Not for Sale

How home grown Scandinavian eco-cities take climate change imaginaries beyond market mechanisms

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Abstract:

Inter-governmental climate talks have, over a twenty-year period, had little success in implementing measures to mitigate human-induced climate change. Their fundamental perspective, one of economic rationality, has not provided a compelling or effective basis for achieving their desired goals. Over the same interval, at the local scale, various constituencies have come together to address climate change by developing communities that allow their residents to live a lifestyle that includes concrete measures that do deal with the problems of climate change. By taking a perspective that emphasises ecological rationality, these eco-communities and eco-villages are challenging the status quo.

This thesis examines four Scandinavian eco-city case sites and uses narrative walking interviews (where in-person observations were made of the characteristics of the built environment), the results of Google Web searches (to examine how these sites are characterised in English digital media), critical literature review, and comparative analysis. It then applies the theoretical frameworks of Critical Institutional Theory and Strategic, Values-based Planning Theory to examine how it is that these efforts have succeeded, to determine who were the key decision makers and who benefited from these projects, and to see what lessons about equity can be drawn from these local actions.

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Neither cities nor places in them are unordered, unplanned; the question is only whose order and whose planning, for what purpose?
- Peter Marcuse (1995, 244)

(We must) make a concerted effort to help demystify ideologies of growth, development and consumption as cultural systems geared to the reproduction of grossly unequal global systems of resource distribution.
– Alf Hornborg (2008, 5)

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1. Introduction

There's an old proverb that "Money is the root of all evil." The lure of quick, short-term monetary gain is what has lulled people into believing stories about 'the good life', served up in such exotic and diverse settings as a hand of cards at a blackjack table in Monaco, at the slot machines in Las Vegas, at horse races in Dubai, or at ring-side of a bloody cockfight in London. Whether in a lavish Mediterranean casino or on the hard trading room floor of the New York Stock Exchange, the lure of incentives to gamble with financial instruments for monetary gain remains just as enticing to those who buy into the game.

Shortly after the ripple effects of the 'Made in the USA' financial crisis in 2008 began to be felt by people across the United States, I noticed that a graffiti artist in Boston had scrawled on the side of a grey concrete building, "When you die, whoever has the most stuff wins." The deep irony and dark comedic undertones of this message stuck with me thanks to its wittiness, not unlike that of the social critic and comedian George Carlin, whose comedy often challenged the very neoliberal market rules which North Americans, Europeans and increasingly others around the world are now allowing to govern our daily lives. We dutifully follow the dictates of an ideology that urges us to drive to accumulate ever more financial capital. But as a result, we are failing to notice an ecological blind spot that alienates us from our *ecological rationality*, cultivated over the millennia of co-evolving as culturally diverse beings who constantly co-create new ways of flourishing and sustaining life projects with other human beings and organisms on the planet. Yet, in spite of allowing our cultivated ecological rationality to take a back seat to financial accumulation imperatives, we seem no closer to attaining any sense of financial security, as many North American and European families suffer with consumer debt, and even entire states fall ever deeper into financial debt as the possibility of sovereign default continues to loom.

Much akin to the rising personal and sovereign debt loads that threatens to spiral out of control in our financial environment, the level of human-made carbon

dioxide in the atmosphere of our physical environment also continues to rise at an alarming rate. When the Kyoto Protocol came into force in February 2005, it was heralded as a way to reign in greenhouse gas emissions using a combination of market mechanisms, featuring a trading scheme for carbon pollution permits, to be used in combination with binding national commitments for emission reductions by the Organisation for Economic Cooperation and Development (OECD) countries in the Global North, also known as the Annex 1 Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

As described on the UNFCCC's Web site, the market-based *Kyoto Protocol mechanisms* are the International Emissions Trading mechanism, the Clean Development Mechanism and the Joint Implementation mechanism. However, in spite of the attempted financialisation of carbon through these market mechanisms, the promised stabilisation of carbon emissions has not materialized. Instead, emissions have not only continued to increase, they have skyrocketed to new heights. In the last ten years, emissions have continued to typically climb by 3 percent annually, and in 2010 emissions jumped by 5.9 percent, which was the largest rate of growth of emissions ever recorded (Gillis 2011), a mark reached just one year after the leaders met in December 2009 at the climate talks in Copenhagen, where they agreed to uphold their Kyoto commitments.

And yet, some national negotiators at the inter-governmental climate talks hosted by the UNFCCC in June 2014, as well as lobbyists from the business community, continued to push for even more *laissez faire*, voluntary, market-based, profit-oriented financialisation solutions, whether in the form of carbon pollution offsets, as carbon pollution permit trading, or as payments for environmental services. Like a gambler in a casino, cashing in their rent money to buy more chips in the belief that their luck is about to change, think-tanks like the Centre for European Policy Studies (CEPS), business lobbyists like the International Emissions Trading Association (IETA), and negotiators representing the United States all cashed in their remaining political capital, betting that more of the same *economic rationality* would win the climate battle. Whether sitting at linen-covered tables in official plenaries or peppering unofficial side event talks with

neoliberal market ideals, these market mechanism advocates tried again and again to steer the discussion towards the dream of 'green' economic growth win-falls, as they optimistically proposed that world leaders continue to gamble on the future liveability of the planet with tweaks to the existing failed emissions trading system (ETS) in Europe and *new* market mechanisms. They did so even though these new market mechanisms have yet to be defined, and in spite of the fact that the existing carbon emissions trading system, and the other existing market mechanisms under the Kyoto Protocol, have utterly failed to yield any noticeable atmospheric carbon reductions.

As national government participants at the inter-governmental climate talks seem too paralyzed to reach an agreement to stop fossil fuel combustion and their resulting greenhouse gas emissions from both individuals and industry alike, many observers, scientists and ordinary citizens have begun to point to the failure of the Kyoto Protocol to reign in emissions as a sign that *national governments* are unwilling or perhaps even incapable of acting. "International agreements don't work and we can't expect governments to do anything based on what we've seen so far from Kyoto," one scientist said to me in confidence. However, there are numerous international treaties that national governments have formulated, agreed to and enforced in the past, such the as the Chicago Convention on International Civil Aviation, the United Nations Convention on the Law of the Sea (UNCLOS), and most notably (in this context) the Vienna Convention for the Protection of the Ozone Layer along with its legally binding Montreal Protocol on Substances that Deplete the Ozone Layer (also known as simply The Montreal Protocol). As the United Nations Environment Programme's Ozone Secretariat points out on their Web site, the original Montreal Protocol was agreed on in September 1987, a mere 28 months after the Antarctic ozone hole was reported by members of the British Antarctic Survey in Nature in May 1985 (Farman et al. 1985). The Montreal Protocol entered into force on 1 January 1989, and in 2014 nations celebrated twenty-five years of successfully controlling ozone-depleting substances under the Montreal Protocol. With its binding timetable upon which substances must be phased out and eventually eliminated, "The Montreal Protocol - one of the world's most successful environmental

treaties - has protected the stratospheric ozone layer and avoided enhanced UV radiation reaching the earth's surface," said UN Under-Secretary-General and UNEP Executive Director Achim Steiner in September 2014 after the release of *The Assessment for Decision-Makers, a summary document of the Scientific Assessment of Ozone Depletion 2014*, published by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO), in which 300 scientists attributed the success of the Montreal Protocol to the "concerted international action against ozone depleting substances" (UNEP 2014b). "The Montreal Protocol community, with its tangible achievements, is in a position to provide strong evidence that global cooperation and concerted action are the key ingredients to secure the protection of our global commons," Steiner added (UNEP 2014b).

Meanwhile, the United Nations Framework Convention on Climate Change (UNFCCC) international treaty, signed in at the Earth Summit in June 1992 and entered into force in March 1994, along with its subsequent legally binding Kyoto Protocol that was first signed in 1997, and then later ratified by nations before it came into force in 2005, has not resulted in a reduction of carbon emissions in the nine years since it was ratified. Given the success of other international agreements, most notably the Montreal Protocol, it is worth asking why there has been such a difference in results. The research literature contains a variety of excellent analyses that have already been done in an attempt to explain why the Kyoto Protocol has failed to yield results compared with the Montreal Protocol. The blame is laid upon various causal influences ranging from geopolitical and economic rivalries between various polluting actors at the national level (such as China, India and the United States) happening concurrently with various domestic deregulatory pressures from industry exerted on the US Congress (Sunstein 2008; Magraw 2008, Orszag and Dinan 2008), to a lack of political courage of "governments to govern" (Monbiot 2014), and finally all the way down to an unwillingness to regulate specific gases and sectors individually (Barrett 2007, Barrett 2008).

This study will not re-examine those debates. Instead, I take a critical view of

their conclusions and use that as a point of departure. My underlying contention is that the Kyoto Protocol seems to be less of a *failure of international agreements* or a *failure of governments*, and more of a *failure of the notion of the usefulness of the financialisation of carbon*, where using market mechanisms was held up as the idealised solution, based on a model of how people function in the world driven by an underlying *economic rationality*. It seems likely that it is this same, incomplete notion of *economic rationality*, being used by national governments at the international inter-governmental climate talks, that has ensnared national negotiators in a net of ever expanding financialisation that has brought talks to a virtual standstill. The irony of the calls by negotiators from the US, the UK, Australia and some European governments to actually increase the scope of financialisation is that those calls are founded upon using the concept of *economic rationality* to ostensibly solve a problem that has been largely caused by the application of the very same economic rationality that created the problem (Plumwood 2002). As Naomi Klein wrote in September 2014 in an article published in the Guardian:

> The idea that only capitalism can save the world from a crisis it created is no longer an abstract theory; it's a hypothesis that has been tested in the real world. We can now take a hard look at the results: at the green products shunted to the back of the supermarket shelves at the first signs of recession; at the venture capitalists who were meant to bankroll a parade of innovation but have come up far short; at the fraud-infested, boom-and-bust carbon market that has failed to cut emissions. And, most of all, at the billionaires who were going to invent a new form of enlightened capitalism but decided, on second thoughts, that the old one was just too profitable to surrender (Klein 2014b).

While national governments have been trapped in twenty years of inter-governmental climate talks that have become increasingly mired in the carbon financialisation quicksand into which the Kyoto Protocol has already sunk, other levels of government have found other avenues for action to confront the growing climate change crisis. Thus, in spite of the inter-governmental stalemate at the national level, new approaches have emerged in urban spaces in Scandinavia based on new "dreams, imaginaries and experiments" (Bradley and Hedrén 2014, 2). These new approaches in urban spaces, sometimes called urban experiments,

have been planned and implemented as eco-city or eco-community districts by various constellations of actors at the subnational level, based on what could be called an *ecological rationality*. These eco-city and eco-community districts seem to demonstrate that implementation of *socio-ecological interactions* approaches that go beyond merely economic rationality are "not only possible but [are] in fact happening" (Bradley and Hedrén 2014, 2).

The aim of this study is to critically examine some of the eco-city and eco-community urban forms that have manifested at the subnational level that support socio-ecological interactions that effectively combat the physical causes and impacts of climate change, while also addressing social equity needs, even in the absence of an effective international climate change agreement. Examining and comparing a mix of four eco-city and eco-community districts located in the Öresund region of Sweden and Denmark, developed over a twenty-year period between 1994 and 2014, enables the exploration of these socio-ecological interactions. The UNFCCC also had its twentieth anniversary in 2014, so this time frame also provides a consistent temporal framing for how to relate local interactions to those of the international climate talks, particularly since some researchers cite insufficient action by OECD (Annex I) countries in the Global North in implementing the UNFCCC equity principle over the past twenty years as the main grievance held by countries in the Global South.

The research questions that drive this exploration are:

1) How can we explain these examples of local-level actions on climate change over the last 20 years even when climate talks have stalled?

2) Who were the key decision makers and who benefited?

3) What lessons can these local actions teach us about equity?

To address these research questions, this paper will use the following structure:

Chapter 1 provides the context from the global climate talks that motivates my interest in studying climate change actions at the subnational level. I also introduce definitions and key concepts that are used throughout the study.

Chapter 2 describes the philosophical assumptions used to guide the research and the methodological approach used to conduct the study, including some words of caution upon the limitations and generalisability of the findings.

Chapter 3 details the empirical results of my qualitative research on each of the four case sites. Background information on each site is provided, including a discussion on the types of socio-ecological interactions investigated. The current role of urban agriculture is then described at each site, in relationship to land use considerations for climate change emissions reductions, as well as considering how agriculture at the site enhances social sustainability for climate change adaptation.

Then in Chapter 4, I evaluate the empirical findings against two theoretical frameworks, namely Strategic, Values-based Planning Theory and Critical Institutional Theory.

Finally, in Chapter 5, I discuss the relevance of the findings in terms of how we can explain these examples of local-level actions on climate change, including the key decision-makers and beneficiaries, and lessons we can learn from these local about equity. I end this chapter with recommendations for future projects

Before proceeding, I will clarify some terms that I bring up in this paper.

1.1. Economic rationality and ecological rationality

According to E.F. Schumacher in his classic book titled *Small is Beautiful,* current neoliberal economic ideologies function as a "religion of economics" with "the modern trend towards total quantification at the expense of the appreciation of qualitative differences" (Schumacher 1973, 254-55). The concept of *economic rationality* as it is used in this paper refers to the usage coined by critical theorist Val Plumwood. According to Plumwood, "Economic rationality in liberalism is, notoriously, identified with individual self-interest, and further identified in economic rationalism with maximizing outcomes for market players" (Plumwood 2002, 67). Similarly, Alf Hornborg has observed that, "any discussion of how to make the economy sensitive to ecological requirements is severely constrained as long as it is couched in conventional, monetary terms such as the 'costs' of environmental protection or revenue gained from emission permits [since] 'costs' and 'gains' are relations between people, not between people and nature" (Hornborg 2001, 17-18). Both Hornborg and Plumwood call out the inherent anthropocentrism and, thus, instrumentalist approach to nature found in such neoliberal economic rationalities as neoclassical environmental economics, and its popular successor used to underpin the ecosystem services framework, ecological economics.

Environmental economics and ecological economics are both "sub-disciplines of economics" (van den Bergh 2007, 3) that are "concerned with the economic analysis of the causes and the nature of environmental problems and their solutions" (van den Bergh 2007, 4). Environmental economics, with its focus on externalities and the "polluter pays principle" (PPP), emerged in the mid-1960s against the political backdrop of the first environmental revolution that followed the release in 1962 of Rachel Carson's seminal work, *Silent Spring* (Pearce 2002, 58). Ecological economics emerged in the 1990s alongside discussions about sustainable development (van den Bergh 2007, 4-5). The theoretical and methodological approach of "environmental and resource economics is very much dominated by neoclassical microeconomics", and also embraces the notions

of "theories of monetary valuation […] using a range of indicators reflecting physical conditions, costs or prices" (van den Bergh 2007, 5).

Building upon this foundation, ecological economics then attempts to use monetary valuation while also applying "methodological approaches [that] are very much embedded in the use of physical-biological indicators and comprehensive systems analysis" (van den Bergh 2007, 5). Most revealingly, a German empirical survey of economists and economic sustainability researchers conducted in 2006 revealed that respondents from both schools of economic thought supported varying degrees of valuation of natural capital. The ecological economists surveyed conceded that nature could be "substitutable by human-made capital only to a limited extent and its services cannot be valued through monetization" while the neoclassical environmental economists surveyed supported valuation approaches focused on "setting the 'right' prices for environmental goods" (Illge and Schwarze 2006, 11-12). However, there are other ecological economists who treat ecosystem services as a subset of natural capital and think that it is important to apply valuations to ecosystem services based on the belief that "without valuing ecosystem services, like pollination by bees or the water purification of a watershed, society cannot accurately measure the overall impact of our economic decisions" (Zencey 2013). However, even prominent ecological economist Richard Norgaard has warned that using the "current valuation methods only help us 'see' ecosystem services and their values from within our unsustainable economy" (Norgaard 2010).

