renters, whereas permanent, often old residents do know each other. R5 mentions that not all oldest people of the house had the energy to join house celebrations, and R4 connects the lack of social activities to the HC's old age composition. On the other hand, R1 says it is the old who still gather together to sit and chat, young being inactive in socialising. R4 emphasises the need to include renters in house activities. R2 mentions some benefits of familiarity during refurbishments: residents visited each other's apartments to peek on finished bathrooms and solidarily helped each other by giving their car shelters for neighbours' use.

Mega (2000) recommends combining participation to art and celebration, providing a joyful way to participate and act for the community. The amount of social activities varied widely among the HCs. In HC A and HC E, social life was possibly the liveliest. In HC A, they had many work parties – voluntary maintenance work in the yards of Finnish HCs, organised a topping up party offering coffee for pleasantly surprised workmen, and the old people still used to sit down and chat in the pavilion on the yard, although this used to happen more commonly before many residents passed away and were replaced with younger ones. In general R1 praised the residents to be a nice group of people actively participating in renovations. In HC E, there were work parties, celebrations for the house, and home concerts organised by a resident. The Climate Street project also includes many events, some of them related to participation, such as personal energy advice and a get-together event to share experiences. In HC C, the respondents told about a celebration for the 35-year old house coinciding with the finishing of the refurbishment, occasional work parties, as well as revealing the sign of the EU project. In HC B and HC D, there were no particular social activities, although people know each other and talk on the yards, or do something with a small group. R4 has heard that in some houses renters are a part of work parties and other activities, and points to including everyone in the activities.

> *"We will have a topping up party in June. The invitation said that the people who were living in the house at the time of the renovation… I said that's interesting, many apartments will be sold and the new owners are not allowed to come then? Hubby said in the HCB meeting they could probably change the wording. It is quite embarrassing if the new shareholders come and see a party and realise: "Oh, I have not been invited!"." –R4*

5.4.2.2.   The objectors

Secondly, those who do not agree about the need to refurbish are generally identified to be the old ones, as they might not understand the need (R4), find it beneficial for them (R5, R8), or be worried of costs (R6, R7). R2 also recognises this possibility, but says that the people promoting deeper refurbishment were in fact the elderly. Among respondents, many active drivers of refurbishment were of older age. R8 says the elderly claimed that old things still served their purpose and a mere facelift would be enough, despite the terrible condition of structures. R3 mentions the elderly residents being uninterested in refurbishments and just wishing their lives to go on normally, which explains R8's notion of their deep worry of what would be done to their apartments.

A certain undefined, difficult group of residents was mentioned in almost every interview. The respondents spoke about a group of people, existing in every HC, who by principle resist every renovation and change in the house. R9 mentions the sceptics who are suspicious and want to "diss" and shoot down new ideas related to the sense of community.

> *"We have a certain clique of residents who are always against every single renovation, and think that the house will stay standing without doing anything. - - Anything you do here, even the ABC letters on the wall, they were not right either."* –R4

This group may complain about minute details such as workmen parking their cars wrong, and provoke others. R1 has heard of houses with a strong opposition group agitating other residents. R5 says that the loudest voices are often the ones rioting their own wrong understanding, which he sees as a reason to not include every opinions. R7 from the same house, instead, thinks having the critical voices in HCMs was a good thing as it broadened the understanding, but says often the critical ones do not come to the HCMs which would be the best place to express their views. R8 has noticed the same phenomenon of the complainers not coming to HCMs. R4 says that strong individuals in her house managed to convince also these objectors about the need to refurbish. The literature also recognises resident-saboteurs, who are difficult to cooperate with, do not want to contribute to the community, and creating doubt among other residents (Miezis et al. 2016; Hauge et al. 2013; IEA 2013; Brown et al. 2014). The "difficult residents" may be excluded from decision making (Dargan 2009), possibly increasing their antipathy towards the system, but inclusion would be the best way to reduce these fears (Hauge et al. 2013).

Residents' own situation may affect their attitudes towards refurbishments. The motivation is especially affected by economic situation: elderly are often seen as reluctant, possibly because of small pensions, and for R8 the cost was a worry too, although she had gotten more interested in energy savings after getting unemployed and having the need to save money. Sickness is often mentioned: R4 has to move to a more accessible home due to her sickness, and R8 is worried of the future elevator renovation as she has a knee problem, and wonders whether she is only experiencing discomfort with the indoor air due to her bronchitis and sinusitis.

5.4.2.3.   The uninformed

Thirdly, the residents who may have difficulties in accessing information about the refurbishments, before or during the process, are recognised to be the elderly and the renters. R8 tells that some old

residents are not willing to come to the HCMs to hear the information, as they are afraid of getting responsibilities. R4 has an example related to information dissemination and the differences between old and young residents:

> *"We have electronic info boards downstairs and it turned out that the young do not have that much time to stop that they could wait the information to change, and the old ones should switch to reading glasses to see. So I told my husband in the HCB that the elderly at least appreciate the information coming to homes on paper so they can read it in peace." –R4*

It is clear that decision making about refurbishments does not concern renters, but some respondents recognise a need to better inform them attend. R2 says their experience of information might have been different as it was dependent on personal communication between their landlord, and as they do not attend the HCMs. She also doubts that some residents with bad personal relationship with the chairman might have affected on their view on how they were informed. R5 tells that residents get information through their landlords and by asking other residents when meeting on the yard, but have not attended the HCMs although they would be welcome. This reflects two issues – renters being dependent on the information given by their landlords, and the differing and unclear culture about whether HCM is a place for the renters. R4 tells about some owners being unwelcoming towards long-term renters attending information events, and herself sees it important that renters do get the information, being residents as any others. She criticizes the custom to send information to owners, some of whom live abroad, via email, resulting in renters being confused and worried of what was happening when workmen started visiting apartments. R8 from the same HC puts some responsibility to the renters, who do not read papers sent to their apartments nor attend meetings that are open for all. R9 believes that information sent to all apartments through intranet could reach renters who are interested in what is happening.

5.4.2.4. The unheard

Lastly, those in a weaker position in participatory planning mainly include the ones not joining the HCB or even the HCMs, where residential participation potential is the biggest. In most refurbishments, there was a clear driver inside the house, often an experienced and technically skilled chairman. Although beneficial for the refurbishment, and often leading to satisfactory results for residents, few active drivers can pose risks to participation. R4 tells that they have had the same HCB for a long time, and one member thinks it is not that important to bring residents'

interests to HCBs even if asked to. This is also reflected in the answers of R2 and R4, themselves not members of the HCB, which focus much more on the implementation than the planning phase.

> *"Usually when they are happy they are quiet. If not, they do not come to say directly, first talk among themselves and then some brave one comes to tell me." –R1*

Participation on HCMs differed: in HC A and HCB, respondents were happy with the good participation rate, which was at least 2/3 in HC A. In HC C, the participation rate was described as average, with approximately 1/3 of owners present. HC D and HC E, the participation rate was really low, approximately 1/4 in HC D. Most respondents, fortunately, told about an increased participation rate when important decisions about refurbishments were made.