Thus, for these schools of *economic thought*, both guided by economic rationalities, the end result could manifest as anthropocentric, instrumentalist 'development' outcomes in which monetary prices commoditize nature as natural capital and ecosystem services, in order to create a *market-based value* for a present or future monetary exchange (i.e. exchange value) of nature between people. Thus, the enclosure of the commons is accelerated as it is assigned monetary values for its ability to produce yields, benefits, stocks and flows *to be used by human beings*.

The alternative approach proposed by Plumwood is what she called *ecological rationality*, which recognizes that human beings are "embodied and ecological beings" and, as a result, "our life rationality must involve some kind of compatibility with the biological systems that support our lives" (Plumwood 2002, 67). Ecological rationality also includes the "capacity to correct tendencies to damage or reduce [our] life-support system" and, thus, an ecologically rational society could attain sustainability if its "corrective capacities enable it to make consistently good ecological decisions that maintain viable ecological relationships and coordinate them with its social organisation," by relating "social and individual goals to the ecological communities in which human societies are embedded"(Plumwood 2002, 68). In this study, I explore the extent to which the eco-cities and eco-communities examined at the four Scandinavian case sites are using approaches that could be described as embodiments of applied ecological rationality within urbanized spaces.

1.2. Financialisation and the Principle of Equity at the climate talks

Like debts and the monetary instruments that support them, the greenhouse gases driving climate change are man made. But unlike debts which could be resolved overnight with a global jubilee, climate change requires years of coordination, cooperation, and regulation to enforce limits, particularly among those with short-term economic interests in continuing to extract profits from providing fossil fuels. The atmospheric degradation caused by our continued fossil fuel usage presents a unique threat to both equity among present populations and intergenerational equity with future generations. Equity is a term that derives from notions of fairness and social justice in that "it represents a belief that there are some things which people should have, that there are basic needs that should be fulfilled, that burdens and rewards should not be spread too divergently across the community, and that policy should be directed with impartiality, fairness and justice towards these ends" (Falk et al. 1993, 2). Whereas intergenerational justice refers to how present generations "hold the natural and cultural environment of the Earth in common both with other

members of the present generation and with other generations, past and future' (Weiss, 1990, 8).

In previous attempts to get past quarterly statement driven short-term thinking so they could start to take this longer view, world leaders have attempted to work through the United Nations to secure the needs of both present and future generations. In 1987, the World Commission on Environment and Development (WCED) framed the concept of equity as encompassing both equity for people today as well as *intergenerational equity* as central, when it stated that, "physical sustainability implies a concern for social equity between generations, a concern that must logically be extended to equity within each generation" (WCED 1987, 1). The influence of the WCED definition can be seen reverberating in the definition of equity adopted by 166 nations under the UNFCCC in 1994 in what is commonly referred to as The Principle of Equity in the Convention, which is stated within Article 3, Section 1 as follows:

> The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof (United Nations 1992, 4).

Article 4 elaborates on the principle of "common but differentiated responsibilities and respective capabilities" (CBDR and RC) by also acknowledging the need to recognize "specific national and regional development priorities, objectives and circumstances" (United Nations 1992, 10). However, this framing of equity in terms of intergenerational equity in accordance with "common but differentiated responsibilities and respective capabilities", where developed countries in Europe as well as the US, Canada and Australia "take the lead in combating climate change" to reduce emissions and the "adverse effects thereof" seems to be increasingly missing from the current climate talks. Equity discussions are now increasingly dominated by what is being called by the Group of 77 + China as the need for the developed countries to settle their historical "climate debt" accumulated while "industrialized countries have developed their economies and their populations, by emitting far more than

their fair share of greenhouse gases" according to the Climate and Energy Coordinator for the Friends of the Earth, Dipti Bhatnagar (2014). One possible driver for the Group of 77 + China shifting in their approach to the discussions on equity in recent years from *ensuring inter-generational equity* to *settling historical climate debt* could be traced back to the significance of China overtaking the US as the highest *current* greenhouse gas polluter in 2006 (Vidal and Adam 2007).

Another possible driver could be attributed to the United Nations conference on racism known as "Durban II" in 2008 where writer and activist, Naomi Klein, observed that the movement pushing for "reparations for slavery and the historic crimes of colonialism [...] had shifted its focus to the idea of 'climate debt' — that is, what the developed world, in tangible economic terms, owes to the people of developing nations who will bear (and are already bearing) the brunt of the costs of climate change, but have done little or nothing, historically, to cause it" (Stephenson 2012). In an interview with *The Guardian*, Naomi Klein said, "Then I came across the idea of "climate debt" when I was doing a piece on reparations for *Harper's* magazine. I had a meeting with Bolivia's climate negotiator in Geneva – her name is Angélica Navarro – and she put the case to me that climate change could be an opportunity for a global Green Marshall Plan with the North paying climate debts in the form of huge green development projects" (Mark 2013). In essence, economic justice has been treated increasingly as commensurate with climate justice through the Principle of Equity. According to Klein, "The refusal to accept the importance of economic justice is the reason we have had no climate action. It's just that simple. What has bogged down every round of UN negotiations on climate is the basic principle that the people who are most responsible for creating this crisis should take the lead and bear a heavier burden" (Stephenson 2012). Finally, Klein takes aim at the cynicism of the climate talks since 2009 in her book, *This Changes Everything*, in which she accuses both national governments from both the Global North and Global South of settling on the 2-degree Celsius long term global goal (LTGG) in the nonbinding Copenhagen Accord as a "safe" limit for dodging the worst of climate change as "a highly political choice that has more to do with *minimizing economic disruption* than with protecting the greatest number of people" (Klein 2014).

Regardless of which of these drivers is most actively motivating negotiators at the climate talks, the end result has been a reframing of equity in discussions at the climate talks through the lens of *economic rationality*. This has signalled a shift in equity discussions from the ecological rationality driven by emissions and the needs of future generations, to achieving equity through payments to the Global South and China by those nations with historical responsibility for using more than their fair share of the global carbon 'budget'. At the UNFCCC climate talks that I attended held in Bonn in June 2014, the Group of 77 + China continued to hold firm to this position. Representatives from Brazil, India, and China (who, together with Russia and South Africa, are in an economic group known as the BRICS nations), together with countries in the Less Developed Countries and Least Developed Countries (LDCs) from Africa, Asia and South East Asia, pushed strongly for the historically highest polluters to take the lead in not only cutting their emissions, but also in providing financial support, while also transferring technology. In essence, the current climate talks seem to feature nations who are, first and foremost, demanding *monetary compensation*, implying that providing them with money is in fact commensurate with promoting *equity.* In other words, there is an attempt among national governments at the intergovernmental climate talks to obtain commensurability in *monetary value* now, rather than intergenerational equity, which originally was based on a full range of values, including equitable access to intrinsic values.

The focus on 'climate debt' by negotiators from the Group of 77 + China has left the negotiators championing *equity* as commensurate with monetary value, which implicitly devalues all other socio-ecological assets that cannot be quantified through neoliberal economic tools using instruments of financialisation. This enables natural capital and human capital to be treated as "more or less infinitely substitutable" based on their exchange value, while entirely ignoring the arguments made by citizens, indigenous peoples and civil society groups about use values, including "intrinsic value, existence value and any other intrinsically non-monetizable value of the environment" (Pepper 1998, 5). I propose that this shift in language is an example of how the language and imaginaries from the Global South have been increasingly colonized by the language of neoliberalism. This colonization can be seen in the ardent support of

Brazil and other members of the G77+China for pollution permitting and payment for environmental services (PES) schemes such as the Reducing Emissions from Deforestation and Forest Degradation (REDD) programme, (also known as the UN-REDD Programme), and the REDD+ Programme, which includes the UN-REDD Programme, the Forest Carbon Partnership Facility (FCPF) and Forest Investment Program (FIP), as discussed in multiple sessions at the Bonn June 2014 climate talks.

Biologist and activist Jutta Kill has, since 2000, provided a compelling analysis on why trade with pollution permits is a false solution to the climate crisis, by documenting greenhouse gas emission credit trading behaviour in carbon markets. In her June 2014 report, Jutta Kill provides case studies with evidence that disprove the economic valuation argument that neoclassical and ecological economists alike continue to champion, which is that 'Nature is destroyed because it's invisible to politicians and business', and that only once we create 'nature that capital can see' that the loss of biodiversity and runaway climate change will be stopped (Kill 2014). As the skyrocketing level of greenhouse gas emissions since the signing of the Kyoto Protocol has shown, economic valuation of nature to create pollution permits as Certified Emission Reduction (CER) carbon credits, and providing Payment for Environmental Services (PES), does not necessarily curtail greenhouse gas emissions. The results of the research conducted by Kill and others, along with the requirements stated in the Principle of Equity in Article 3 and Article 4 of the Convention, all point to the need to change drivers of excessive greenhouse gas emissions. However, negotiations seem less concerned with reducing carbon emissions and changing our socio-ecological interactions, and more concerned with increasingly focusing on ways to generate income from the financialisation of carbon through various carbon market trading mechanisms.

Some researchers claim that "the on-going process of globalisation and European integration have shifted authority away from national states up to the European level and down to sub-national levels, with an increasing role of non-state actors" (Kluvánková-Oravská 2010, 14). If this is true, this could be a sign that the

leadership on climate change at the subnational level could have greater influence on climate policy, in spite of national inaction. This paper looks to eco-cities in Sweden and Denmark to see how equity manifests at the subnational level in the context of four Scandinavian eco-city case sites. My research is guided by the original definition of equity found in the Convention, as it applies to intergenerational equity. In the discussion section of the concluding chapter, I will then review what lessons can be learned from how subnational initiatives are implementing climate change actions and promoting intergenerational equity for residents of eco-cities and eco-communities.

2. *Philosophical and methodological approach*

2.1. Philosophical assumptions

My research is conducted from the philosophical perspective of critical realism advocated by Roy Bhaskar (1975, 1993, 1998). In terms of how things can be known, Critical Realism (CR) argues **ontologically** that reality goes beyond what we can observe, measure or interpret based on our knowledge (Sayer 2000). Critical Realism holds that reality is nested in three layers, starting at the top layer being what our senses perceive in the *empirical* domain, followed by the domain of the *actual* in the middle, and finally the domain of what is the *real* in its deepest layer beyond our immediate perceptions (see Figure 1). In other words, all of these layers are components of reality, but only the deepest layer contains real objects. In terms of what is knowable, CR **epistemologically** accepts that the phenomena that can be observed in the empirical domain are products of different causal processes emerging from many interacting structures and mechanisms (Sayer 2000). CR acknowledges the role of social influences in shaping our perception of reality used in constructivism without falling into the total relativism trap found in strong constructivist traditions of philosophy that can paralyse larger scale actions by refusing to go beyond studies of the particular. CR also avoids the positivist trap of attempting to overgeneralize findings into grand theories.

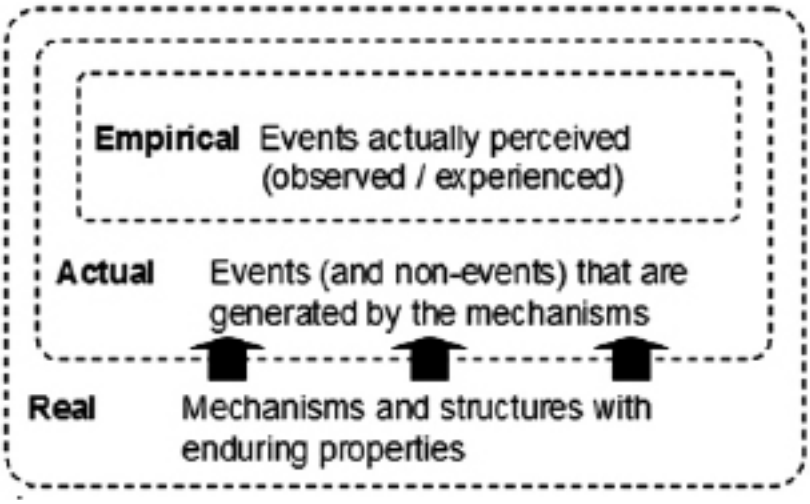

Figure 1: The three domains of the real (stratified ontology of critical realism).

(Source: Johnston and Smith 2010)

Critical realism also provides a valuable way to further distinguish between economic rationality and ecological rationality by making a distinction between the transitive and the intransitive objects of knowledge in the world. Bhaskar (1975) defines these as follows:

> Intransitive objects are the 'real things and structures, mechanisms and processes, events and possibilities of the world; and for the most part they are quite independent of us' (Bhaskar 1975:22). That is, the existence of an intransitive object does not depend on our knowledge or perception of it. Transitive objects, on the other hand, include theories, paradigms, models and methods. These objects are subjective and their existence is dependent on human activity (if people suddenly ceased to exist, transitive objects would cease to exist) (Johnston and Smith 2010).

Based on this framing, economic rationalities are based on *the economy*, which is essentially a man-made model or method of moving goods and services, but most importantly, its existence is dependent on human activity. Unlike the artificial construct we call *the economy*, the Earth in CR terms would be classified as an intransitive object that does not depend on our knowledge or perception of it. The interactions and flows of "material aspects of global society", including the related flows of energy and environmental resources, can be referred to as the "socio-ecological systems" (Hornborg 2009, 238), socio-ecological interactions or socio-environmental interactions. These socio-ecological interactions are an illustration of the transitive interacting with the intransitive.

I am also framing critical realism from within the political ecology branch of critical theory as my guiding perspective on identifying socio-ecological inequity and injustice, since it enables me to reflect critically on the impact of the dominating neoliberal discourse. Part of the process of using a political ecology framing requires the use of reflexivity within each method (i.e. note taking and active reflection) to provide a critical perspective, recognizing how one's own previous life experiences, as well as the current contextual setting of this study, may have impacted my perceptions. The other part of this process is acknowledging the influence of power on myself and on the case site outcomes.

As Alf Hornborg, Michael Foucault, and other social scientists have pointed out, there are powerful social groups that tend to "exert influence over the way in which social processes are defined – and even questioned" (Hornborg 2009, 238). Val Plumwood was critical of environmental scientists from the Global North, acting as the self-appointed Earth "EcoGuardians" who were "unable to recognize their own knowledge as politically situated, hence failing to recognize the need to make it socially inclusive [...] and actively engaged with its boundaries and exclusions" (Plumwood 2002, 68). Plumwood also critiqued scientists for claiming to be dispassionate, disengaged "objective knowers" (Plumwood 2002, 43) who are somehow immune to influence. As Plumwood said, "Disengagement carries a politics, although it is a paradoxical politics in which an appearance of neutrality conceals capitulation to power" (Plumwood 2002, 43). As a result, these scientists use the appearance of detachment to conceal how they are influenced by social, cultural and political privilege, and as well, even financial prejudice from corporate funding patrons. Plumwood points out that, with four out of five scientists employed by corporations that are motivated less by understanding and more by manipulating observations to meet instrumental concerns, the self-appointed EcoGuardians can "miss the fact that their knowledge is produced within – and often reinforces – inegalitarian social structures" (Hintz 2003). Thus, to paraphrase Donna Haraway, rather than seek "a doctrine of objectivity that promises transcendence […] and unlimited power," I will instead engage in a "critical, reflexive relation" of my own perceptions in relationship to the "multiplicity of local knowledges" shared with me by my interlocutors at each site as different forms of situated knowledges (Haraway 1988, 579).

Hornborg, Foucault, Plumwood and other social scientists have all recognized that powerful social groups manipulate the very language used to define boundaries of possibility and shape meaning-making, so it is imperative for social scientists and natural scientists to critically consider the way language is used to define and shape meaning-making possibilities around both the problem and the solution. Hornborg warns that "The language devised to manage socio-ecological 'problems' viewed through such system-serving lenses will naturally constrain

our capacity to actually 'solve' problems in the sense of changing the direction of societal development, which may well require fundamentally reorganizing social relationships. The language of policy and management thus tends to avoid questions of power, conflicts, and inequalities" (Hornborg 2009, 238).

2.2. Narrative walking interviews

I conducted in-person site visits to each case site. As part of my in-person visits to each site, I met with interlocutors who had detailed knowledge of the study areas. In each case, I then used what could be described as a narrative walking interview method. The walks were conducted in English, either one-on-one or in a small group of students from Lund University. Walks lasted between one hour and three hours. The narrative interview roughly follows the process outlined by Uwe Flick (2009, 177-185) but were somewhat less structured. Instead of a biographical account of their self, the interlocutor was asked to talk about the case site itself. Therefore, the probing question to begin the interview was presented in advance over email as some variation of "Can you tell me about the environmental and social aspects of this area?" During the narrative walking interview, further "probing" would take place to gather "narrative fragments" that were not yet discussed (Flick 2009, 177). The narrative walking interview (also known as the narrative interview, and the walking interview) methodology can range from unstructured approaches in which "researchers simply wander through the landscape talking to participants", to being completely "highly structured tours" (Evans and Jones 2011, 849).

My methodology was generally less structured in order to give my interlocutors the opportunity to break into asides and provide spontaneous glimpses into their world that would otherwise have likely been excluded if the walking route had been strictly predetermined in advance. Applied geography researchers James Evans and Phil Jones claim that, "It is argued that walking interviews generate richer data, because interviewees are prompted by meanings and connections to the surrounding environment and are less likely to try and give the 'right' answer. Indeed, it seems intuitively sensible for researchers to ask interviewees to talk

about the places that they are interested in while they are in that place" (Evans and Jones 2011, 849).

2.3. Critical literature review

John Creswell defines the *critical literature review* as a method used by "researchers who are trying to summarize extant theory in order to see where theory or research is lacking" whereby the researcher "not only summarizes research but takes an analytical stance towards it" (Creswell 2009). The nature of this research is focused on gathering qualitative observations for comparative analysis, so my aim was not to catalogue each and every instance of where each of these eco-cities and eco-communities are written about in formal and informal publications. What makes this literature review critical is that I used a political ecology lens in my research approach, in order to explicitly consider otherwise hidden power relationships and power influences throughout the data gathering process. The critical literature review also considered the elements that are problematic about the climate change talks, as well as to evaluate more specifically what local and national actors say about each of the case sites through English language media. In terms of sources, my critical literature included both a review of formally published academic journals, government publications, as well as a review of the informally published 'grey literature', including Web sites, blogs, email campaigns, promotional materials online, and email correspondence.

The critical literature review focused on three aspects:

a) The history, ecological sustainability features, actors, urban form elements, funding mechanism for each case site
b) Applying a critical perspective in my literature review to question *power relationships* and confront conformist *business-as-usual framings* when researching various claims being made in both the formally published academic literature and the informally published 'grey literature' from various online digital media sources on the eco-cities and eco-communities themselves, as well as the various theoretical

frameworks that have been attributed to explaining the phenomena explored in this paper, including climate change and urbanization.

c) The content of digital media coverage on each case site based on the content in search hits found through Google searches in English media

Documents, Web sites, articles and reports used for the critical literature review were both sent to me by email from key interlocutors connected with each case site, as well as obtained through using the Google search engine by conducting online searches on the World Wide Web (referred to henceforth as the Web). Examples of the search terms entered into Google that were used to find information included the names of the four case site communities as well as terms such as "ecocity", "ekostad", "ecovillage", "Økosamfund", "green community" and various compound word searches that combined the name of the community and more specific to features such as "association", "governance", "farming", "gardening", "cooperative", "climate change", "global warming", "energy", "energy efficiency", "climate", "climate smart", "SUDS", "sustainable urban drainage", "sustainable", "sustainability", "climate change", "urbanization", "urban agriculture", "organic agriculture", "regenerative agriculture", "permaculture", "green roofs", "agriculture technologies", "technology", "carbon sequestration", "soil organic matter (SOM)", "soil organic carbon (SOC)", "social metabolism", "life cycle analysis (LCA)", and other related terms.

2.4. Comparative analysis: Comparison by similarities

Direct observations from the narrative walking interviews, in combination with the results from the critical literature review, provide the empirical data used in the comparative analysis. Regarding the selection of case sites, Uwe Flick has noted, "Qualitative case-oriented studies tend to restrict the number of cases to numbers between two and four" (Flick 2009, 97). In keeping with Flick's recommendation, I have limited my research to four cases.

The scale at which the comparative analysis is conducted at is the scale of the urban form element. Since definitions vary in the planning literature, I will

adhere to a very simple usage that can be found in actual city practice, rather than more artful definitions found in the architectural literature. Thus, the definition of *urban form* is the "general pattern of building height and development intensity" whereas the *urban form element* is considered to be those "structural elements" that define the city physically, such as natural features, transportation corridors (including the planned fixed rail transit system), open space, public facilities, as well as activity centres and focal elements" (City of Los Angeles Planning Department 1995). I will also extend the definition of structural element to include both physical and social structural elements.

For this granular scale, I have used a qualitative comparative analysis as one of several qualitative methodological tools. Specifically, the *method of agreement* approach pioneered by John Stuart Mill is used, which "argues that if two or more instances of a phenomenon under investigation have only one of several possible causal circumstances" or a recurrent combination of conditions "in common, then the circumstance(s) in which all the instances agree is the cause of the phenomenon of interest" (Ragin 1987). However, this simple technique for seeking patterns of invariance used by itself may lead to faulty empirical generalizations, so I have combined it with what is called the *most different design system*, which, in combination, allows me to look at the sites as *'most different, similar outcome'* cases. Essentially, the *most different design* is not particularly interested in aggregate level units of study (such as countries) since it is suited to research at the more granular "variable-based" level (Guy 1998), as I am doing in studying the urban form elements. Therefore, the principal task when using the *most different design* is to "find relationships among variables that can survive being transported across a range of very different" units of study (Guy 1998).

2.5 Other materials

Some of my observations made during the *ADP Technical experts meeting: Forum on experiences and best practices of Cities and Subnational Authorities in relation to adaptation and mitigation* held on June 10, 2014 (a.k.a. "City Day") and the *ADP*

Technical experts meeting on Land use held on June 11, 2014 during the June 2014 climate talks in Bonn, provided some insightful overall context for how to select criteria for the comparative analysis matrix table. In particular, the discussions on June 11 increased my awareness of the Land Use Land Use Change (LULUC) in urban areas using a landscape perspective.

2.6. Validity, reliability and generalisability

However, there are still limitations in using this approach. For example, even this strategy can create a "false sense of security in the strength of the findings" since the findings may seem to be "generalisable to a wide range of political and social systems" but even with a range of different cases, "the underlying causal process assumed to exist may not, even though it may appear from Berlin […] to Bogota" (Guy 1998, 36-41). For comparative analyses, the *dependent variable* represents the output or effect that is the focus of the study (represented in this paper by the creation of an eco-city or eco-community), whereas the *independent variables* are the inputs that are evaluated in the matrix table to see if they are the source of causal variance (Mills 2008). In this *'most different, similar outcome'* case design, I evaluate the wide range of differences in order to identify the causal variable (or collection of components) that is the crucial similarity, aside from the eco-city/eco-community output (dependent) variable that I started with at each case site.

There is no single agreed upon definition for an eco-city in the literature. Richard Register, author and founder of both the Eco-city Builders and the Urban Ecology non-profit groups, coined the term *ecocity* in his book, *Ecocity Berkeley: Building Cities for a Healthy Future*, published in 1987. Register defines an eco-city as an "ecologically healthy city" wherein "the city design is strongly informed by knowledge of ecology and its design principles" (Fox 2008). On Register's Ecocity Builders Web site, the tremendous diversity of realized eco-city urban forms is also acknowledged by stating, "Because each city is unique, there is no one-size-fits-all ecocity model or one way to get there from where we are now."

In fact, none of the four case sites in this study either specifically refer to Register's definition or acknowledge the work of Ecocity Builders. As a result, the criteria by which I am classifying these projects as eco-cities or eco-communities is that they must have either described themselves, or other *digital media* sources must have classified them, as either an eco-city or an eco-community as a signifier of an ecologically positive urban or peri-urban community. The definition of digital media that I am using in this study is that digital media is any "audio, video, and images that exist in a computer-readable format, and can reside on a local device (CD, DVD, hard drive), or remote location (website)" (University of Guelph 2006).

3. Empirical material: Case sites

In the following section, I present the empirical materials from each of the four case sites. Empirical materials are combined from all the research methods, including the critical literature review and the narrative walking interviews. This was done in order to provide a coherent presentation of urban form elements for each site. I start off with a map to show where each site is located within the Öresund region. Then, for each site, I provide a brief background, followed by how each district is promoted as a model in the digital media. Next, I will break down the different types of socio-ecological interactions. Special attention is given to the current role of urban gardening, particularly since organic regenerative agriculture and permaculture practices provide both physical carbon sequestration and social accessibility benefits. In terms of climate change emission reductions, this study as an underlying assumption recognizes the research that has already been done on the role of land use in general, and regenerative agricultural practices in particular, for enhancing the ability of soil to land use to provide carbon storage to reduce the concentration of carbon dioxide that goes into the atmosphere (Powlson et al. 2011) while also providing ways for communities to increase food security as they attempt to adapt to and cope with a changing climate (Parker et. al 2014). I then provide an inventory of the social access and equity measures implemented in each district. Key physical and social structural elements are discussed for each case site. The detailed *Qualitative comparison* of *socio-ecological interactions by case site* for all physical and social elements observed is presented in Appendix 1. At the end of the section, I present a summary of the key decision makers and who benefited. Next, I will proceed to the theoretical analysis section of the paper, where I will analyse how well each theoretical framework explains the development of the eco-cities and eco-communities that I have selected as my case sites.

The case sites are all located in the Öresund region, straddling both Denmark and Sweden around the body of water called the Öresund Strait that separates the two Scandinavian countries (see Figure 2) situated in the Baltic Sea region.

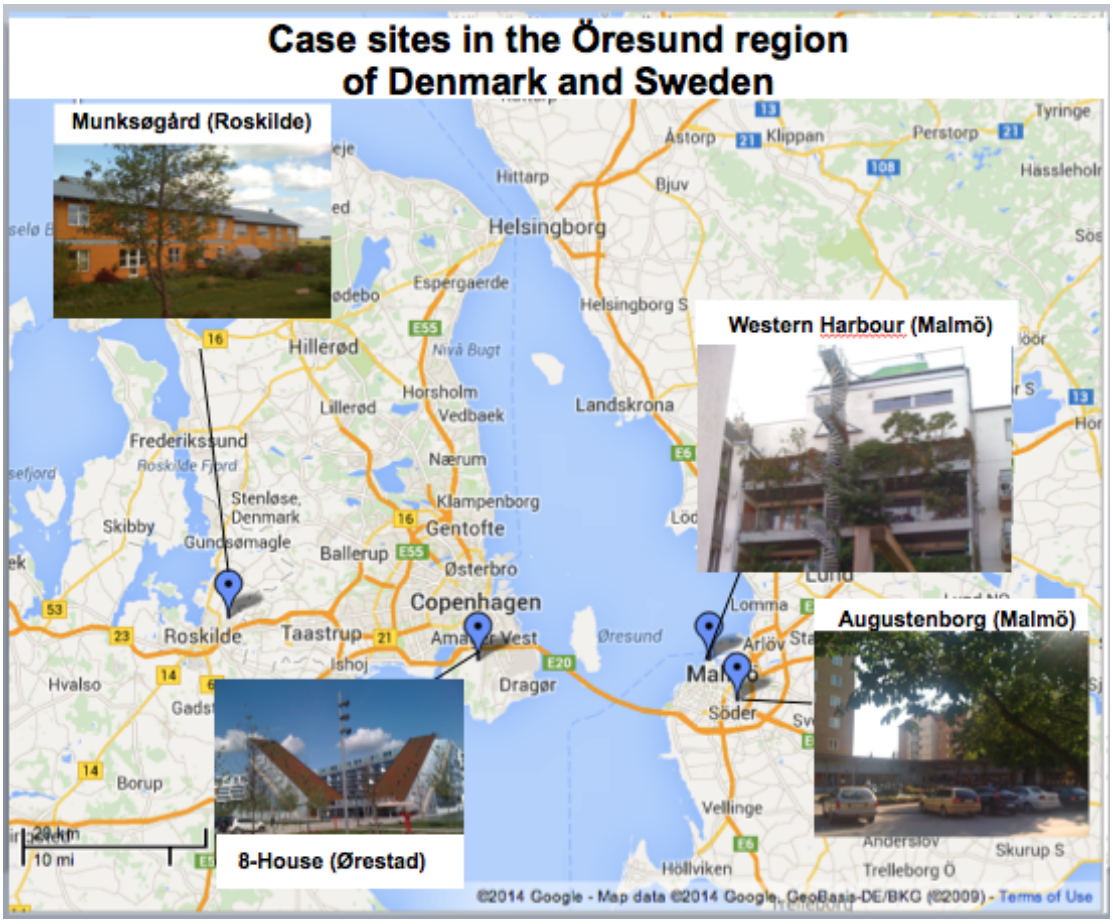

Figure 2: Eco-cities and eco-communities in Öresund Region.

Öresund region: Political framework

The case sites are all in the European Union (EU), although they are not fully in the Eurozone since they both have kept their own currencies. From a climate policy perspective, this is also significant since the European Council set targets in 2007 for EU member states that were adopted by the EU to reduce greenhouse gas emissions by 20% by 2020, to increase the share of renewable energy to 20%, and to make a 20% improvement in energy efficiency, as outlined in the *Energy for a Changing World* package adopted on 9 March 2007. The European Council has also "given a long-term commitment to the decarbonisation path with a target for the EU and other industrialised countries of 80 - 95% cuts in emissions by 2050" (European Commission 2010, 4). Both Sweden and Denmark have chosen to go further, by increasing their national targets for greenhouse gas emission cuts to be 40% by 2020 (City of Copenhagen

2012b, 12). The Government of Denmark, in 2013, reaffirmed their goal that "by 2035 [the] Danish electricity and heating supply will be completely based on renewable energy [and that the] goal for 2050 is that all energy consumption, including [in] the transport sector, will be based on renewables" (Danish Government 2013, 7). Back in 2006, the Government of Sweden's then Minister of Sustainable Development, Mona Sahlin, announced that "Our dependency on oil should be broken by 2020" (Vidal 2006). However, a more recent Government of Sweden quietly replaced this oil-free goal for 2020. The current national goals expressed on the Government of Sweden's Web site are to "achieve a vehicle fleet free of fossil fuels by 2030" and to "achieve the goal of a Sweden free of net emissions of greenhouse gases by 2050" both of which will be outlined in a plan called Roadmap 2050 which will chart the national plan for how to get an emissions-neutral Sweden (Government of Sweden 2014).