The difference between old and young residents is prevalent in R2 telling about a long HCM about whether a mangle, mostly used by elderly residents, should be acquired, and that it felt like the old would crash the young in decision making. This may be related to the inactivity of young people to become HCB members, a problem emphasised by R1 and R5. There is also a group of elderly who are only interested in life moving on, giving the mandate to decide to other residents (R3). The inactivity of young may be due to the voluntary nature of the work, and as R1 puts it:

> *"It feels like all the volunteers have died in the Winter War, this is a bit that kind of a job." –R1*

The HC work in general is seen as demanding – R3, R4, R5 R6 and R8 describe the increased workload along big things such as refurbishments and the different types of new tasks at hand. In HC D, the number of meetings increased from a yearly norm of 5-8 to approximately 30, leading R4 to ask her chairman husband whether he could spend some time at home, too.

> *"If something was a bit late or did not go exactly like someone wanted, they attacked me as I am the wife of the chairman. I told them that I will not interfere with HCB matters and it is not my fault that I happen to live in the same household as the chairman - - actually it is not such a nice sport to sit in the board." –R4*

Even though respondents did not describe the workload as unreasonable, R1 says he demanded a small compensation for chairmanship, refusing to continue voluntary work after decades – after all he has related expenses such as phone bills and gas costs. R9 says that although he finds the

volunteer work in the house and Climate Street residential workshops rewarding and important for his investment to the apartment, it is a voluntary job along family life and other hurries, and he sometimes feels people not participating come along as free riders.

Although gender was of no focus of the research, it was very prevalent in some interviews, especially with regard to women's relationship with technology. R1 tells that *even* an older female apartment buyer understood the investment potential in a refurbished house. R4 refers to the female gender of a property manager, who lacked technical understanding, making it hard for things to move forward. R4 tells that she understands the refurbishment need partly due to experience of fixing cars with the male members of the family, and emphasises her interest towards technology. R8 mentions that the rest of the HCB are men, and more interested in technology than she is.

> *"When he was leaving the boss said I would become a good construction man. I told him to take me to work then. Sometimes he asked how do I know and I said we have always done things together and I have always been so curious about these men's work."* –R4

> *"I am the only one who has had to switch from office work to construction expert, ho-hum…The men said I had good ideas - - I have almost gotten a load of snow falling on me when stepping outside, could we not put some shed there, I have wondered why no one has put it into practice. In HCB, when boys talk, I wisely sit quietly and ask."* –R8

R1 tells that a female member of the HCB understandably disassociates herself from the technical side of refurbishments. R6, also a female in a HCB, although not emphasising gender, says:

> *"I said that I don't want to be part of the planning as I am no technical expert and I can't, but one other HCB member told me: "Listen, no one here is any better of an expert, that's why we had the company experts.".*" –R6

It seems that there is a need to support the female residents' self-confidence regarding refurbishments, so that they can fully participate. R1, who sees the representativeness of the HCB as a gender question says that women have many other good and different views that should be taken into account. And as is prevalent from some interviews, the residents have, despite lack of experience or expertise, felt competent to gather information and make good plans and decisions with the help of property managers and outside experts.

Some residents saw it as people's own responsibility to participate. R2 says many people unhappy with the results had not themselves clearly expressed their views, and no one can do the thinking work for them or force anyone to attend meetings. R9 says everyone has the possibility to attend workgroups if they wish, and wonders what makes people so indifferent to their own investment. R5 says that many who would be welcome to events do not come, and that the critique should be expressed in the HCMs. Considering the problem of non-participation, R9 wonders whether participation should be made all circus and fun, but himself considers actual effect and concrete benefits more important. This point was also made by Friedrich et al. (2013): ideally residents can participate as part of their other activities, and see the results shortly afterwards.

Trying to make residents participate can turn out to be a major challenge even if it may be for their best (Buhr et al. 2016). Engagement in participatory processes may be negatively affected by personal or heard bad experiences. In Dargan (2009), locals were reluctant to participate in regeneration boards when they heard of its lack of progress and in-fighting – also in this study, HCB work was not seen in a completely positive light. People may lack available time (Aravena et al. 2016) and be worried of the stress caused by participation (Chileshe et al. 2013), a possible reason for low HCM participation rate in many HCs. Residents may not stay long in the apartment in case of plans to move away (Achtnicht & Madlener 2014) or be disinterested due to their old age, which was the case in some HCs. Brown et al. (2014) had an interviewee suspect that some may not participate as they are already happy with their homes. It needs to be made sure that the lack of participation is not due to lack of information and communication (Roininen & Oksanen 2011), especially since this study reflected communication issues in also successful refurbishments. It may also be that the ways and means offered for participation are not the ones people would want to use (Dargan 2009). Including pressing issues of residents' own interests on the agenda may help to resolve the issue of non-participation (Buhr et al. 2016).

5.4.3. Participation benefits

To follow the division used before, I will discuss the participation benefits stemming from the interviews with regard to good governance – more specifically, acceptance and engagement, good ideas, empowerment – especially from the perspective of pride, and sense of community.

The early introduction of plans with involvement and empowerment of all political, local and financial actors resulted in better consensus among stakeholders and achievement of goals of

European eco-cities (Bayulken & Huisingh 2015b). The HCB needs to justify the need and make sure that information about residents' main interests and planning decisions reaches everyone by encouraging an open culture of participation. Some respondents found potential in including residents already to planning, wishing reduced suspicion, broadened scope of ideas, and satisfied residents identifying with the project (HC C, R9). Participation may not slow down the process, as many fear, but create acceptance, engagement and even excitement, speeding up decision making (R1, R6, R9). Residents do feel less resistant towards changes they have had a change to define and be informed about (Suschek-Berger & Ornetzeder 2010; Jauhiainen 2002; Lapintie 2002). R9 gets satisfaction of being able to have a concrete effect in his neighbourhood, and R2 sees her own activity to have resulted satisfaction in the end result. Yet, the difficulty of including everyone's suggestions and opinions needs to be recognised. Residents should be clear of which decisions they can affect, and giving options is a popular practice to limit choice and make things move forward.

Despite being laymen, residents have good ideas. The benefit of broader ideas outside HCB was recognised in some HCs – in HC C, especially technically skilled residents, but even critical voices, were listened to. Some respondents praised the habit of free discussion after HCMs, where many good ideas had emerged. In HC E, the main resident driver was not a HCB member. In HC A and HC D, residents believed in HCB's ability to make technical decisions, even to the extent of surpassing outside planners. Practical examples of good ideas include R8's idea to improve safety with adding a window sill shelter for falling snow, R4's local knowledge in warning contractors about windy conditions – eventually delaying works and causing safety issues as residents needed to be called to take equipment down from roof, R2's demand to turn shower doors "wrong way" for easier access, and the many concrete solutions in the Climate Street, one key aspect being the spreading of the idea that nice ideas can also come from grassroots level. The Climate Street has an ideology of imperfect trials (Hielscher et al. 2011) and mini pilots (Holopainen et al. 2016).

Good house management makes residents value their property and the area, potentially making them interested in the topic and having an effect (Virtanen et al. 2005). R3 and R5 have been trained as energy experts, and turned their knowledge into action, advising others about energy use, and planning their own extensive refurbishments. It seems that active HCB members seeking information, and the targets of energy advising in HC C and HC E, have gained new skills and

knowledge about energy efficiency and refurbishments. R9 especially mentions his deepened understanding and broadened views about energy matters in the participation focused project.