However, the European Council has also adopted a stance similar to the stipulations of Article 3 of the UNFCCC. The 20 - 30% cuts are contingent on the effort being matched by other industrialized nations. Specifically, the European Council states the cuts will be made, "provided that other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries [contribute] adequately according to their responsibilities and respective capabilities" (European Commission 2010, 4).

Shortly after the adoption of the EU Climate and Energy Package in 2008, the Covenant of Mayors was launched by the European Commission as a non-binding agreement between a group of European Mayors who have pledged to "go beyond the objectives set by the EU for 2020, reducing the CO2 emissions in our respective territories by at least 20%, through the implementation of a Sustainable Energy Action Plan" (Covenant of Mayors 2008). In the Öresund region, the mayors responsible for the cities overseeing municipal governance of all of my case sites, namely Malmö, Copenhagen, and Roskilde, all became signatories of the Covenant of

Mayors in 2008, and had all submitted Sustainable Energy Action Plans by 2009.

I will now discuss the four case sites in my study, focusing on what climate actions have been taken to reduce greenhouse gas emissions and to find ways to adapt to expected changes. My four case sites range from districts within urbanized cities to suburban peri-urban areas (where 'peri-urban' refers to human habitations near cities along the rural-urban boundaries).

3.1. Western Harbour

3.1.1. Narrative walking interviews

I had two interlocutors on two separate narrative walking interviews in the Western Harbour (or Västra Hamnen in Swedish). I first met with Louise Lundberg (of Grönare Stad AB), along with a group of about fifteen other Lund University students on Wednesday, March 6, 2013 for a narrative walking interview of Bo01. Louise had been suggested on the City of Malmö (or Malmö stad in Swedish) Web site as someone who could be contacted for those interested in technical site visits of this area. During our walk, Ms. Lundberg discussed the work she had done on the local green roof initiatives, as well as her insights from having worked with the City in providing advice on both the sustainable urban drainage solutions (SUDS) and waste-to-fuel solutions implemented here, based on her previous experience of co-designing similar systems at Augustenborg. Ms. Lundberg is not an employee of the City of Malmö.

For my second narrative walking interview, I met one-on-one with Li Dahlgren (Beast Studio co-founder and volunteer Coordinator at Plantparken) on Friday, July 11, 2014 to walk through Bo02 with a focus on Plantparken. Helen Nilsson, a project manager at the City of Malmö, recommended that I speak with Ms. Dahlgren after I had contacted the City of Malmö inquiring about their urban agriculture activities. Ms. Dahlgren is not an employee of the City of Malmö.

I will provide relevant reflections from these interviews as part of the observations in section *3.1.4. Role of socio-ecological interactions to meet climate change*.

3.1.2. Digital media: How is the district promoted as a model?

The Western Harbour has received a number of awards and accolades that have elevated its eco-city status and promoted its urban design in the English language media as being a city that is frequently cited as being a model eco-city. Awards of recognition won so far include: The 1996 decision by the European Union and Sweden awarding Malmö the first European Housing Exposition, that ran from May 11 to September 9, 2001 for Malmö's proposal, *Bo01-City of Tomorrow* (SURBAN 2001); the 2000 "Campaign For Take-Off (CTO)" Award from the European Commission, based on the city of Malmö's plan to build "an urban area composed of 600 apartments completely supplied by renewable energy sources" (CMHC 2005, 10; European Commission 2000); the 2001 Swedish Architects Association's Housing Award for the "Kajplats 01"apartment building at the Bo01 Housing Expo; the American Institute of Architects Honour award given to Moore Ruble Yudell Architects & Planners for the Tango Housing complex at Bo01, in which SWECO was involved in as the Associate Architect (CMHC 2005, 10; Moore Ruble Yudell Architects & Planners 2014); the 2007 Grist Magazine ranking that listed Malmö as #4 on their "15 Green Cities" list (Grist Staff 2007); the 2009 Kasper Salin Prize for "buildings that hold a high architectural standard" awarded by the Swedish Association of Architects to the Urban Villas tenants association consisting of architects Cord Siegel, Pontus Åqvist, and Ulrika Connheim, as well landscape architects Karin Larsson, Niels de Bruin, Ola Nilsson and Magnus Svensson for the Urban Villas 'building community' in the Bo02 district. (Dalman et al. 2010, 46); the 2009 World Green Building Council's BEX Award for Best Master Plan given to the City of Malmö for the Western Harbour; the 2009 UN-Habitat Scroll of Honour award given

to the City of Malmö for all of its urban innovation in human settlements and sustainability; the 2011 Earth Hour Capital awarded by the World Wildlife Fund to the City of Malmö for being "willing to make ambitious and long-term efforts to combat climate change" (Malmö stad 2014); and the June 2013 edition of "Climate Leader Papers", published informally online by the UK-based consulting firm Climate Action, in partnership with the United Nations Environment Programme (UNEP), highlighting Malmö in a feature written by Ilmar Reepalu, the former Mayor of the City of Malmö (Malmö stad 2014).

One of the most striking observations I made when researching the Western Harbour through online digital media was noticing the sheer volume of search results that can be found in Google's Web search. There is a tremendous number of English language Web sites where reviews of the Western Harbour in general, and of Bo01 in particular, can be found. This is due, in large part, to the many study visits and media tours that have taken place since Bo01 was launched in 2001. On a Google search I did in September 2014 (with Google Personalization turned "off") on just the terms 'Western Harbour Bo01' there were 34 pages (~340 hits) of search results returned, ranging from newspaper articles and technical reports to a plethora of blog posts written by students, faculty and staff who have travelled to Malmö to do study visits in the area. Most digital media attention is focused on the initial Western Harbour development, Bo01. A Google search done in September 2014 (with Google Personalization turned "off") on just the terms 'Western Harbour Bo02 ' yielded 8 pages (74 hits) of search results.

3.1.3. Background

3.1.3.1. Location, population and scale

The Western Harbour is located in southern Sweden on the shores of the Öresund Strait (see Figure 2) as its own district within the City of Malmö. The Western Harbour is also adjacent to the old, historical central business district of Malmö, but is separated from the central business district by the Malmö Central train station and a system of man-made canals that make the Western Harbour function as a man-made island, connected by bridges to the mainland. The area has undergone significant man-made physical, topographical modifications since the end of the 18th century. These have included the use of land-fill for colonizing the sea and seabed to create man-made piers and jetties in the harbour for human-built seafaring vessels and for industrial human use in manufacturing, lasting from the 1870s to the 1980s, with the last use of landfill occurring in 1987 (Malmö stad 2006, 2).

The Western Harbour is an old harbour port that did not have a residential housing population prior to the development of the eco-city project. As of 2013, the Western Harbour had a population of 6,835 residents, which accounts for 2% of the 312,994 residents in all of Malmö (Statistiska centralbyrån 2014; Malmö stad 2014c). Bo01 presented 350 residential units at the European Housing Expo in 2001 (Foletta and Field 2011, 84) but as of 2006 it had grown to 950 housing units that occupy 25 hectares (Malmö stad 2006), while Bo02 added 600 apartments units in 16 buildings that occupy 4 hectares (Foletta and Field 2011, 86). As of 2012, there are 1450 housing units in Bo01 and 630 housing units in Bo02 (Malmö stad 2014c, 3).

3.1.3.2. Role of subnational climate change targets in project

Greenhouse gas targets set at the subnational level were not specifically cited as a rationale behind the design decisions for the Western Harbour. However, in 1998, as planning for Bo01 was beginning, the City of Malmö, under then Mayor Ilmar Reepalu, adopted the *Environmental Strategy for the City of Malmö 1998-2002*, which set targets for reductions in emissions of carbon dioxide by 25 % by 2005 and by 60 - 75 % by 2050, along with a reduction in nitrogen emissions into the Öresund by at least 30 % by 2005 (Malmö stad 1998). Then in 2009, calling itself "Sweden's Most Climate Friendly City," the Malmö City Council adopted its *Environmental Programme for 2009-2020*, in which the City of Malmö targeted making municipal offices and municipal-run services climate neutral by 2020, followed by the entire municipality by 2030, including having the entire city run on 100% renewable energy by 2030 (Malmö stad 2009, 7). To reach the climate neutral target by 2020, "Malmö is planning a local climate fund [that] entails compensating greenhouse gas emissions from municipal activities through increased investments both in renewable energy, [such as] solar cells and wind generation, and in technologies that increase energy efficiency" (Malmö stad 2009c, 1).

3.1.3.3. Decision-making approach

The arrival of a new mayor in 1994 launched a new style of planning and political leadership. In 1995, shortly after entering office, former mayor Ilmar Reepalu introduced "'Value-based Planning' as a holistic long-term approach to the development of the built environment" which changed how the city worked with its land and property (Academy of Urbanism 2014). Decision-making for the development of both the Bo01 and the Bo02 districts in the Western Harbour eco-city followed an approach characterized by extensive planning and cross-stakeholder communications, as well as some visionary inspiration about shared

values for what a city could look like in the future. This is why the project was called 'Bo01 - City of Tomorrow' by the City of Malmö. Eva Dalman, one of the original members of the City of Malmö team explains it this way:

> It was a challenge for the future. Bo01 was the answer to the question, how could [one] solve the biggest environmental problem, global ones, in a sustainable city development . . . (Senthilingam 2014).

Core value statements were built into the Quality Programme. The Quality Programme was summed up in a case study completed by Gary Austin, which was published in the Journal of Green Buildings:

> Through a series of meetings and presentations, the participants developed the "Quality Program," which established performance requirements. The dialogue sessions modified and ratified the philosophy and goals of the project, but more importantly, they were a mutual learning opportunity for the city, project planners, and developers. The dialogue fostered an atmosphere of collaboration and innovation. The 20 developers selected for the project committed to material, technological, environmental, and architectural quality measures before any parcel was sold. Although time-consuming, the process resulted in rapid approval of the plans later submitted by the developers to the city (Austin 2013, 36).

Following initial planning efforts, construction started in 1998 (Foletta and Field 2011, 82), with the City of Malmö defining the qualities desired in the new Bo01 district. Launched in March 1999, the City of Malmö made this into a legally binding agreement with developers under the Quality Programme, with Quality Metrics and a Quality Checklist used to ensure these goals were met (Sadek 2012, 134). Architects, developers, citizens and officers from the City of Malmö engaged with the Quality Programme through what was called the "Good Dialogue" or the "Creative Dialogue" approach that was led by the City of Malmö (Austin 2013, 36). The construction of the Bo01 Exhibition residential housing project was completed for the European Housing Expo held in 2001, which is why the project uses the numbers "01" to represent the 2001 target opening date, while the letters "Bo" represent the Swedish verb "to dwell" (Rose 2005). In the district called Bo02 (Flagghusen), the Creative Dialogue process for

Bo02 began in April 2004; the first residents began to move into the district in 2007, with the remaining parts of the district mostly completed in 2008, regardless of the then emerging global financial crisis (Dalman et al. 2010). Future districts planned for the Western Harbour include Bo03 (Fullriggaren) and Bo04 (Kappseglaren). At the time of this study, construction was under way on Bo03, while construction on Bo04 had not yet been started. I chose to examine in this study only completed communities, within the scope of the eco-city and eco-community concepts, so both Bo03 and Bo04 were excluded from my research.

The City of Malmö suggests on its external Web site that one of the reasons for the unique character of Bo01 is because there were twenty-six different architectural firms involved in designing the structures (Malmö stad 2014b). However, in addition to those architects and the twenty developers who were selected for the final project (Austin 2013, 36), the City of Malmö, the Government of Sweden and local residents were also strongly involved. All of the architects who were approved had to provide design proposals that were in accordance with standards specified by the City through the 'Creative Dialogue' process. The 'Creative Dialogue' was a holistic process developed by Klas Tham, a world-renowned architect and planner that was hired by the City to establish "a philosophical basis for Bo01 and serve as its pre-eminent designer and director, [balancing] the technological goals of the project with an overarching concern for the social environment and elevating the aesthetic quality of the development" while successfully transmitting his holistic approach to officers in city departments as well as to developers and architects in the Bo01 planning process (Austin 2013, 36). The City of Malmö's City Planning office and the Property Management Office were all pivotal in ensuring that the Quality Programme was followed, since it set guidelines for architectural qualities, choice of materials, energy consumption, green issues and technical infrastructure (Malmö stad 2014b). The strong involvement by the City of Malmö as a government body also provided a way to get input and representation from citizens, since the city government is a representative

public body charged with representing their citizen constituencies, in order to act in the public interest.

Since 2001, the Malmö City Planning office has continued to oversee the development of the Western Harbour. The Bo02 section of the Western Harbour was also designed by many architects, in collaboration with the City of Malmö, and the process was also anchored in the Creative Dialogue that built upon what was learned from the Bo01 Quality Programme, while also incorporating the National Housing Board's *Building-Living-Dialogue* framework. The Building-Living-Dialogue framework not only incorporated the Creative Dialogue as a requirement, but also added regulatory requirements for sustainable construction, with a goal of having a sustainable building and property sector operating by 2025, by changing building practices and energy consumption during construction (Dalman et al. 2019, 9). In Bo02, the Creative Dialogue was launched in April 2004 with 13 developers, and a test panel of engaged citizens, together with officers from the City of Malmö Planning office and the City of Malmö Property Management office (Dalman et al. 2010, 8). The dialogue focused on architecture, planning, the environment and quality (Dalman et al. 2010, 8). In Bo02, a new decision making format that had not been tried in Bo01 was also tried. A group of friends who wanted to build their homes together to live together in a single building contacted the City of Malmö in order to participate in the design process and to select construction materials. The 'self-builder' approach was not tried in Bo01, so this brought a new approach for the City to incorporate into the planning process. The group of friends joined the Creative Dialoge to "build a house together, as friends amongst friends" in a "building community" (which in Germany is called either a "byggemenskap" or "baugemeinschaft") consisting of a group of people joining together to plan, finance and build homes for themselves usually with the help of an architect (Dalman et al. 2010, 45). The structures they built together are called the Urban Villas (which is called Urbana Villor in Swedish). It has seven units in two buildings with an adjoining courtyard.

3.1.3.4. Funding sources

From the 1870s until 1979, the land now called the Western Harbour was privately owned and occupied by the Kockums Shipyard. Starting in 1979, the Government of Sweden took over the company to restructure it so that outstanding government orders for military vessels could be completed. By the 1990s, the building of civilian vessels in the shipyard ended (Malmö stad 2013). SAAB briefly owned the area, and built a facility, with funding from the Government of Sweden, intended for manufacturing cars, but the plant closed in 1991 after Saab-Scania merged with General Motors (Malmö stad 2009b). The City of Malmö bought the 175-hectare artificial island that is the Western Harbour area in 1996 (DAC 2012) from SAAB, and then used the former SAAB plant as the Malmö Exhibition & Convention Centre (Malmö stad 2009b).