Interviews revealed residents' pride in their HCs. R1 and R2 acknowledged to be lucky for the good HCM participation rate and easy decision making processes. Especially respondents from HC A, HC C and HC E were proud of their well and fast-conducted project, pioneering example, and replicated solutions and participation models. Positive attention and possibility to replicate results is an excellent way to both promote the cause of refurbishment, as well as create pride among residents. Participatory refurbishment can also create positive development in the area, as discussed before. R1 also praises the nice group of people who have been excitedly participating in activities around refurbishment, praised even by workmen who were surprised with a topping up party.

> *"As I know the people here I knew that here we do not procrastinate and hesitate much, but when we start doing, we really do and things start happening - - we have done first and others have followed."* – R1

Refurbishments are seen by some respondents to have the possibility to bring people closer. R2 learned to know fun and active new neighbours in HCMs and got many new people to greet and chat with at the yard. Similarly, the working groups for Climate Street renewal have made R9 network and get to know new people he can greet on the street. R9 tells that the solar panel project was perceived as a nice thing which people talked about, bringing them closer. He hopes the same to happen in the yard renovation in cooperation with two neighbouring HCs. People can be brought closer also because of problems. R8 mentions that elderly residents actively approached others asking details, as the information methods did not suit their needs, and that people are now talking about the indoor comfort issues which emerged after refurbishment. Despite living in a metropolis, R9 hopes that the neighbourhood would have more of a small town feel, where you can greet everyone, as well as combine resources to make the neighbourhood more comfortable to live in.

Table 3. Phases of participatory refurbishment.

Resident Interests	Project stage	Participation potential
- (Free) condition checks - Options for future additions - Info: energy, projects, funding - Encouraging examples (+/-) - Include broad scope of issues	**Problem definition**	- Training "energy experts" - Survey of residents' renovation needs, energy-related practices - Individual energy advise, sharing experiences
- Focus on providing residents with justifications and information about benefits and other key interests (cost, schedule) - Examples: excursions, models - Outside support for HCB work, co-planning with experts - Roles and responsibilities	**Planning**	- Culture of open discussion: excursions, infos, planning - Recognise expertise in house - Local knowledge - Common info events in neighbourhood - Fun participation events - Communication plan
- Expertise of contractor etc. - Most decisions before implementation - Consensus	**Decision making**	- Encourage all to attend HCMs - Decisions with real effect - Expert in HCM - Give options
- Enough time - Clarifying phases and important dates	**Preparation**	-
- Service attitude, flexibility - Clear instructions - Timely info, predictability of disturbance, schedule, costs - Actor-actor communication - Supervisor guardiance - Clean worksite	**Implementation**	- Familiarity with other actors - Residents support each other - (personal) info channels for all - Tell children what is happening - Displaying old structures - Clear contact person (also before and after)
- Finished work - Advice on using the solutions - Immediate feedback of small fixes	**Handover**	- Celebration
- Technical support until durability ensured - Follow-up and other actors' responsibility in case of problems	**Using**	- Intangible results made visible
- Systematic resident feedback of process and results	**Evaluation**	-
- Reference site for contractor - Local, national, international visits - Media coverage - Academic cooperation	**Replicability**	- Refurbishment-themed neighbourhood events - Resident ambassadors - Self-created presentation content

End result

Good condition - Savings in maintenance and living costs - Increased value of investment
Increased living comfort - Pleasing visual look - Easy maintenance - New technology
Shared/own systems - Energy saving - Inreased social interaction - Pride

6. Conclusions

Urban areas are to be in the frontline of solving increasing environmental issues. Buildings represent a 40 % share of energy consumption and carbon emissions, and the refurbishment need facing Europe's post-war housing stock offers a window of opportunity to affect this in a massive scale with energy refurbishment. The ever-increasing refurbishment need facing the housing built in the decades of fast urbanisation means refurbishment moving from marginal to the front line of urban sustainability solutions.

The discussion of urban sustainability and participatory planning reveals a challenge facing the social aspect of both planning ideals. Eco-cities, powered by the concepts of SD and EM, have evolved from grassroots communities with social focus to international, growth-oriented technological innovation centres supported by policy and business. As participation, demanded by social sustainability, has evolved in theory and more and more required in legislation, this neoliberalist and technocratic context poses challenges for the power of citizens'.

The same problem is reflected in housing refurbishment. Despite technological barriers being relatively few, and refurbishing existing housing affecting the local residents, the process is often seen in mere technical terms. This, however, does not serve neither the environmental nor the more holistic sustainability goals, as it is the residents' acceptance, engagement and living habits that affect the success of refurbishments. Therefore, seeing the refurbishments as local, participatory processes and understanding residents' circumstances, attitudes, needs, interests, and roles is of central importance to conduct successful energy refurbishments. By doing this, social sustainability goals including good governance, use of local knowledge, and increasing empowerment and sense of community, can be addressed.

By interviewing residents who had experienced an energy refurbishment, three questions were aimed to answer: what purposes and goals do residents have for refurbishments, how the process should be, and what is the role of participation in it.

Firstly, it was clear that residents' motivations vary, are not only or mainly environmental, and that enhancing participation and community feeling was not a clear goal in most cases. The main interests of residents are economic or related to their living quality.

The economic aspect included concern of costs, energy bill savings and increased property value, both related to a sense of investment. The costs caused resistance and questions in HCs, different funding mechanisms as extra motivators or enablers of investment, and costs were a significant factor in different decision-making situations, although expertise was sometimes preferred over cheap cost. Success in achieving savings had enabled stable maintenance and living costs, perceived especially important in times of increasing energy prices. Savings do not, however, need to be waited for and are not immediately visible to normal residents, causing a need to achieve other, more concrete benefits, or more effectively communicate these less tangible benefits within HCs. There was a sign of rising property values and attractiveness, as well as estimates of energy refurbishment working as a marketing factor for the houses and the areas.

With regard to living comfort, it became especially important if it was lost, which was the unfortunate case in one of the HCs which had problems with indoor air as a result of the refurbishment. It is of central importance to ensure basic comfort after refurbishments, as this case caused significant stress and dissatisfaction. Visual aspects were important for residents within their apartments, with regard to their own house façade, and generally in the area, offering a good co-benefit for projects to achieve residents' support. Some residents showed special interest towards technological solutions, but more generally important was the ease of maintenance for the new solutions. An important point with regard to residents' interest and participatory district refurbishments is the nature of new systems as either private or collective – one resident appreciated being separated from the same heating system with a neighbour, and one wished for more shared facilities between the neighbours.

Although environmental aspects of refurbishments were widely acknowledged, residents' relationship with environment and energy, as well as their importance as motivators, varied greatly. There seemed to be a trend of one's believe in individuals' and communities' power to act for climate causes to correlate with deep environmental motives. For some these themes were mainly visible in everyday behaviour and for some through their work in house maintenance. Personal energy advice in form of outside experts or trained residents within the HC seemed useful practices to make residents pay attention to their own energy consumption.

Secondly, the important and intertwined process aspects included information and communication, trust, and replication. Residents gained information about the refurbishment topic from many levels

– following the field, from the neighbourhood, and within their close circle. Municipality information events, funding programs and contractor exhibitions were examples of successful information channels. These channels were activated in areas facing refurbishment need, catching a moment of opportunity when aware residents preparing for refurbishments start engaging with professionals. Technical support and communication were important also during and after refurbishment, and personal contact was appreciated.

Planning was mainly conducted by HCBs in cooperation with different experts, including municipalities, contractors and project partners. Apart from distrust in professional planning offices' expertise and sometimes hard-to-understand technical content, this cooperation was perceived as fruitful. There was a wide consensus about HCB planning being sufficient, but the communication of justifications, residents' main interests, and the content of the plans to other residents was seen to be of central importance if other residents were to be convinced about and engaged with the process, and to gain their trust. A good communication culture was based on good HC strategy and discussing it together created motivation for good house maintenance, as well as the important element of trust. Trust within the HC and between stakeholders was very important in all planning stages.

Examples especially in the vicinity were important motivators and helpful in project planning, making it important to share refurbishment experiences. There was clear networking and experience sharing happening already in the interviewed cases, but more focus on communal feeling is needed to promote the trend and avoid neighbour envy. Refurbishments also made residents more engaged to developing their house and the neighbourhood, which gives an opportunity to use resident ambassadors in promoting the experiences.

It was also clear that all stages support the following ones, making it important to focus on the early phases with regard to e.g. residential evaluation, decision making, communication strategy and information dissemination, and roles and responsibilities.

Thirdly, residents' position in comparison with other stakeholders was perceived good, and there was a level of co-planning between residents and other stakeholders. The Finnish housing cooperative model means that HCB members and other residents have different participation power. The general trend is that before the refurbishments, it is the HCB that recognises the refurbishment need, defines the goals, stays in contact with other stakeholders, gathers information,

and prepares plans, making many decisions on the way before other residents are involved. This is partly justified with technical expertise, revealing that refurbishments are indeed seen as mainly technical processes by many. Other residents can mainly affect by attending HCMs to receive information, as well as participate in decision making, although there were sign of ideas to include residents more strongly to planning in some cases. As long as information provision worked, pre-made plans were appreciated. Enabling other residents to engage with outside experts in HCMs or extra information sessions was useful, as was limiting residents' options in decision making to avoid chaos. It is important to pay more attention to residential pre-evaluation as well as a good HC strategy to make residents involved earlier in the process. When participation was a special focus of a project, the level of it deepened, suggesting major potential in including residents in other projects as well.

There were many different groups of residents, the drivers recognised to be the active ones in HCBs and other neighbourhood activities. Four challenging groups from participation perspective were recognised to be the unsocial, the objectors, the uninformed, and the unheard. These groups reflect issues of lack of social inclusion, resistance, insufficient information provision, and non-participation. Some related issues were unclear culture of who is an accepted participant in the house, as well as the difficulty of HCB work. These groups, as well as the multiple motivations residents had for refurbishments, suggest a potential in segmentation to better make residents excited both about the end results and the process.

Participation was found to have many benefits: information and inclusion made residents more engaged to the development and satisfied with its results, speeding up the decision making phase. Also other than technically skilled residents provided good ideas for the project. The active residents gained knowledge of energy themes, as well as pride that helps the replication of the results. In some cases, people started networking more, creating a sense of community.

Lastly, I will pay attention into evaluating my work. As refurbishments often do not have a residential focus, it may be visible in the research conducted about them. Still, I used a relatively extensive amount of literature to gain an understanding of the topic, define my research questions, and form the interview questions. Among this literature were theoretical works, case examples, and participatory planning as a leading concept helped to find relevant literature that also discussed the residential aspect.

Interviewing residents is an especially suitable method, as it is the residential perspective the research focuses on. Residents themselves know their situation, attitudes, interests, needs, experiences and level of involvement the best. The interview method enabled talking about these themes in a free but organised manner. As it was the individual experiences I was interested in, qualitative content analysis fit the purpose well, giving deeper understanding of the interdependencies of different themes. A small sample size and non-randomised sampling in only Finnish context may have led to a relatively large share of respondents especially interested in refurbishments, and context-specifity of the results. Still, other views were also represented as well as discussed in the interviews, and especially refurbishment-oriented respondents may offer good insight to potentials and future trends. I have discussed the results in a manner that enables comparing them with other projects and localities, and am confident that similar methods can be used to analyse different contexts.

As is always with interviews and qualitative analysis, this research is value-embedded and may suffer from the interviewer's positionality. I refrained from clearly stating opinions during the interviews, focusing on the respondents' experience, and hope that my own interest toward urban sustainability and participatory planning are thus reflected mainly in the choice of research questions.

I wrote the thesis employed by Sweco Finland Ltd. and funded by the EU, but worked independently as neither limited the scope nor methods. The instructions given were to discuss refurbishments from the viewpoint of residents. The results may later be used in the EU-MODER project, which Sweco is leading, or considered in EU-GUGLE and Climate Street projects where the majority of respondents were found.

7. Future research

As this research was a part of an EU project with wide scope, already the decision to focus on residential areas and residents in refurbishments was a considerable cropping of scope. In future research, in order to get a deeper understanding of the multiple questions related to residents in refurbishments, I can offer some ideas where the scope can be restricted.

Firstly, one can focus on certain kind of refurbishment, such as change of energy system to geothermal or solar, or on measures that affect the building fabric, such as insulation. Also the three goals of changing to more renewable energy, increasing energy efficiency, and reducing energy consumption, can be researched separately. Environmental and energy attitudes are an interesting theme, but may not be the most important for residents. Instead, the aspect of consumption, instead of energy efficiency, should also be of focus as it can be an integral part of the projects.

Secondly, one can also focus on certain kind of areas, such as socio-economically deprived ones, where many issues are highlighted, but which also have the greatest potential to be uplifted in projects that aim for comprehensive sustainability.

Thirdly, one can focus on how to better make residents accept refurbishments, or how to make them more satisfied with the end result, or any stage in between as in how to make residents satisfied with the process. An interesting theme to research could be infill building as a source of funding for the HCs to implement the projects.

Fourthly, a particular resident interest, be it the economic aspects, disturbance, or comfort gains, can be of focus. Here, multi-disciplinary approaches may prove useful, as e.g. service design can offer good insights into involving residents into co-production of tailor-made solutions.

Lastly, the experiences of homeowners and renters can differ significantly due to e.g. legislative or communicational reasons. The occupancy type can be of focus, as well as members or non-members of the HCB, or other classifications related to the type of residents. Here, segmentation into different resident types e.g. with regard to their motivations or positions within the stakeholder network, offers an interesting topic of research.

8. Bibliography

Achtnicht, M. & R. Madlener (2014). Factors influencing German house owners' preferences on energy retrofits. *Energy Policy* 68, 254–263.

Agyeman, J. & B. Evans (2004). "Just sustainability": The emerging discourse of environmental justice in Britain? *The Geographical Journal* 170: 2, 155–164.

Allouhi, A., Y. El Fouih, T. Kousksou, A. Jamil, Y. Zeraouli & Y. Mourad (2015). Energy consumption and efficiency in buildings: current status and future trends. *Journal of Cleaner Production* 109, 118–130.

Andersen, M.S. & I. Massa (2000). Planning ecological modernization — origins, dilemmas and future directions. *Journal of Environmental Policy & Planning* 2: 4, 337–345.

Aravena, C., A. Riquelme & E. Denny (2016). Money, comfort or environment? Priorities and determinants of energy efficiency investments in Irish households. *Journal of Consumer Policy* 39: 2, 159–186.

Arnstein, S.R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners* 35: 4, 216–224.