Prior to the redevelopment of the land, it underwent extensive soil contamination removal and remediation. The City of Malmö Property Management Office managed these soil remediation efforts since the City owned the land. The Property Management office managed the soil decontamination work done to remove high concentrations of toxins, ensuring that around 6000 cubic meters of soil were decontaminated. Areas with lower levels of toxins were buried beneath new soil (Malmö stad 2009, 12) that was class "A" soil to a depth of 2 meters, and that topsoil was increased to a thickness of 1.2 meters over the whole area (Malmö stad 2006, 3)

The soil decontamination work was made possible by funding provided in the late-1990s and early 2000s by both the EU and the Swedish government. For example, the Government of Sweden's Local Initiatives Program (LIP) provided grants that funded (normally) up to 30% of the project and was cost-shared with business and the municipality, so the Western Harbour project could be funded in part by the LIP, in addition to being cost-shared with business and the City of Malmö (Dale 2011). The

Swedish government also subsidized the Local Climate Investment Program (KLIMP), designed to stimulate and support municipalities to take action on climate change. The City of Malmö used LIP, KLIMP, and EU financial grants for adaptation initiatives as stimulus funding for some of the redevelopment work done by the City of Malmö, E.ON Sverige AB (formerly known as Sydkraft, who is the private energy supplier for the district), developers and architects in Bo01. Bo02 did not receive the same level of funding. The LIP ran from 1998-2002, and the KLIMP continued the work of the LIP, but the last grant for KLIMP was awarded in 2008 and all projects had to finish by the end of 2012 (Naturvårdsverket 2009, 3 & 5).

3.1.4. Role of socio-ecological interactions to meet climate change

3.1.4.1. Physical design

The buildings in Bo01 and Bo02 range from two storey townhouses to mixed-use apartment buildings, which generally do not exceed six floors in height, with the exception of the landmark Turning Torso building. This tower was completed in 2005, and is Sweden's tallest skyscraper; it is 54 stories tall, and contains 147 apartments, with offices and services filling out the rest of its floorplan (HSB 2014).

During both the narrative walks with Ms. Lundberg and Ms. Dahlgren, the availability of pedestrian and bike paths was encouraging. However, the foot and bicycle traffic was relatively sparse when compared to Lund, Copenhagen or even the Centrum district of Malmö. There were more pedestrians during my summer 2014 visit compared to the spring 2013 visit, which could be due to the cold, windier conditions in the winter, fall and spring when compared to the summer, when the hot weather attracts people from all over Malmö to the pedestrian routes leading to the beaches and boardwalks. Based on studies conducted in 2008 and 2010, however, there seems to be some evidence that the combination of design

and policy measures have encouraged the use of bicycles, walking and public transportation as favoured mobility approaches among residents in the Western Harbour, which has resulted in the area's residents having a much smaller carbon footprint than other residents in Malmö (Foletta and Field 2011, 91). The same studies of residents of the Western Harbour revealed that "more than 35% of residents travel less than 5 kilometres to get to work, […] 27% […] work from home at least one day per week, […] a third of residents travel less than 500 metres to get to a grocery store and half travel less than 1 kilometre," all of which makes it "easier for residents to commute by walking, cycling or public transit," which helps "reduce emissions generated by motorized forms of transportation" (Foletta and Field 2011, 93).

Ms. Lundberg pointed out the presence of the local public housing corporation, Malmö Kommunala Bostadsföretag (MKB), throughout the development, as marked with the discrete MKB signs posted on various buildings, including some with direct access to the boardwalk overlooking the Öresund. In Bo01, the Ms. Lundberg was able to point out the thermal solar systems used to heat water used in the district heating system, and also said, "There's a wind turbine not far from here that is used to generate 100% of the electricity used in this area" (Lundberg 2013a). The 2 Megawatt wind turbine (named Boel) yearly production is estimated to be 6000 Megawatt-hours, which was enough to cover the original, estimated power needs of Bo01 (Malmö stad 2009d). Due to additional units that were after the original plan, Bo01 has an overall power need that exceeds this amount (Malmö stad 2014e). MKB, as Malmö's largest provider of rental housing, holding over 22000 apartments throughout Malmö, has since 2008 supported the use and development of wind-powered electricity, and in the same year made its first solar cell installation to test a new technique for self-support (Ståhle 2009). Former Mayor Ilmar Reepalu proudly proclaimed in an interview in 2012 that the Western Harbour had already "established itself as the first carbon-neutral neighbourhood in Europe" owing to its 100% use of renewable energy

sources thanks to the energy generated from the waste-to-energy incineration plant, as well as the use of solar and wind power, combined with its aquifer based district heating and cooling system (Ling 2012).

However, as a recent case study noted in an article published in the *Journal of Green Building,* the energy efficiency of the Bo01 buildings did not meet their initial goals (Austin 2013). Ms. Lundberg explained to our group during the narrative walking interview that, "Some of the initial estimates that were made by the architects and builders for energy consumption were made somewhat optimistically, and did not necessarily account for how people actually live in the space, especially if, for example, they are running two computers and a big screen TV all the time" (Lundberg 2013a). Additional research determined that the reason the projected data for energy consumption and savings for the buildings in Bo01 did not correlate to projected estimates after the buildings were constructed and operational was because builders used different standards and methods for calculating energy efficiencies, so City planners have subsequently introduced uniform standards for measurement, reporting and verification (Dale 2011).

3.1.4.2. Current resident access to urban gardening

Bo01 led to the introduction of the Green Space Factor System under the Quality Programme. 'Green Points' were assigned for different landscape features in each plot. Additionally, developers had to describe in their detailed plans how they would achieve the requested Green Space Factor (GSF), which in the case of Bo01 was set at a GSF of 0.5, and then they would have to submit their plans to the City. It would then be reviewed by a landscape architect who would evaluate how vegetation, water and non-paved surfaces would be applied on top of buildings, as well as to the walls on buildings and the spaces around buildings (Kruuse 2011, 5) The City required at least 10 Green Points in each courtyard to encourage a certain

quality standard be kept in each of the green areas (Malmö stad 2006, 5). However, while it succeeded in ensuring developers applied piecemeal, checklist approaches to applying specific elements, such as Sustainable Urban Drainage Systems by using permeable gravel surfaces on the ground and green roofs on top of buildings, I noticed right away that the landscaping came across as fairly grey around the residential buildings, owing to the lack of plant vegetation and soil. Having green roofs is excellent for stormwater management and for curbing the urban heat island effect, but these green roofs were counted as green space in the Green Points system, even though the greenery they provide is invisible to pedestrians. Additionally, the lack of soil depth on the green roofs in Bo01 not only thwarts any possibility of residents using them for urban gardening, but also severely reduces or eliminates many opportunities for building soil organic carbon for trapping carbon dioxide to reduce atmospheric carbon levels, part of the mix of greenhouse gases that worsen climate change. Part of the challenge in the Bo01 district is also the extent to which residents may still need to be cautious when digging. When asked about the lack of visible gardening by residents in Bo01, Ms. Lundberg noted, "There's still the contaminated soil to think about. In some areas it was removed. In other areas, it was capped off with good soil on top down to a depth of 2 meters, so residents may still need to ask permission before they do too much digging."

The scene was somewhat different in Bo02. During my narrative walk with Ms. Dahlgren, we walked by several apartments where people were experimenting with urban gardening, regardless of how much space they had on their balcony or in their small yards. In one spot, I noticed someone even was growing a few stalks of corn.

Ms. Dahlgren introduced me to Plantparken (which translates to Plant Park in English). The Plantparken is located adjacent to the temporary building housing the day-care centre, in a plot of vacant lots wedged

between the beach and road, and within a stone throw of the Urban Villa residences. Here's an excerpt from our discussion once we arrived:

> Plantparken started as a project out of our K3 class at Malmö University with our teacher. First it was just for student projects, just to try to grow our own food. […] Soon after I got involved, we decided to open it up to the community. The demand has been incredible. […] Some people have even gotten into arguments about getting their own little plots. […] Now we have a system, and different ways for people to contact me. I've become basically the volunteer coordinator, even though that class is over and I've since graduated from university. […] I like to say "Hello!" and ask other gardeners, "What are you growing? How did you do that? Can you show me?" It's a great way to meet people. I think more people talk to each other now. […] One day I was in the garden, and a man was walking his dog and he came up to the fence and said, "What is this? What is this place?" I told him all about it. He seemed really excited to hear we had a community garden. He said, "I'm coming back. This is incredible. I'll be back." And he did! He walks by here pretty often and we still talk when he comes by. […] Once I told people we were giving away plots, it only took a few days through word of mouth before all the plots were gone. Now we have a waiting list (Dahlgren 2014).

I walked through the plots that were being tended with varying degrees of intensity. Plantparken reminded me of a fledgling version of the typical Swedish "kolonilotter" or Danish "kolonihave" (which in English means "colony of lots", "allotment garden communities", or simply "allotments"), but without any of the little garden houses found in other more established allotments. Modes of utilisation ranged from gardens with simple furniture for sitting and small grills for doing some light outdoor cooking over a fire sitting on top of a layer of grass, to allotments that were bursting with food plants in every square metre. The social potential for the space for social access was visible. The waiting list is indicative of untapped demand among residents for this amenity. "This area is all filled in, so it didn't have to be decontaminated, " explained Ms. Dahlgren. "They just brought a few truckloads of what they called 'good soil' for us when we setup the Plantparken. Some of the other gardeners have also added more of their own soil too. Below the soil that was added for us, the soil

gets pretty sandy" (Dahlgren 2014). She showed me the hose hook-up near the parking lot for the day-care centre where they can hook up their hose to water the garden, and explained their community gardening tools system. We also discussed the role of regenerative, organic agricultural techniques and her plans to update their compost system.

From a climate change emissions reduction perspective, the park encourages local food growing, reducing the number of grocery store trips for consumers and producers alike that are using modes of transportation and fertilizers made from fossil fuels. However, it also uses soil on the ground that is deep enough to build stores of soil organic carbon for sequestering carbon dioxide.

However, in spite of the waiting list for additional allotments, the biggest challenge facing Plantparken is that the area they are using is currently slated for construction of more buildings in 2015-2016. When we last spoke, Ms. Dahlgren had not yet been informed by the City of Malmö what, if any, provisions had been made for Plantparken and its urban gardeners. As a result, a cloud of uncertainty remains over the future of this community of gardeners, and their garden, in Bo02.

Meanwhile, across the street from Plantparken, another community of gardeners took a different approach. The community of friends that came together to design and build the Urban Villas residence designed gardening spaces into their balconies, on their rooftop, and in a shared courtyard area. The staircase provides a way for its residents to visit one another and enjoy each other's gardening efforts. However, unlike the open design of Plantparken, that is meant to be visible and accessible to the public, the private urban gardens inside the Urban Villas are on private property and as such are off-limits to pedestrians who do not already own a unit in the residence. Nonetheless, officers from the City of Malmö who oversaw the Creative Dialogue all agreed upon seeing Urban Villas after it was built that "the courtyard is by far the greenest with a sunken

greenhouse in the courtyard and balcony plots which one can plant in" since the balconies were intentionally designed and reinforced for gardening (Dalman et al. 2010, 22).

Both the waiting list for allotments at Plantparken, and the integral role that space for gardening played in the design fought for by the 'building community' of Urban Villas, seem to be indicative of a desire for more urban gardening space where people can get their hands in the soil.

3.1.4.3. Additional resident options for social access and equity

Bo01 was harshly criticized for its lack of opportunities for social inclusion for people at different income levels, so efforts were made by the City of Malmö to encourage developers in the Bo02 area to offer different types of tenures and ownership structures in order to appeal to different incomes and life stages, while focusing on affordability.

Overall, greater attention was given to physical, financial and social accessibility in Bo02. In addition to having the University campus nearby, there are also schools that have opened that are accessible on foot and by bicycle to residents of both Bo01 and Bo02. Rental accommodations in Bo02 account for 62 % of the housing units (although the average rental prices remain above comparably sized units in other parts of Malmö), a residence for mature adults aged 55 and older (Tornahem) was added, a preschool opened in August 2009, and a residence for people with disabilities and special assistance needs opened in 2010 (Dalman et al. 2010, 12). The Kockums Fritid fitness gymnasium, which predates these developments, remains open but was extensively renovated as Bo01 was being built to include various energy efficiency additions along with solar panels that connect to the rest of the district energy system. The nearby Maxi ICA and the COOP Nara grocery stores are accessible by public transit, as well as by biking and walking. Many public spaces for walking and

gathering are also available in both Bo01 and Bo02. I was quite surprised by the increased number of privately owned restaurants, cafés and ice cream shops in Bo01 between my first visit in 2013 and my most recent visit in 2014.

However, neither opportunities for community members to participate in local governance through local decision-making, nor opportunities for formal social activities that encourage social inclusion, are visible by looking at the physical structures or the English language online digital media. As a result, I have marked categories relating to this topic as "unknown" in the comparative analysis table, pending future research that can investigate further.

During our walk around Bo01, Ms. Lundberg shared a reflection on the social and economic changes that had taken place in the area prior to being rebuilt as the eco-city, as she reminisced about her youth growing up in and around Malmö. Ms. Lundberg said,

> My Dad actually worked at Kockums. He was a designer. I used to visit him. He worked as an engineer designing submarines for the military. He worked in the offices, though. The workers in the Kockums Shipyard building the ships were in the shipyard area. […] The thing is that, when the Kockums Shipyard closed, a lot of people lost their jobs. But now, with the redevelopment of the area, there are actually more people working in the Western Harbour now than they did with the Kockums Shipyard (Lundberg 2013a)!

The City of Malmö has attempted to get the statistics into the public view on the change in the number of people employed in the Western Harbour, when accusations have risen about the higher cost of living in the Bo01 area being a sign that the area was a playground for the rich. However, the shift from the availability of manufacturing jobs in the old shipyard docks that had lower educational requirements, to the kinds of jobs requiring higher education such as information technology, media, and knowledge worker jobs, is still an area of critical debate. The decision to construct and open the new Malmö University campus in the Western Harbour in

1998 was the first signal from the City of Malmö that they wanted to increase the role of higher education in the formation of the new identity for the Western Harbour, to help change its former working-class image. The arrival of SVT, the Media Evolution City business incubator, along with various information technology and consulting companies such as PricewaterhouseCoopers (PwC), continued the shift in employment demographics. Thanks to the Maxi ICA and the Coop Nara, there are now grocery stores for residents, acting as both a source of food and a source of employment, where the education requirements are not as specialized. However, further research would be required to compare the income associated with these new jobs relative to the old manufacturing jobs by comparing salaries based on similar levels of education. It almost seems as if the towering edifice of the Turning Torso, filled with apartments and office workers, is meant to cast a long shadow that blots out any lingering memories that long-time Malmö residents may still have of the towering shipyard cranes that once dominated the skyline of the old port.

Neither specific emissions targets, energy buy-back schemes, nor Kyoto Protocol style market mechanisms, such as carbon offsetting or pollution permits, were used to either motivate the City in their decision-making or incentivise the residents who now occupy the area. Refer to the *Appendix* to review the detailed qualitative summary table that compares the elements present within the context of the socio-ecological interactions in the Western Harbour to the other three case study sites.

This examination of the Western Harbour district provided detailed insights into the decision-making process and the underlying rationales driving the City of Malmö. Of all the case sites, this one required the most background information in order to contextualize how it became the collection of neighbourhoods that are now there. The study uncovered several aspect of the process, including the adoption of a value-based planning approach, the Quality Programme, the Creative Dialogue, as well as the Green Space Factor and Green Points System. The final diversity in

structures delivered by architects, developers and cooperating community building teams designed under the guidance of the City of Malmö, was not a *laissez faire*, deregulated, neoliberal free market accident that came together by chance. Furthermore, the increase in visible, planned urban gardening spaces, and the unmet demand for more gardening allotments in Plantparken, seem to be expressions of some of the underlying values residents have, in terms of what they feel is important to have in their community, namely green spaces with soil for gardening and room to have socio-ecological interactions with not only their neighbours, but also with nature in the outdoors.