Baird, G. (2015). Users' perceptions of sustainable buildings – ey findings of recent studies. *Renewable Energy* 73, 77–83.

Baker, S. (2007). Sustainable development as symbolic commitment: Declaratory politics and the seductive appeal of ecological modernisation in the European Union. *Environmental Politics* 16: 2, 297–317.

Bartiaux, F., K. Gram-Hanssen, P. Fonseca, L. Ozolina & T.H. Christensen (2014). A practice–theory approach to homeowners' energy retrofits in four European areas. *Building Research & Information* 42: 4, 525–538.

Bayulken, B. & D. Huisingh (2015a). A literature review of historical trends and emerging theoretical approaches for developing sustainable cities (part 1). *Journal of Cleaner Production* 109, 11–24.

Bayulken, B. & D. Huisingh (2015b). Are lessons from eco-towns helping planners make more effective progress in transforming cities into sustainable urban systems: A literature review (part 2 of 2). *Journal of Cleaner Production* 109, 152–165.

Beal, V. (2014). Selective public policies: Sustainability and neoliberal urban restructuring. *Environment and Urbanization* 27: 1, 303–316.

Blomsterberg, Å. & E. Pedersen (2015). Tenants acceptance or rejection of major energy renovation of block of flats - IEA Annex 56. *Energy Procedia* 78, 2346–2351.

Blühdorn, I. & I. Welsh, I (2007). Eco-politics beyond the paradigm of sustainability: A conceptual framework and research agenda. *Environmental Politics* 16: 2, 185–205.

Boström, M. (2012). A missing pillar? Challenges in theorizing and practicing social sustainability: Introduction to the special issue. *Sustainability: Science, Practice, & Policy* 8 :1, 3–14.

Boström, M., Å.C. Vifell, M. Klintman, L. Soneryd, K.T. Hallström & R. Thedvall (2015). Social sustainability requires social sustainability procedural prerequisites for reaching substantive goals. *Nature and Culture* 10: 2, 131–156.

Boyer, R.H.W. (2016). Achieving one-planet living through transitions in social practice: A case study of Dancing rabbit ecovillage. *Sustainability: Science, Practice, & Policy* 12: 1, 1–12.

Brown, P., W. Swan & S. Chahal (2014). Retrofitting social housing: Reflections by tenants on adopting and living with retrofit technology. *Energy Efficiency* 7: 4, 641–653.

Buhr, K., M. Federley & A. Karlsson (2016). Urban Living Labs for sustainability in suburbs in need of modernization and social uplift. *Technology Innovation Management Review* 6: 1, 27–34.

Burns, T.R. (2015). Sustainable development: Agents, systems and the environment. *Current Sociology* 64: 6, 1–32.

Bäcklund, P. (2002). Miten kuulla asukasta? Kaupunkitila ja osallisuuden haasteet. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds.): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 141–157. Gaudeamus, Helsinki.

Bäcklund, P. & R. Mäntysalo (2010). Agonism and institutional ambiguity: Ideas on democracy

and the role of participation in the development of planning theory and practice - the case of finland. *Planning Theory* 9: 4, 333–350.

Bäcklund, P. & R. Mäntysalo (2009). Yhdyskuntasuunnittelun teorioiden kehitys ja asukkaiden osallistumisen tarkoitus. *Terra* 121: 1, 19–31.

Caragliu, A., C. Del Bo & P. Nijkamp (2011). Smart cities in Europe. *Journal of Urban Technology* 18: 2, 65–82.

Chahal, S., W. Swan & P. Brown (2012). Tenant perceptions and experiences of retrofit. *In Proceedings of Retrofit 2012 Conference*, 24-26. University of Salford, Salford.

Chatterton, P. (2013). Towards an agenda for post-carbon cities: Lessons from Lilac, the UK's first ecological, affordable cohousing community. *International Journal of Urban and Regional Research* 37: 5, 1654–1674.

Checker, M. (2011). Wiped out by the "greenwave": Environmental gentrification and the paradoxical politics of urban sustainability. *City & Society* 23: 2, 210–229.

Chileshe, N., J.M. Khatib & M. Farah (2013). The perceptions of tenants in the refurbishment of tower blocks. *Facilities* 31: 3/4, 119–137.

Christoff, P. (1996). Ecological modernisation, ecological modernities. *Environmental Politics* 5: 3, 476–500.

Dargan, L. (2009). Participation and local urban regeneration: The case of the New Deal for Communities (NDC) in the UK. *Regional Studies* 43: 2, 305–317.

Davidoff, P. (1965). Advocacy and pluralism in planning. *Journal of the American Institute of Planners* 31: 4, 331–338.

Dempsey, N., G. Bramley, S. Power & C. Brown (2011). The social dimension of sustainable development: Defining urban social sustainability. *Sustainable Development* 19: 5, 289–300.

Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buldings. European Parliament, Council of the European Union. Brussels.

Eames, M., T. Dixon, T. May & M. Hunt (2013). City futures: Exploring urban retrofit and sustainable transitions. *Building Research & Information* 41: 5, 504–516.

EU-GUGLE (2017). EU-GUGLE: Älykkäämpiä kaupunkeja perusparantamalla. 1.1.2017. <http://eu-gugle.eu/fi/>

EU-MODER (2016). EU-MODER: Barriers and needs for new processes and improved tools. 28.4.2017. < http://www.vtt.fi/sites/moder/Pages/Reports-and-papers.aspx>

European Commission (2008). Commission staff working document - Accompanying document to the proposal for a recast of the energy performance of buildings directive (2002/91/EC) - Summary of the impact assessment {COM(2008) 780 final} {SEC(2008) 2864}. Brussels.

European Commission (2011). Commission staff working document - Accompanying document to the proposal for a recast of the energy performance of buildings directive (2002/91/EC) - Summary of the impact assessment {COM(2008) 780 final} {SEC(2008) 2864}. Brussels.

European Commission (2017). European Commission: 2020 Climate & energy package. 1.1.2017. < https://ec.europa.eu/clima/policies/strategies/2020_fi>

Eurostat (2014). Living conditions in Europe. Publications Office of the European Union, Luxembourg.

Fawcett, T. (2014). Exploring the time dimension of low carbon retrofit: Owner-occupied housing. *Building Research & Information* 42: 4, 477–488.

Friedrich, P., A. Karlsson & M. Federley (2013). D2.1. Boundary conditions for successful Urban Living Labs. *SubUrbanLab*. 24 p.

Fu, Y. & X. Zhang (2017). Trajectory of urban sustainability concepts: A 35-year bibliometric analysis. *Cities* 60, 113–123.

Galvin, R. (2014). Why German homeowners are reluctant to retrofit. *Building Research & Information* 42: 4, 398–408.

Ghomashchi, V. (2012). Building sustainability through collaborative planning. *International Journal of Sustainable Development and Planning* 7: 1, 14–25.

Gibson, R. (2006). Beyond the pillars: Sustainability assessment as a framework for effective integration of social, economic and ecological considerations in significant decision-making. *Journal of Environmental Assessment Policy and Management* 8: 3, 259–280.

Glad, W. (2012). Housing renovation and energy systems: The need for social learning. *Building Research & Information* 40: 3, 274–289.

Golubchikov, O. & P. Deda (2012). Governance, technology, and equity: An integrated policy framework for energy efficient housing. *Energy Policy Journal* 41, 733–741.