3.2. Augustenborg

3.2.1. Narrative walking interview

I had two interlocutors on two separate narrative walking interviews in Augustenborg. I first met with Louise Lundberg (of Grönare Stad AB), along with a group of four other Lund University students on Friday, April 19, 2013 for a narrative walking interview in Augustenborg. I had met Ms. Lundberg about a month beforehand in March 2013 for the narrative walking interview in the Western Harbour, and Louise had offered to show me around Augustenborg as well. During our walk, Ms. Lundberg discussed the work she had done on the green roof initiative based at the Scandinavian Green Roof Institute in Augustenborg, while also providing additional context around the history of various environmental and social projects that had taken place over the years in this residential area.

For my second narrative walking interview, myself and one other researcher from Lund University met with Klara Asp (Horticulturalist, Green Roof Institute Botanical Roof Garden) on Friday, July 18, 2014 for a narrative walking interview around the Scandinavian Green Roof Institute Botanical Roof Garden, in order to see and hear more about the botanical roof garden and Augustenborg.

I will provide relevant reflections from these interviews as part of the observations in section *3.2.4. Role of socio-ecological interactions to meet climate change.*

3.2.2. Digital media: How is the district promoted as a model?

The Augustenborg district of Malmö, which was rebranded as Ekostaden Augustenborg (meaning Eco-city Augustenborg in English), received several awards and accolades that have elevated its eco-city status and promoted its urban design in the English language media into being an area that is frequently cited as being a model eco-city. Awards of recognition won so far include: the 2007 Grist Magazine ranking that listed Malmö as #4 on their "15 Green Cities" list (Grist Staff 2007); the 2009 UN-Habitat Scroll of Honour award given to the City of Malmö for all of its urban innovation in human settlements and sustainability; the 2010 UN-Habitat World Habitat Awards given to the City of Malmö and Malmö's municipal housing authority, MKB Fastighets AB, for using the Ekostaden Augustenborg Project to help the existing residents of the social housing community of Augustenborg to tackle both urban renewal and environmental issues by improving the physical environment, while also tackling social challenges in cooperation with the residents; the 2011 Earth Hour Capital award by the World Wildlife Fund to the City of Malmö for being "willing to make ambitious and long-term efforts to combat climate change"; the 2013 City to City Barcelona FAD Award given to Ekostaden Augustenborg for its work with sustainable city development through the implementation of green roofs and open storm water systems in the neighbourhood (Malmö stad 2014).

I used a Google search to find the number of English language Web sites that could be found. On a Google search performed in September 2014 (with Google Personalization turned "off") on just the terms "Augustenborg eco-city" there were 23 pages (229 hits) of search results

returned, ranging from newspaper articles and technical reports to many blog posts written by students, faculty and staff who have travelled to Malmö to do study visits in the area.

3.2.3. Background

3.2.3.1. Location, population and scale

Augustenborg is a neighbourhood in southern Sweden within the Fosie district of Malmö, just southeast of the central business district. The area was transformed from being a peri-urban region on the rural fringe of Malmö into a medium-density residential district of Malmö in the 1950s, characterised mainly by low-rise apartment blocks. Today, there are approximately 3,000 residents in Augustenborg (Bouton et al. 2013, 14), which accounts for just under 1% of the 312,994 residents in all of Malmö (Statistiska centralbyrån 2014). The community consists of 1800 housing units, spread among 15 buildings (DAC 2014) that occupy approximately 32 hectares (Kazmierczak and Carter 2010).

3.2.3.2. Role of subnational climate change targets in project

Greenhouse gas targets set at the subnational level were not specifically cited in the rationale behind the design decisions for Augustenborg. However, planning for the retrofitting of Augustenborg began in 1997 (Kazmierczak and Carter 2010), just a year prior to the City of Malmö, under then Mayor Ilmar Reepalu, adopting the *Environmental Strategy for the City of Malmö 1998-2002*, which set targets for reductions in emissions of carbon dioxide by 25 % by 2005 and by 60 - 75 % by 2050, along with a reduction in nitrogen emissions into the Öresund by at least 30 % by 2005 (Malmö stad 1998).

3.2.3.3. Decision-making approach

As was described above regarding Western Harbour, the arrival of a new mayor, Ilmar Reepalu, in 1994 was followed by him introducing 'Value-based Planning' in the City of Malmö, characterized by extensive planning and cross-stakeholder communications, as well as some visionary inspiration about shared values for what a city could look like in the future (Academy of Urbanism 2014). The project was co-managed by the City of Malmö and MKB, since most of the properties were owned and operated by MKB as social housing. The initial focus of both the MKB and the City of Malmö was to address flooding caused when the old sewage drainage system was unable to cope with the combination of rainwater runoff, household wastewater and pressure from other parts of the city. At the same time Peter Lindhqvist, from the Service Department of the City of Malmö, was also suggesting that an eco-friendly industrial park be opened in the area (Kazmierczak and Carter 2010, 5). Then in 1998, the Environmental Strategy was adopted by City Council, Trevor Graham was hired as a project leader based on his groundwork experience developed in England (Kazmierczak and Carter 2010, 6), and the Ekostaden Augustenborg project was relaunched, with a broader goal of making Augustenborg a more sustainable neighbourhood. The MKB and the City then began to involve more stakeholders, including Augustenborg residents, leaders from local businesses, schools and the nearby industrial concerns, as well as researchers from Lund University and participants from the private sector who were instrumental in developing the Botanical Roof Garden (Kazmierczak and Carter 2010, 6).

Similar to what had been happening in the Western Harbour at the same time, the approach to communications became very open and quite consultative. The result was that "the project encountered little opposition [and both the] constant communication and in-depth community involvement enabled the project to accommodate residents' concerns and preferences regarding the design of the stormwater system",

as well as the design of recycling, food waste sorting, and the retrofitted energy efficiency systems (Kazmierczak and Carter 2010, 6). Ms. Lundberg explained the significance of the SUDS impact as follows:

> It has been a huge change. People now are really proud of living here because they are living in a special place and they can see the changes. Some of these residents have been seeing me coming here for years, bringing different groups to look at what has changed around here, and the residents…they really take pride in it now. Many of them were also involved in the process, going to community events and providing feedback, so they were part of the process too, and that made a big difference (Lundberg 2013b).

3.2.3.4. Funding sources

Project planning began in 1997, with the Ekostaden Augustenborg project officially running from 1998 until 2002, and the Sustainable (Urban) Drainage System (SUDS) for stormwater management component was completed in 2001 (Kazmierczak and Carter 2010, 4). While management costs were handled by Malmö Kommunala Bostadsbolag (MKB), based on rents collected from residents, the project funding for the retrofit came from multiple government funding sources including the Government of Sweden's Local Investments Programme for Ecological Conversion and Eco-Cycle Programme, the Swedish Department of the Environment, the European Union through both the EU LIFE program and the EU URBAN program, as well as from the City of Malmö (Kazmierczak and Carter 2010, 5).

3.2.4. Socio-ecological interactions to meet climate change

3.2.4.1. Physical design

The buildings in Augustenborg range from 3 stories to 7 stories in height (Kazmierczak and Carter 2010), giving the neighbourhood a cosy, intimate design when walking around on the pedestrian walkways between

buildings and along the tree-lined streets. During my first visit in Spring 2013 during the narrative walking interview with Ms. Lundberg, I was struck by the rapid transition in the urban landscape. From the busy, heavily trafficked road and the industrial park setting where the bus had dropped me off, our group of Lund University students soon climbed the stairs and walked among test plots on the wooden walkways that criss-cross test patches high atop the Rooftop Botanical Garden in the light industrial park building used to house the Scandinavian Green Roof Institute. Then from there, Ms. Lundberg took all five of us to walk among the tree-lined internal streets and the pedestrian walkways winding among the residential buildings of Augustenborg. Some of the SUDS structures were obvious to see as single-purpose, reinforced concrete trenches. However, other parts of the drainage system provided temporary storm water detention in grass-covered areas that provided green space as parks when they were not covered in storm water. Some of the area also had been designed as clay lined ponds that would hold rainwater as ponds, in order to provide habitat for animals as well as to enhance the aesthetics of the landscaping around the buildings. Ms. Lundberg also showed us the anaerobic biodigester that was being used to collect and treat graywater flowing out from the laundry room of one building where flooding had been a problem in the past. Ms. Lundberg explained the significance of the SUDS impact as follows:

> There has been a dramatic change here. With the installation of this new way of handling stormwater, we can now handle almost all of the rainwater we get from storms without it going into the main sewer system for the City, and without the flooding problems we were having here before (Lundberg 2013b).

Researchers found in their studies of the stormwater runoff from the site that the "green roofs in Augustenborg intercept around half of the total rainwater runoff [volume] over the course of a year [and] the roofs have a significant cooling effect in the summer when compared with standard black bitumen roofs" which reduces the urban heat island effect (Kazmierczak and Carter 2010, 7). The entire open SUDS system, both on

the ground and on the green roofs, is estimated to reduce the volume of stormwater entering the local Fosie district combined sewer system from cloudburst, heavy rain storm events by 90 % (Kazmierczak and Carter 2010, 6).

Ms. Lundberg also pointed out the connection between the Augustenborg and Western Harbour developments as follows:

> Some of the things you can see in the Western Harbour were actually tested out here first. The SUDS we have here, the green roofs, the food waste separation for biogas . . . that all started here in Augustenborg. A lot of the lessons we learned doing it here first helped with some of the work that later happened to incorporate those systems into the Western Harbour (Lundberg 2013b).

In terms of renewable energy, aside from the food waste separation system that helps Malmö to make biogas for their public transit buses (Malmö stad 2014d), Augustenborg is experimenting with solar panels separated by climbing vegetation on the walls of one apartment building, as well as having an extensive installation on top of the SGRI building. Ms. Lundberg explained that the biggest energy change in the neighbourhood was achieved by retrofitting existing buildings. This involved changing windows and improving wall insulation to improve energy efficiency, while also gaining aesthetic co-benefits by improving the external appearance of buildings and health co-benefits by reducing issues with moisture and mould inside the apartments (Lundberg 2013b).

How do these modification relate to climate change? Energy efficiency improvements help to reduce climate change inducing greenhouse gas emissions such as carbon dioxide (Kazmierczak and Carter 2010, 3) at times when the municipality is unable to purchase electricity supplied from wind turbine sources as the City of Malmö has attempted to do since 2008 (Ståhle 2009). Biofuel production from food waste also replaces the need for the use of fossil fuels in Malmö's public transit buses (Malmö stad 2014d). Stormwater management provides a way to adapt to the expected increased frequency of intense rainstorms that is likely to be exacerbated

in the future in this area as a result of climate change (Kazmierczak and Carter 2010, 3). Green roofs also provide urban cooling to help reduce the urban heat island effect, which will be particularly important for vulnerable populations, such as children and the elderly, during the increased number of heat waves expected during future summer months due to climate change (Kazmierczak and Carter 2010, 7).

When I returned to Augustenborg in summer 2014, I could see that digging had begun on the foundation of a new apartment building near the town square in the centre of the neighbourhood. The MKB began construction in 2014 on the new Greenhouse Augustenborg apartment building that is planned for completion in 2015, adding 46 additional housing units in a building rising 14 floors into the air (MKB 2011; 2014). While the Greenhouse Augustenborg apartments are outside the scope of my study (as they are still under construction), it is important to mention that the construction site for the Greenhouse has already begun to change the appearance of the neighbourhood and alter the traffic flow on the street in that particular section of Augustenborg. There are, thus, some useful opportunities for additional studies to be done in this area (both during and after construction) to determine if and how the new structure and its residents are integrated into the existing residential community.

3.2.4.2. Current resident access to urban gardening

The redesign of the public spaces to accommodate the new SUDS and to restore the aesthetics of the complex with new landscaping, including new fruit trees, resulted in more spaces between housing blocks where residents can now setup garden box allotments where they can grown their own food plants (Kazmierczak and Carter 2010, 7). There is no official policy written on the MKB Web site with regards to gardening on their properties. However, there is an informal program for residents at MKB properties in Malmö for obtaining free garden boxes from the MKB to

place on the grounds around or near their building. In Augustenborg, the rehabilitation of the grounds for the Ekostaden Augustenborg Project did not officially establish a community garden, but a community dialogue between the residents, the MKB employees, and the researchers who worked on landscaping for the SUDS continued on even after the project officially ended. Ms. Lundberg introduced me to some of the gardening boxes during my first visit. "That one over there is right next to the balcony so they can look out and see their garden growing," Ms. Lundberg pointed out at one location on the grounds, where the simple raised, wooden garden box sat on the otherwise trimly cut lawn (Lundberg 2013b).

When I returned to Augustenborg for my second visit, I went looking for more garden boxes. I found some outside one building. The gardener had hung a sign marked "Privat!" to indicate that they would like to keep what they had sown, rather than sharing their produce with anyone who should happen to want some. I also found the vertical wall garden, filled with lettuce and dangling strawberries, that had been installed, just across from the town square in full view of the residents, which was also conveniently hung just above a park bench where one could sit and snack on the freshly plucked strawberries.

I later phoned the MKB office and spoke to Andreas (no last name provided) to ask how residents obtain their own raised garden beds at this point. Andreas explained that the boxes are still free, but MKB now organizes things a bit more by first checking to see if there is an available box already installed on the grounds that is no longer in use that could be reused, and only if that is not the case do they then provide a new free garden box. The MKB also takes down more information, such as the name, phone number, and unit number of the resident, along with the location of the box, so that the MKB office can keep track of who is tending to which garden box. He was not able to tell me if there is a waiting list or

not of residents waiting for garden boxes, but assured me that MKB gets back to everyone who requests one.

3.2.4.3. Additional resident options for social access and equity

The Malmö Kommunala Bostadsbolag (MKB) owned social housing rental housing units account for 89% of the housing units in Augustenborg, given that MKB owns 1,600 (Kazmierczak and Carter 2010) of the 1800 housing units (DAC 2014). The relatively low rental price point provided by MKB's social housing in Augustenborg creates housing accessibility to those with lower annual incomes who want to live in the community.

In the centre of Augustenborg, there is a square in front of a building topped by apartments with storefronts all along the base. This public square provides a social gathering place for everyday interactions, especially after school and after work, where families and young people gather at the local restaurant, while clusters of older men sit together on the benches in the square in deep discussion. It is also a space that is used from time to time for special events. In the past, the Augustenborg Farmers Market has been held in this square, as well as other multicultural holiday events. Aside from the market square, there are also many green spaces covered with lawns and shrubs in between buildings that provide meeting spaces, some of which have benches and customized concrete chairs built by a local resident for sitting, as well as places for grilling and picnicking. In addition to the green spaces and fields that were redesigned for the SUDS onsite, there are also formal playgrounds that have been designed with activities for children of different ages.

The MKB, in its role as property manager, also facilitates organizing some social events and provides some opportunities for local involvement in decision-making. There may be other social organizations, as well, that operate on an informal basis, but this is unknown at the time of this study

and would require additional investigation. The success of the Ekostaden Augustenborg project has been attributed by many to the use of constant, interactive dialogue with local residents. Even when there were language barriers to overcome, residents and people working in Augustenborg were involved in every aspect of the project. For example, residents became involved in the design of the outdoor environment. During the project, even a special needs advisor, plus a local access and mobility group, worked with the Ekostaden Augustenborg design team (WSCST 2013, 26). Both the City of Malmö and MKB wanted to ensure that residents, especially youth, as well as people working in Augustenborg, were engaged in the design and implementation of different parts of the project, which resulted in "400 out of 2000 residents becoming actively involved in dialogue and implementation efforts [including] practical surveys and research activities, in development planning and in designing the physical environment" (Andersson 2013, 23).