Gram-Hanssen, K. (2014). Retrofitting owner-occupied housing: Remember the people. *Building Research & Information* 42: 4, 393–397.

Gupta, R. & S. Chandiwala (2010). Understanding occupants: Feedback techniques for large-scale low-carbon domestic refurbishments. *Building Research & Information* 38: 5, 530–548.

Gustavsson, E. & I. Elander (2016). Sustainability potential of a redevelopment initiative in Swedish public housing: The ambiguous role of residents' participation and place identity. *Progress in Planning* 103, 1–25.

Haines, V. & V. Mitchell (2014). A persona-based approach to domestic energy retrofit. *Building Research & Information* 42: 4, 462–476.

Hajer, M. (1995). *The politics of environmental discourse: Ecological modernisation and the policy process*. 344 p. Oxford University Press, New York.

Hauge, Å.L., J. Thomsen & E. Löfström (2013). How to get residents/owners in housing cooperatives to agree on sustainable renovation. *Energy Efficiency* 6: 2, 315–328.

Healey, P. (1992). Planning through debate: The communicative turn in planning theory. *The Town Planning Review* 63: 2, 143–162.

Hernández, D. & D. Phillips (2015). Benefit or burden? Perceptions of energy efficiency efforts among low-income housing residents in New York City. *Energy Research & Social Science* 8, 52–59.

Hielscher, S., G. Seyfang & A. Smith (2011). Community innovation for sustainable energy, *CSERGE Working Paper* 3 (2011). Norwich.

Holopainen, R., M. Federley & P. Tuominen (2016). Evaluating Urban Living Labs for modernisation and social upgrading of suburban areas in Finland and Sweden. *In Proceedings of 20th CIB World Building Congress*. Tampere.

Horelli, L. & H. Kukkonen (2002). Osallistuminen, ympäristö, vuoropuhelu. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 243–259. Gaudeamus, Helsinki.

Huber, J. (2000). Towards industrial ecology: Sustainable development as a concept of ecological modernization. *Journal of Environmental Policy & Planning* 2: 4, 269–285.

Häkkinen, T. & K. Belloni (2011). Barriers and drivers for sustainable building. *Building Research & Information* 39: 3, 239–255.

Häkli, J. (2002). Kansalaisosallistuminen ja kaupunkisuunnittelun tiedonpolitiikka. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 110–124. Gaudeamus, Helsinki.

IEA (2013). IEA EBC ANNEX 51; Case studies and guidelines for energy efficient communities. Fraunhofer IRB Verlag, Bonn.

OECD/IEA (2013). Transition to Sustainable Buildings. IEA Publishing, Paris.

Ilmastokatu (2017). Ilmastokatu - Climate Str. 1.1.2017. <www.ilmastokatu.fi>

Janssens, B. & M. Van Dorst (2012). Ecological building design measures as a powerful leverage for social sustainability and vice versa : A "real-life" perspective from grouped housing projects. *In PLEA2012 - 28th Conference, Opportunities, Limits & Needs Towards an environmentally responsible architecture*, 1-7. Lima.

Jauhiainen, J. (2002). Kaupunkiliikkeet ja kamppailu osallisuudesta kaupunkitilaan. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 125–140. Gaudeamus, Helsinki.

Jensen, J.O., M.S. Jorgensen, M. Elle & E.H. Lauridsen (2012). Has social sustainability left the building? The recent conceptualization of "sustainability" in Danish buildings. *Sustainability: Science, Practice, & Policy* 8: 1, 94–105.

Jensen, J.O. & K. Gram-Hanssen (2008). Ecological modernization of sustainable buildings: A Danish perspective. *Building Research & Information* 36: 2, 146–158.

de Jong, M., S. Joss, D. Schraven, C. Zhan & M. Weijnen (2015). Sustainable–smart–resilient–

low carbon–eco–knowledge cities; Making sense of a multitude of concepts promoting sustainable urbanization. *Journal of Cleaner Production* 109, 25–38.

Joss, S (2011). Eco-cities: The mainstreaming of urban sustainability – key characteristics and driving factors. *International Journal of Sustainable Development and Planning* 6: 3, 268–285.

Joss, S., R. Cowley & D. Tomozeiu (2013). Towards the "ubiquitous eco-city": An analysis of the internationalisation of eco-city policy and practice. *Urban Research & Practice* 6: 1, 54–74.

Jänicke, M. (2008). Ecological modernisation: New perspectives. *Journal of Cleaner Production* 16: 5, 557–565.

Karlsson, A., M. Federley, E. Bonnier, R. Holopainen, K. Buhr & P. Tuominen (2016). Evaluation of the Urban Living Labs in Alby and Peltosaari. *SubUrbanLab*. 87 p.

Karvonen, A. (2013). Towards systemic domestic retrofit: A social practices approach. *Building Research & Information* 41: 5, 563–574.

Kasioumi, E. (2011). Sustainable urbanism: Vision and planning process through an examination of two model neighbourhood developments. *Berkeley Planning Journal* 24: 1, 91–114.

Kastner, I. & P.C. Stern (2015). Examining the decision-making processes behind household energy investments: A review. *Energy Research & Social Science* 10, 72–89.

Keiner, M. (2005). Re-emphasizing sustainable development — the concept of "evolutionability." *Environment, Development and Sustainability* 6: 4, 379–392.

Kettunen, P. (2002). Miksi osallistumisesta puhutaan? Osallistumisen kehittäminen suomalaisissa kunnissa. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 18–35. Gaudeamus, Helsinki.

Koch, C. & M. Buser (2015). Sitting between two chairs: Introducing social sustainability in three large Swedish contractor companies. *In* A. B. Raidén & E. Aboagye-Nimo (eds.): *Procs 31st Annual ARCOM Conference*, 397-406. Association of Researchers in Construction Management, Lincoln.

Koskiaho, B. (2002). Onko osallisuus vahvaa demokratiaa? Maankäyttö- ja rakennuslain

soveltamisesta. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 36–57. Gaudeamus, Helsinki.

Kovács, G. (2009). Joseph A. Schumpeter, ympäristöoptimismi ja teknologian sosiologia. *In* Massa, I. (eds): *Vihreä teoria*. Gaudeamus, Helsinki. p. 406.

Kuronen, M., J. Luoma-Halkola, S. Junnila, C. Heywood & W. Majamaa (2011). Viable urban redevelopments - exchanging equity for energy efficiency. *International Journal of Strategic Property Management* 15: 3, 205–221.

Kyrö, R., J. Karhu, M. Kuronen & S. Junnila (2012). Generating low-energy alternatives for neighbourhood-scale urban residential refurbishment through occupant involvement. *In Joint International CIB W070, W092 & TG72 Conference: Delivering Value to the Community*, 431-436. Aalto University.

Langhelle, O. (2000). Why ecological modernization and sustainable development should not be conflated. *Journal of Environmental Policy & Planning* 2: 4, 303–322.

Lapintie, K. (2002). Tarinoita takapihalta : asukkaan ja asiantuntijan kohtaamisesta. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 158–179. Gaudeamus, Helsinki.

Lawson, L. & A. Kearns (2010). Community engagement in regeneration: Are we getting the point? *Journal of Housing and the Built Environment* 25: 1, 19–36.

Lemprière, M. (2016). Using ecological modernisation theory to account for the evolution of the zero-carbon homes agenda in England. *Environmental Politics* 25: 4, 690–708.

Levine, M., D. Ürge-Vorsatz, K. Blok, L. Geng, D. Harvey, S. Lang, G. Levermore, A. Mongameli Mehlwana, S. Mirasgedis, A. Novikova, J. Rilling, H. Yoshino (2007). Residential and commercial buildings. *In* B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds.): *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* 387-446. Cambridge University Press, Cambridge; New York.

Lidskog, R. & I. Elander (2012). Ecological modernization in practice? The case of sustainable development in Sweden. *Journal of Environmental Policy & Planning* 14: 4, 411–427.

Lindblom, C. (1959). The science of "muddling through." *Public administration review* 19: 2, 79–88.

Marsal-Llacuna, M.L. (2017). Building universal socio-cultural indicators for standardizing the safeguarding of citizens' rights in smart cities. *Social Indicators Research* 130: 2, 563–579.

Massa, I. (2009). *Vihreä teoria*. 406 p. Gaudeamus, Helsinki.

Mayhew, S. (2009). *A Dictionary of Geography*. 560 p. Oxford University Press, Oxford.

Mega, V. (2000). Cities inventing the civilisation of sustainability: An odyssey in the urban archipelago of the European Union. *Cities* 17: 3, 227–236.

Meijer, F., L. Itard & M. Sunikka-Blank (2009). Comparing European residential building stocks: Performance, renovation and policy opportunities. *Building Research & Information* 37: 5–6, 533–551.

Mickaityte, A., E.K. Zavadskas, A. Kaklauskas & L. Tupenaite (2008). The concept model of sustainable buildings refurbishment. *International Journal of Strategic Property Management* 12: 1, 53–68.

Miezis, M., K. Zvaigznitis, N. Stancioff & L. Soeftestad (2016). Climate change and buildings energy efficiency - the key role of residents. *Environmental and Climate Technologies* 17: 1, 30–43.

Mol, A.P.J. & G. Spaargaren (2009). Ecological modernisation and industrial transformation. *In* Castree, N., D. Demeritt, D. Liverman & B. Rhoads (eds.): *A Companion to Environmental Geography*, 253-265. Blackwell Publishing Ltd, Chichester.

Mol, A.P.J. & G. Spaargaren (2000). Ecological modernisation theory in debate: A review. *Environmental Politics* 9: 1, 17–49.

Mol, A.P.J., G. Spaargaren & D. Sonnenfeld (2014). Ecological modernization theory: Taking stock, moving forward. *In* Lockie, S., D. A. Sonnenfeld, & D. R. Fisher (eds.): *Routledge International Handbook of Social and Environmental Change*, 15-30. Routledge, New York.

Monfaredzadeh, T. & R. Krueger (2015). Investigating social factors of sustainability in a smart city. *Procedia Engineering* 118, 1112–1118.

Murphy, K. (2012). The social pillar of sustainable development: A literature review and framework for policy analysis. *Sustainability: Science, Practice, & Policy* 8: 1, 15–29.

Murphy, R. (2015). The emerging hypercarbon reality, technological and post-carbon utopias, and social innovation to low-carbon societies. *Current Sociology* 63: 3, 317–338.

Neuvonen, A., J. Wangel, C. Liljenström, M. Annala, M. Parkkinen, A. Valladares, K. Mattila & V. Vesanen (2014). Smart Retro – novel way to develop cities. Demos Helsinki, Helsinki.

Niemenmaa, V. (2002). Asukasaktiivien ääni : osallistuminen ja osallisuus Helsingin kestävän kehityksen prosessissa. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 200–217. Gaudeamus, Helsinki.

Olsson, S., T. Malmqvist & M. Glaumann (2015). Managing sustainability aspects in renovation processes: Interview study and outline of a process model. *Sustainability* 7: 6, 6336–6352.

Opp, S.M. (2016). The forgotten pillar: A definition for the measurement of social sustainability in American cities. *Local Environment* 22: 3, 286–305.

Pakarinen, T. (2002). Osallistumisen taustalla olevat ajatusmallit ja osallistumisen tulevaisuus. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 75–91. Gaudeamus, Helsinki.

Persson, J. & S. Grönkvist (2015). Drivers for and barriers to low-energy buildings in Sweden. *Journal of Cleaner Production* 109, 296–304.

Power, A. (2008). Does demolition or refurbishment of old and inefficient homes help to increase our environmental, social and economic viability? *Energy Policy* 36, 4487–4501.

Rapoport, E. (2014). Utopian visions and real estate dreams: The eco-city past, present and future. *Geography Compass*, 8: 2, 137–149.

Reames, T.G. (2016). A community-based approach to low-income residential energy efficiency participation barriers. *Local Environment* 21: 12, 1449–1466.

Reid, L., K. McKe & J. Crawford (2015). Exploring the stigmatization of energy efficiency in the UK: An emerging research agenda. *Energy Research & Social Science* 10, 141–149.

Roininen, J. & E. Oksanen (2011). Asukaslähtöinen arviointi lähiöiden peruskorjauksessa –

Maunulan ASLA–malli. Yhdyskuntasuunnittelun tutkimus- ja koulutuskeskus (YTK) Aalto-yliopisto.

Saaranen-Kauppinen, A. & A. Puusniekka (2006). KvaliMOTV - Menetelmäopetuksen tietovaranto. *Tampere: Yhteiskuntatieteellinen tietoarkisto*. 1.1.2017. < <http://www.fsd.uta.fi/menetelmaopetus/>

Sairinen, R. (2009). Ympäristöhallinnan monet teoriat. *In* Massa, I. (eds.): *Vihreä teoria*, 130-150. Gaudeamus, Helsinki.

Schatz, L. & D. Rogers (2016). Participatory, technocratic and neoliberal planning: An untenable planning governance ménage à trois. *Australian Planner* 53: 1, 37–45.

Sharifi, A. (2016). From garden city to eco-urbanism: The quest for sustainable neighborhood development. *Sustainable Cities and Society* 20, 1–16.

Staffans, A. (2002). Kilpailu tiedosta kiristyy : supertyypit eletyn kaupungin tyyppeinä. *In* Bäcklund, P., J. Häkli, & H. Schulman (eds): *Osalliset ja osaajat: kansalaiset kaupungin suunnittelussa*, 180–199. Gaudeamus, Helsinki.

Stambej, A. & R. Linna (n.d.). Asukaslähtöisyys olennainen osa putkiremonttia. Vahanen Yhtiöt.

Stieß, I. & E. Dunkelberg (2013). Objectives, barriers and occasions for energy efficient refurbishment by private homeowners. *Journal of Cleaner Production* 48, 250–259.

Strandberg, M. & W. Lerme (2014). Towards a sustainable Hammarkullen. Department of Development in Angered.

Sunikka-Blank, M. & R. Galvin (2012). Introducing the prebound effect: The gap between performance and actual energy consumption. *Building Research & Information* 40: 3, 260–273.

Sunikka, M. (2006). Energy efficiency and low-carbon technologies in urban renewal. *Building Research & Information* 34: 6, 521–533.

Suschek-Berger, J. & M. Ornetzeder (2010). Cooperative refurbishment: Inclusion of occupants and other stakeholders in sustainable refurbishment processes in multi-floor residential buildings. *Open House International* 35: 2, 33–38.