In addition to the pedestrian walkways and bike paths within the residential area, pubic transit bus stops are available on the main roadways that surround Augustenborg, providing access to the centre of Malmö and connections to the Malmö Central train station within a 20-minute bus ride. A supermarket-sized grocery store named "Özen All-Frukt AB" (located across the street from Augustenborg at Lantmannagatan 59, Malmö) has adjusted its stock of packaged and fresh groceries to reflect the ethnic diversity of the neighbourhood, including foods from the Middle East and the Baltic region, as well as a halal butcher. There are several schools nearby, a public library and a variety of locally run restaurants and services along the busy streets surrounding Augustenborg, potentially providing access to both services and job opportunities to the adjoining neighbourhood that can be reached without requiring the use of fossil-fuel powered motorized vehicles. One study found that many of Augustenborg's population are employed locally, for example, working in the neighbourhood's grounds maintenance, or within the nearby industrial park (Energy Cities 2005, 13). According to another

report, some significant social changes began to take place between 1998 and 2002 during the active phase of the Ekostaden Augustenborg project. Not only did the turnover rate of apartments drop by 50% as people chose to stay in the neighbourhood, but the unemployment rate actually dropped from 30% all the way down to the average across Malmö that was hovering around 6%, and participation in elections jumped from 54 % to 79% (Kazmierczak and Carter 2010, 7).

Neither specific emissions targets, energy buy-back schemes nor Kyoto Protocol style market mechanisms, such as carbon offsetting or pollution permits, were used to either motivate the City in their decision-making or incentivize the residents who now live in the area. Refer to the *Appendix* to review the detailed qualitative summary table comparing the elements present within the context of the socio-ecological interactions in Ekostaden Augustenborg to the other three case sites.

This examination of the Augustenborg community in the Fosie district provided a hands-on look at a retrofitted site in the context of municipal social housing. This study also uncovered aspects of the development process that were quite similar to what took place in the Western Harbour in terms of both the way that SUDS and waste-to-energy techniques were applied, and how they provided meaningful opportunities for community residents to engage in the process through a consultative, communicative approach. Once again, as was the case in the Western Harbour, the diversity of solutions applied to address community challenges was the result of a deliberate, inclusive, planned approach. Additionally, the provisioning of free, raised gardening boxes to the residents by the MKB seems to indicate a willingness by the property manager to accommodate the desire of residents to have access to land for growing their own food in soil outdoors. The continued requests for garden boxes by residents shows a demand for gardening as a valued socio-ecological interaction within a diverse, older social housing area.

3.3. Ørestad South – 8 House

3.3.1. Narrative walking interview

I had one interlocutor who met with me one-on-one for a narrative walking interview in Ørestad South (also called Ørestad Syd in Danish). I first met with Mira Margaritha Cordsen, (Experience Ørestad / Cand.com) one-on-one on Thursday, May 15, 2014 for a narrative walking interview in Ørestad, after having found her contact information through the Ørestad.dk Web site, maintained by the property developer named By & Havn (or By og Havn, which translates in English to 'Copenhagen City & Port Development' or 'CPH City and Port Development') who develops areas along the waterfront and in Ørestad. Ms. Cordsen is not an employee of By & Havn.

I will provide relevant reflections from this interview as part of the observations in section *3.3.4. Role of socio-ecological interactions to meet climate change*.

3.3.2. Digital media: How is the district promoted as a model?

The media profile was raised for 8 House (also called 8 Tallet in Danish) in the Copenhagen suburb of Ørested South when it received several awards and accolades focused on praising its architecturally daring features. Recognition of its architecture included the 2011 World Architecture Festival's Housing award for World Housing Building of the Year (World Architecture Festival 2011), being named one of the 10 Best Architecture Moments of 2001-2010 by the Huffington Post (Slevin 2010), and receiving the 2012 American Institute of Architects (AIA) Honour Award for Architecture, that recognizes achievements that elevate the general quality of the architectural practice (Jordana 2012). In fact, most of the mentions of 8 House that I found in online digital media tended to appear in either architecture 'trade paper' style promotional Web sites (such as

ArchDaily, Inhabitat), or in the design sections of mainstream newspapers (such as the New York Times). There was only one award that was received by the Bjarke Ingels Group (BIG) for the 8 House project focused on its 'green' features. That award was the 2010 Scandinavian Green Roof award, which was granted by the Scandinavian Green Roof Institute (SGRI) for the 1,700 square meter green roof installation at 8 House (Michler 2010). It should be noted that the SGRI is located within the Ekostaden Augustenborg district of Malmö, and the moss-sedum pre-vegetated mats used for the green roof system installed on 8 House is a product of Veg Tech A/S, a green roof retailer that is endorsed by and a member of the SGRI. The award was given to both Veg Tech A/S and to BIG for the 8 House (SGRI 2014). Neither BIG nor any of the awards refer to the 8 House as an eco-city. The way I came across 8 House in the digital media was in a search for eco-villages and eco-communities. The appearance of online digital media on 8 House as an eco-village owes its origin to some artful writing by online architectural 'trade paper' outlets, which first characterized it as a kind of mountain village and then later began to write about it as an eco-village. However, 8 House may not be what members of the Global Ecovillage Network (GEN) had in mind, since they define an eco-village as, "an intentional or traditional community using local participatory processes to holistically integrate ecological, economic, social, and cultural dimensions of sustainability in order to regenerate social and natural environments" (GEN 2014). In contrast, 8 House was designed by an architectural firm and funded by a private development consortium of companies. Local participatory processes neither drove the design, nor govern its on-going activities. The use of the 'village-street' and gardens connecting to the townhouse units built along the same winding 'village-street' does provide the basis for the development of a sense of community that could stimulate social dimensions of sustainability. However, visible evidence of holistically integrating the other dimensions of sustainability to "regenerate social and natural systems", as stated in the GEN definition of eco-village, is limited or non-existent based on observations from my site visit and my critical literature

review. Bjarke Ingels, founder of the architectural firm that bears his name, prefers to describe what his team does with buildings as "*hedonistic sustainability*, or eco-awareness divorced from thoughts of privation" (Parker 2012). According to Ingles, "Very often, sustainability is misunderstood in the Protestant way that it has to hurt in order to be good" (Hofmeister 2012). The main 'eco' features in 8 House discussed in digital media sources are both its green roof, to reduce the urban heat island effect, and its urban elements that support social sustainability. These include the winding village-inspired street that takes you from the ground floor to the 10th floor, the private gardens that adjoin the street, and the activity rooms.

I used a Google search to find the number of English language Web sites that could be found that promote thinking of 8 House in this way. On a Google search I did in September 2014 (with Google Personalization turned "off") on just the terms "eco-village '8 House' Ørestad" there were 10 pages (86 hits) of search results returned, with sources ranging from online architecture "trade papers", to blog posts written by students, faculty and staff who have travelled to Ørestad for study visits.

3.3.3. Background

3.3.3.1. Location, population and scale

Ørestad South is a district in Denmark just a little over five kilometres south of Copenhagen's city centre on the island of Amager. No serious attempt was made by the City of Copenhagen to urbanize this marshland reclaimed with infill in 1964 (Danish Ministry of the Environment n.d., 2) bordering the Kalvebod Fælled nature reserve until 2005. In December 2005, the Copenhagen City Council passed the district plan for Ørestad South, authorizing that it be opened to commercial and residential use (DAC 2014b). Reliable population statistics for the Ørestad South district itself are not yet readily available, but as of 2012, there were 7,445

residents in all four districts of Ørestad (By & Havn 2010) including Ørestad North, Amager Fælled kvarteret, Ørestad City and Ørestad South. Thus, the entire Ørestad area accounts for approximately 0.4% of the 1,950,522 residents of metropolitan Copenhagen (World Capital Institute 2013). 8 House in Ørested South is shaped like an elongated number "8" and consists of 475 housing units all contained within one single 61,000 square meter building (Bjarke Ingels Group n.d.) on approximately 4.5 hectares.

3.3.3.2. Role of subnational climate change targets in project

Greenhouse gas targets set at the subnational level were not cited in the rationale behind any of the design decisions taken concerning either the Ørestad South project in general or 8 House in particular. However, various policies were updated or added following the completion of 8 House that can still be seen reflected. Future research could engage the BIG architectural firm as well as City officers to determine if there were any communications between the City and BIG that could account for the inclusion of particular aspects. For example, the Copenhagen City Council adopted the *City of Copenhagen Climate Adaptation Plan* in 2011, followed in 2012 by the adoption of the *Cloudburst Management Plan*. I attended a presentation in August 2014 given by Lykke Leonardsen, head of the Climate Unit at the City of Copenhagen. Ms. Leonardsen is in charge of the Climate Change Adaptation program, and the City's ambitious plan to be the first carbon neutral capital in the world before 2025. She explained that part of the willingness of the City Council to approve both the Adaptation and Cloudburst Plans was motivated by a sense of urgency felt by Council members to formulate a plan of action to respond to the flooding that Copenhagen had experienced following the intense cloudburst in July 2011, when Copenhagen received 150 mm of rainfall within 3 hours, resulting in flooded streets and basements that caused almost a billion euros in damage (Leonardsen 2014). She also explained

that the Council is now preparing for a final review at meetings in October 2014, before approval can go through for the seven proposed stormwater management plans that will cover all twenty-six local water catchment areas of Copenhagen. The Ørestad district is situated in Amager area, which is covered in the specification for the *Amager & Christianshavn* catchment area cloudburst plan (Leonardsen 2014).

For reducing greenhouse gas emissions, the Council adopted a climate change action plan in August 2012, titled *CPH 2025 Climate Plan*, which included targets to cut carbon emissions by 1.16 million tons, save Copenhageners 4000 Danish Kroners (DKK) on their electricity and heating bills, and a pledge by the City of Copenhagen to become carbon neutral by 2025, wherein *carbon neutrality* is defined by the City of Copenhagen on their Web site as being when "Copenhagen's carbon net emissions equals zero (which is) when Copenhagen has reduced carbon emissions to a minimum; and compensated for the remainder of emissions with external initiatives (e.g. windmills)" (City of Copenhagen 2014). To ensure policy coherence and consistent implementation, the CPH 2025 Climate Plan is linked to "local master plans, the Agenda 21 plan, the Action Plan for Green Mobility, the City of Copenhagen Resources and Waste Plan, Cycling Strategy 2025, and the Eco-Metropolis 2015" visionary plan (City of Copenhagen 2012b).

3.3.3.3. Decision-making approach

At the City of Copenhagen level, the decision-making approach focuses on multi-stakeholder collaboration and communication, while also taking a leading role in setting the regulatory framework that must be followed by the Ørestad South district, as well as by all other districts within Copenhagen based on planning documents approved by the City Council. As mentioned previously, the district plan for Ørestad South was approved in 2005 by the City Council (DAC 2014b). The district plan is tied to the

Ørestad Act of 1992, passed by the Danish Parliament, that authorized the opening up of the entire Ørestad area for commercial and residential use, which led to an international architectural competition launched in 1994. This resulted in a plan presented by a team of Finnish architects (ARKKI) being selected following public consultation and debate (By & Havn n.d.).

The choice of plan was also motivated by particular ideas about what would be valued on this new site. The motivation was as described below by Rita Justesen, chief planner at the City and Port Authority:

> We had 310 hectares on the edge of the city with no existing buildings. It could act as a testing ground for new urban and architectural ideas. For example, we had the possibility of building high-rise blocks which were not allowed elsewhere in the city (Foster 2012).

The City of Copenhagen selected a Master plan for Ørestad in which they would "build and extend a modern mass transit network, including an automated train that takes 10 minutes to shuttle passengers between Ørestad and Copenhagen Central Station, while trying to eliminate the need for commuting altogether" by including residences, shops and offices locally in mixed arrangements (Foster 2012). The winning plan from the competition then became the basis for the final Master plan approved in 1997, which stipulates that "the district shall have a high architectural and environmental quality" (By & Havn n.d.). By & Havn now oversees construction in Ørestad in cooperation with the City, in accordance with the Master plan and District plans for Ørestad. By & Havn, which is tasked with overseeing development of the area in accordance with the Master plan under the guidance the chief planner, is a foundation owned jointly by the City of Copenhagen and the Danish state (Foster 2012).

The City, together with By & Havn, used a strategy whereby the Master plan framework provides guidance as they work collaboratively with stakeholders in the area. This strategy enables the Danish government and the City along with By & Havn to apply the Master plan alongside specific plans for reducing greenhouse gas emissions while adapting to

and coping with a changing climate. For example, the Danish government helped to fund the extension of the metro train lines and other infrastructure before the City began to "sell off plots to private developers" with the intention of reducing greenhouse gas emissions from car use (Murphy 2011). Since then, the City has developed its detailed Climate Plan, called the CPH 2025 Climate Plan, in which the City points out that the plan is "the result of the collaborative effort of the City of Copenhagen and numerous external players, the business community, organisations etc. who have all played a part in framing the Plan" (City of Copenhagen 2012b, 6). The City also uses the Plan as an invitation for on-going dialogue when it states, "the Plan also takes into account a constantly changing world, allowing for the introduction of new solutions and technologies in the years to come. Businesses, citizens and scientists will be offering new suggestions and solutions. Copenhagen is ready to listen and collaborate" (City of Copenhagen 2012b).

However, while the CPH 2025 Climate Plan approach is now in place as a guide for the municipal government, decision-making for the development of 8 House in Ørestad was more opaque, owing to it being a commission given to a private architectural firm by the private business consortium that bought the land from By & Havn. For example, the original plan for 8 House had "a continuous green roof, with pre-vegetated mats from Veg Tech A/S used on the sloping portions and recreational intensive roof gardens planned atop the flat areas, [but citing] the economic climate and budgetary restrictions, only the lower sloped portions were greened" (Greenroofs.com 2011). When asked about the change in 2011, Kai-Uwe Bergmann, BIG Partner and Director Business Development, said, "Our design called for the entire roof area but the flat areas were cut due to the financial crisis and ensuing financing difficulties, so the other portions were sacrificed. But it's even amazing that the building was built at all these past three years " (Greenroofs.com 2011). In spite of the dramatic change, it was not open to public discussion. Copenhagen residents were not involved in decision-making in the pre-construction phase of the

development. Even the decision not to finish the green roof to the specifications in the original design proposal was not a public discussion with local residents, future residents and the City of Copenhagen, even though the green roof was central to both the ability to manage stormwater on site, and the ability to reduce the urban heat island effect while still providing residents with more access to green spaces. The 2012 Cloudburst Plan stipulates that, "Property owners are, basically, responsible for flood-proofing their properties on private soil. This might involve protecting basements by means of anti-flood backflow valves, ground level adjustments, raising the sides of light wells, basement entrances, etc." (City of Copenhagen 2012c, 19) while also including provisions for property owners, of both new developments and existing buildings, to be responsible for water runoff from their site so they "cannot just let their runoff cause flooding for someone else or let it flow into the swage pipes to overwhelm the stormwater system for us downstream in the City" (Leonardsen 2014).

3.3.3.4. Funding sources

The Bjarke Ingels Group designed 8 House, commissioned in 2006 by St. Frederikslund and Per Hopfner in 2006 under the name "St. Frederikslund Holding", and construction of the building began in 2008 (Green Planet Architects n.d.). At one point, the funding group (and owners) consisted of Store Frederikslund Holding, Høpfner A/S and none other than Danish Oil Company A/S (Lobo 2012). Construction was completed in December 2010 at building cost of EUR 92 000 000 to St. Frederikslund Holding (City of Copenhagen 2012, 14).

According to Bjarke Ingels, founder of the Bjarke Ingels Group, "8 House was cheaper than its only neighbour" which Ingels attributes to "BIG's hard work making sure the complex building could be properly prefabricated" (Murphy 2011).