Tweed, C. (2013). Socio-technical issues in dwelling retrofit. *Building Research & Information* 41: 5, 551–562.

UN General Assembly (2000). United Nations Millennium Declaration. A/RES/55/2.

UN (2014). World Urbanization Prospects: The 2014 Revision, Highlights. United Nations, Department of Economic and Social Affairs, Population Division. New York. 27 p.

UN General Assembly (2015). Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1.

UN-Habitat (2016). World Cities Report: Urbanization and Development: Emerging Futures. UN-HABITAT, Nairobi. 262 p.

UNEP (2012). Cities and Buildings, UNEP DTIE Sustainable Consumption & Production Branch, Paris. 16 p.

UNEP SBCI (2009). Buildings and Climate Change. UNEP DTIE Sustainable Consumption & Production Branch. Paris. 56 p.

Vallance, S., H.C. Perkins & J.E. Dixon (2011). What is social sustainability? A clarification of concepts. *Geoforum* 42: 3, 342–348.

Virtanen, K., R. Rahtola, R. Vahanen, P. Korhonen, H. Levamo, J. Salmi & J. Taskinen (2005). Asukaslähtöisen perusparantamisen kehitystarpeet: IKE-esitutkimus. 80 p. *Suomen ympäristö 768, Ympätistöministeriö, Asunto- ja rakennusosasto.* Libris Oy, Helsinki.

Vlasova, L. & K. Gram-Hanssen (2014). Incorporating inhabitants everyday practices into domestic retrofits. *Building Research & Information* 42: 4, 512–524.

VTT & ITL (2016). Urban Living Labs as arenas for co-creation in urban areas. *SubUrbanLab*. 12 p.

WCED (1987). Report of the World Commission on Environment and Development: Our Common Future. Oxford University Press, Oxford. 27 p.

Webber, P., A. Gouldson & N. Kerr (2015). The impacts of household retrofit and domestic energy efficiency schemes: A large scale, ex post evaluation. *Energy Policy* 84, 35–43.

Wilson, C., L. Crane & G. Chryssochoidis (2015). Why do homeowners renovate energy efficiently? Contrasting perspectives and implications for policy. *Energy Research & Social Science* 7, 12–22.

Winston, N. (2009). Urban regeneration for sustainable development: The role of sustainable housing? *European Planning Studies* 17: 12, 1781–1796.

York, R., E.A. Rosa & T. Dietz (2010). Ecological modernization theory: Theoretical and empirical challenges. *In* Redclift, M. & G. Woodgate (eds.): *The International Handbook of Environmental Sociology*, 77-90. Edward Elgar Publishing Ltd., Cheltenham.

Appendix. Interview frame.

1) **Background information (5 min.)**
   - **Respondent**

     o Are you employed, retired, or unemployed?

     o Are you an owner occupant or renter?

     o Are you a member of HCB? Do you participate in any other neighbourhood activity?

     o Do the neighbours in your HC know each other?

     o Do people in your HC participate in HCMs? Are there any other meetings?

   - **Neighbourhood, HC, apartment**

     o What is the housing type?

     o What is the building year?

     o How long have you lived in this HC? And in the area?

     o Why did you choose to live in this house and area?

     o Are you planning to move? Why?

     o What is good and bad in this apartment, house, and area?

2) **Refurbishment and results (20 min.)**
   - **General information**

     o What was done?

     o Who were the main actors and where did the initiative come from?

     o How was the refurbishment funded?

     o Were there any other related social activities or energy advising?

   - **Before: introduction, attitudes, motives**

     o How was the refurbishment introduced and by whom?

     o Were you more pro or against the refurbishment at firts? How about other residents? Did the voices pro or against lead the conversation?

     o Did you have previous good or bad experiences of renovations or had you heard of such?

     o What worries did you have related to the refurbishment?

- o What mostly interested you in the refurbishment? What was your main motive to have it done?
- o What convinced you? Did someone have a particularly big role in convincing you?
- o What do you believe are the biggest motives for residents to conduct or not conduct refurbishments?
- o Were there any trade-offs made at the expense of energy efficiency?

- **Phases**
  - o Tell about the phases of the refurbishment: what happened before, during and after? Did everything go as planned?
  - o Did the HC and the residents have enough time for decision making and preparing?
  - o Did the refurbishment cause disturbance? What kind? Did you get informed about it beforehand? How?
  - o Which one do you think is a better option: a large refurbishment at once or a step-by-step approach?

- **Thoughts afterwards**
  - o What were your needs in the refurbishment? Were those taken into account?
  - o Was there one solution for everyone or were individual options offered?
  - o Are you happy with the end result? What is the biggest benefit?
  - o Were the works finished at once? Is there still something you would like to change?
  - o Did anything in your living change because of the refurbishment, e.g. new technology?
  - o Do you believe the refurbishment has been beneficial for the value and livability of the house and the area?
  - o Would you do this again? Could you consider future refurbishments?
  - o Do you think you would have agreed without outside initiative or funding?

3) **Participation (20 min.)**
- **Information**

- Did the residents and other stakeholders have a common understanding of the goals and the process?
- Were stakeholder roles and responsibilities clear?
- Were the benefits and disturbances clear for you before starting? Did you know what will happen and when?
- Did the information increase understanding or affect positively the attitude towards the refurbishment?
- Did residents know when they had a chance to get information and tell your opinion?
- Did you know in all phases who to contact if you had questions? Was this instance easily approachable?
- Do you think there should be one specific contact person for residents?
- Was the information you received in different phases of refurbishments: continuous, timely, coherent, clear, understandable, practical, trustworthy, open, personal, specific, illustrative? If not, can you give an example?
- Did residents communicate amongst themselves before/during/after?

- **Depth**

  - Could residents affect what will be done and how things will be done, e.g. budget and schedule? What things could residents affect? When?
  - Is there something you would have wanted to affect more?
  - Were the refurbishment needs mapped from residential point of view?
  - Were the residents present in planning and decision making?
  - Were residents presented with a ready-made plan? Was it a good or a bad thing?
  - Was the knowledge of residents used?
  - Were residents asked for feedback afterwards?
  - Do you think residents affected/could affect the end result beneficially? Do you think participation could make them more satisfied?
  - When do you think residential participation is most important?

- **Roles**

  - How would you describe the roles of HCB members and other residents, and owner occupants and renters?

- Did information go to everyone?
- Could everyone participate? Should everyone participate?
- Did the participant represent other residents?
- Is there some group of residents who should be encouraged to participate more?

o Did someone need to do an excessive amount of work?

o Do you feel other stakeholders did their job well? Were they trustworthy? Did the communication work?

o What increased or decreased your trust towards other stakeholders and the refurbishment in general?

o Should the resident be a key stakeholder? Was the residents' position strong?

- **Situation afterwards**

o Has communication within the house changed when compared to before the refurbishment? How about between residents and other stakeholders? What things are being talked about?

o Have experiences been shared within the neighbourhood?

o Do you feel more engaged in developing your house or neighbourhood now?

4) **Environment and energy relationship (10 min.)**

o Is energy usage visible in your everyday life and how? Do you speak about it in your household or with neighbours? Has anything changed compared to the time before refurbishment?

o Do you live environmentally friendly? How about the people in your closest circle?

o Do you follow environmental discussion in the media?

o Do you believe that an individual can have an effect on environmental issues? How about a community?