3.3.4. Socio-ecological interactions to meet climate change

3.3.4.1. Physical design

8 House is a ten storey building at its highest point and one storey at its lowest point. It also has two sloping green roofs totalling over 1700 square meters, which are "strategically placed to reduce the urban heat island effect as well as to visually tie it back to the adjacent farmlands towards the south [and it also] allows for [sunlight] and natural ventilation for all units" (Bjarke Ingels Group 2014). The way that access to natural light has been incorporated into the physical design of the building meets the need for natural lighting in homes as stipulated in Copenhagen's policy for building architecture (City of Copenhagen 2010).

As is required under Copenhagen's 2012 Cloudburst Plan, "rainwater is collected and repurposed through a stormwater management system" (Bjarke Ingels Group 2014). The onsite SUDS include the green roof, visible open surface systems around the property such as canals, concrete lined channels and a pond-like water feature in front of the café where the sloping roofs nearly meet the ground.

During the narrative walking interview I had with Ms. Cordsen during Summer 2014, as we approached the site I wondered where all the people were. The long boulevard leading to the site seemed empty, especially on such a nice sunny day. As we rounded the corner, I could see where the people were. I first noticed the café with outdoor and indoor seating that was teeming with people. Then, I saw a grassy area in front of the café with some kids running around, using what I later realized was outdoor exercise equipment for kids and adults alike. And then finally, we reached the bottom of a path where I had my first look at the inside of this unusual structure.

8 House has been described as a "European courtyard block twisted into a loop and threaded with a winding "street", which acts as a public

thoroughfare all the way up and around the block" (Murphy 2011). The "street" is called Amagers gåtur / Amagers Walk, and it is a one kilometre long path that twists along the external façade of the interior courtyard to connect the units. This open-air interlocked stone covered path winds its way along the interior courtyard of the building from the first floor to the top of the building on the tenth floor. According to Bjarke Ingels, the design was meant to evoke the idea of a 'mountain village' (Inhabit 2011). When Amagers Walk meets the south corner of the building, a massive set of stairs, which is also accessible to units, brings you back down to the café along the outer facing wall.

As I walked down the exterior stairs, squinting from the glare of the sunshine bouncing off the painted white aluminium and tinted glass clad exterior, I became aware of a challenge presented by this kind of "green" building approach. Both the Turning Torso in the Western Harbour and 8 House on the edge of Ørestad represent a central contradiction, rife with socio-ecological dissonance. Glass clad, tall buildings are a far cry from what might be considered sustainable buildings. These modernist monuments are as far removed from the building principles of bioshelters, Earthships, or traditional rammed-earth clay and straw-bale construction as one can get, and yet there are LEED awards hanging proudly in foyers of such buildings around the world. According to University of Toronto scientist and climate-smart building expert, Danny Harvey, simply adding a green roof alone is not enough to make a building green. When asked about the use of green roofs on top of modern glass skyscrapers, Professor Harvey responded, "Well they'll help a little, but that's a small part of the picture. If you put a green roof on top of an all-glass building, it's a bit of a joke. It's not a green building" (Paperny 2010). In other words, we cannot critically address climate change or equity challenges if we consider "glass-enveloped buildings are certified green, simply because they install double or triple insulating glass or five-star air-conditioners" (Narain 2014).

3.3.4.2. Current resident access to urban agriculture

The design of 8 House provides some opportunities for individual urban gardening in raised beds built into the patios, but access is not available to everyone. The two storey townhouse-like housing units along the Amagers Walk have gardens, but not the single storey apartments stacked above them (Murphy 2011). Units next to the outer staircases leading down the southern outer wall of the building also have garden boxes. In total, there are 100 "semi-intensive garden" boxes built into the outdoor spaces, each with a dimension of approximately one square meter. However, that leaves 375 of the 475 units without gardens.

After investigating the layout of the two inner courtyards, it was clear that they were not intended for gardening. They were both covered in grass, and designed in the shape of steep hills in one courtyard, and then given a rugged step-like structure using concrete in the other courtyard, leaving neither courtyard in a condition that was suitable for residents to garden.

As an alternative to individual gardens, there is a community garden in the nearby Plug N Play urban park, located about 500 meters from the building. By & Havn recognizes that the Plug N Play area is "very popular" but they are also careful to point out that it is "temporary" (By & Havn n.d.) indicating that they plan to sell the land and approve new buildings for the Plug N Play park at some point. Ms. Cordsen brought me to see the Plug N Play area set aside for the Ørestad Urbane Haver (which in English translates to the Ørestad Urban Garden). Ms. Cordsen shared the following observation with me during our walking interview:

> There has been talk about closing the park. But it is just so hard to imagine. This area gets so much use and people really enjoy coming here. My husband and I like to come here too on the weekends, and there are just so many people out walking or doing stuff in the park. Here in the garden, it's really something incredible. There are actually sixty people on the waiting list waiting for small plots in the urban garden. I have applied for a plot too, so that's how long it was when I called to ask. Who knows how long it is

> now! Gardening has become incredibly popular, and you can see how peaceful it is out here too. People take a great deal of pride in their plots. [...] There are more gardens being setup under the metro rail lines too. . . the Metrohaverne (Metro Gardens). I'm sure those will have a waiting list too (Corsden 2014).

The tidiness and the lushness of the urban gardens at Plug N Play had a quality that is similar to what can be seen at Plantparken in Malmö. I could see a relationship again to the Danish and Swedish allotment garden movement. The only thing missing here were the little summer cottages that can often be seen in more established allotment gardens.

3.3.4.3. Additional resident options for social access and equity

Promotional material circulated about 8 House touted that it would offer apartments that "come in a range of sizes and prices to accommodate a large cross section of the population" (BuildingIndustry.org. 2012). However, 8 House is also a private development with no social housing provision (Murphy 2011). As a result, this limits those who can live in the complex to those who have sufficient income.

The design of 8 House as a mixed-use space, however, does mean that different sized units accommodate people with different needs in different life stages, if they can afford one of the single-level or multi-level units. The design also accommodates live-work possibilities, since residents have could try to rent or purchase commercial units at the base of the building to run their own business, or potentially obtain employment on site at one of the local businesses. Local amenities at ground level along the emergent streetscape that I saw during my visit included offices (including one occupied by Froosh, the juice company), as well as a grocery store, a café and a daycare centre.

There are bike paths, canals for kayaking, and sidewalks for pedestrians in the area. The closest public transit stop is the Vestamager Metro Station, located about 600 meters from 8 House to help residents easily access the rest of the city. However, the key feature of the community is the unique Amagers Walk along the inner courtyard of the building. According to the designers, the path was meant to "provide a safe public space for adults and children to use to meet and visit each other, and was intended to evoke the image of a mountain village" (8TALLET 2014b).

The inner courtyards provide some additional community space, but their awkward design makes it impossible for kids or adults to have an impromptu soccer game. There is an indoor "community hall on the roof" (Murphy 2011), as well as the privately owned café on the main floor, that also provide meeting places.

In my discussion with Ms. Cordsen, I was alerted that the residents of 8 House, Ørestad South, and other parts of the district can participate in the Ørestad homeowners association known as GFS Ørestad (Grundejerforeningen Ørestad Syd). GFS Ørestad is independently run by homeowners in the area in order to have a forum to discuss social activities in and around Ørestad South, focused on common public areas such as the Plug N Play park, as well as to bring up safety issues in the area.

At 8 House, the challenge remains to reconcile accessibility and equity when you have a space so defined by exclusivity. While the "street" winding up from the bottom to the top of 8 House does provide spaces for community connection for the residents who live there, the fact remains that street-life here does not organically incorporate mixed use components that allow both living and livelihoods to co-exist side-by-side. Live/work arrangements are segregated vertically, resulting in a locked-in physical structure and thus a locked-in social arrangement designed exclusively for residential use everywhere above the ground floor. Additionally, the internal street remains a private laneway, given that it

has restrictions for access regarding when non-residents are permitted to visit the space. According to signs posted at the ground floor entry to the internal "street", and also on the 8 House Web site, "8 Tallet" non-residents taking "tours are only permitted during the hours of 10:00 to 16:00 on weekdays" and "tours must not take place on weekends or holidays" (8TALLET 2014), thus reminding visitors that they are on private property, not unlike a gated community in the United States. Thus, the kinds of freedom of access to roadways and neighbourhoods found in other municipality-run urban and peri-urban spaces do not apply here. This alone removed any illusions I had as a visitor that Amager's Walk could ever be a street in a mountain village, or just another "street" in Copenhagen. Instead, the illusion of a street falls away to the reality that the so-called "street" is simply an outdoor hallway in a private building.

Neither specific emissions targets, energy buy-back schemes nor Kyoto Protocol style market mechanisms, such as carbon offsetting or pollution permits, were used to either motivate the City of Copenhagen in their decision-making or incentivize the residents who now occupy 8 House. Refer to the *Appendix* to review the detailed qualitative summary table comparing the elements that form the socio-ecological interactions in 8 House to the other three case sites.

This examination of the 8 House community in the Ørestad South district provided a look into one example of privately funded, newly constructed, mixed-use urbanization in the Danish context. This study also shed light on the role that SUDS and green roofs can play in a planned suburb as a strategy for adapting to climate change impacts. It also demonstrates how the City provides planning guidance and regulations to ensure private developers address particular climate change goals, such as stormwater management. Again, as was the case in at the Bo02 site in the Western Harbour, demand for urban gardening has been acknowledged through the provisioning of private gardens in some units. Also, as was the case

with the Plantparken community garden in Bo02, Urbane Haver is also in high demand as indicated by the long waiting list.

3.4. Munksøgård

3.4.1. Narrative walking interview

I had one interlocutor who met with me, along with a group of about ten other researchers from Lund University, for a narrative walking interview in Munksøgård. I met with with Eva Diekmann (Green InSight founder and resident of Munksøgård) on Saturday, May 3, 2014 for a narrative walking interview in Munksøgård after seeing an invitation from a group of students at Lund University. Ms. Diekmann is not an employee of either the town of Trekronor or the municipality of Roskilde.

I will provide relevant reflections from this interview as part of the observations in section *3.4.4. Role of socio-ecological interactions to meet climate change*.

3.4.2. Digital media: How is the district promoted as a model?

Unlike the other case sites in this study, the online digital media profile for the eco-village of Munksøgård does not feature commendations and awards. Located 25 kilometres outside of Copenhagen in the Roskilde district of Trekronor, it has gotten the most digital media attention from researchers and students doing study visits on eco-villages, along with coverage from writers focused on eco-villages and green buildings. I was introduced to Munksøgård through a study visit organized by students at Lund University, and not through a general Google search on 'eco-city Denmark' that I started with to identify potential sites early in my study. The kind of search results found on Munksøgård in English language online media are a mix of informally published blog posts and articles in e-

newsletters, plus a few references within formally published academic journals.

I used a Google search to investigate the number of English language Web sites that could be found. On a Google search I did in September 2014 (with Google Personalization turned "off") on just the terms 'Munksøgård eco-village' there were 17 pages (151 hits) of search results returned, with sources ranging from writers focused on the eco-village movement, to blog posts written by those students, faculty and staff who have travelled to Munksøgård for study visits.

3.4.3. Background

3.4.3.1. Location, population and scale

Munksøgård is an eco-community on the peri-urban fringe of the City of Roskilde, bordering on farm fields in Roskilde municipality, which is located 25 kilometers west of Copenhagen's city centre on the island of Zealand (or Sjælland in Danish). It has been administratively integrated into the Trekroner district of Roskilde. There are approximately 225 residents of Munksøgård, (Munksøgård 2014) which accounts for 0.5 % of the 48,721 residents of Roskilde as of 2014 (Denmark Statistik 2014). The community consists of five clusters of row-house dwellings with twenty row houses in each cluster, for a total of one hundred row houses (Munksøgård 2014). The buildings and land area included in the community covers a total of 4 hectares (NICA 2012).

3.4.3.2. Role of subnational climate change targets in project

Greenhouse gas targets set at the subnational level were not specifically cited in the rationale behind the design decisions at Munksøgård. However, during the planning of the project, the members in the

Association included keeping carbon dioxide emissions low as a priority, which is why they chose to create their own micro district heating system powered by wood pellets (Hansen 2009). Additionally, during the time the project was being initiated in the mid-1990s, the Danish government was viewed as supporting various environmental and social "programs, campaigns, and experiments […] in a political landscape change that favoured the interplay of new actors and networks in experimenting on housing technologies and settlements [using] ecological materials and self-constructed buildings", whether through local Agenda 21 projects or national campaigns for saving energy and water (ClimateBuildings.dk 2014). Also, around the same time, many of Denmark's local and subnational authorities were involved in implementing Agenda 21, "the United Nations programme of action on sustainable development" adopted in 1992 at the United Nations Conference on Environment and Development, commonly known as the Earth Summit (Moos 1998, 3). Desirable outcomes sought from projects or activities under the local Agenda 21 included: protecting the atmosphere and reducing air pollution; strengthening renewable energy resources and reducing energy consumption; sustainable settlements; management of solid waste and wastewater; and sustainable agriculture (Moos 1998, 22). It is interesting to note in retrospect how all of these desired Agenda 21 outcomes were applied within Munksøgård.

In 2008, Roskilde signed onto the EU Covenant of Mayors to reduce carbon dioxide emissions across the entire municipality as a geographic area by a minimum of 20% by the end of 2020, but it was not until 2011 that Roskilde published their first municipal climate plan (Roskilde kommun 2014).

3.4.3.3. Decision-making approach

Munksøgård is a member of the Global Ecovillage Network (GEN), and it meets with the basic definition of an eco-village which is to be "an

intentional or traditional community using local participatory processes to holistically integrate ecological, economic, social, and cultural dimensions of sustainability in order to regenerate social and natural environments" (GEN 2014). During our narrative walking interview, Ms. Diekmann explained that the Munksøgård Association was founded by a group of people who had a common interest in living in an ecologically sustainable way while also practicing an open, participatory democracy. Several locations were considered, but at one point, members were put in contact with contacts from Roskilde kommun. "The Association was looking for a location," said Ms. Diekmann. "At the same time, Roskilde had all this land they wanted to develop, but they were looking for a group that might want to try something different in how they setup a community so that the Kommun wouldn't need to put in all the City services, such as sewage and heating . . . at least not right away. It was a good match since the Association wanted to be self-sufficient with heating and waste and other things" (Diekmann 2014). Decision-making was characterized by cooperation among Association members, as well between the Association and Roskilde municipality. Studies conducted on the relationship in the early days are "described as being well-functioning and flexible [and that the] municipality was sympathetic and helpful towards the alternative solutions that the group wished [to implement, such as having their own] decentralized wastewater treatment plant and their own energy supply, allowing the municipality to not to lay down supply pipes and wires to the rather remote area" (Holm et al. 2008).

The result of this close collaboration between the City and the Association can be seen in how the final local plan itself was designed. In particular, the area's local plan requires particular ecological regulations be followed, such as requiring "photovoltaic cells […] as an integral part of the roof structure, composting facilities and waste separation" (Holm et al. 2008). In addition to working with the City, the Association also collaborated with various architects, developers and consultants at each stage.

3.4.3.4. Funding sources

The Munksøgård Association was formed in 1995, and construction was completed in 2000. The Association had 20 core members who would provide funding to reside in the 20 owner-occupied dwellings, while the remaining 80 units were funded under the Roskilde housing association (Holm et al. 2008).

3.4.4. Role of socio-ecological interactions to meet climate change

3.4.4.1. Physical design

The two storey row houses, painted different colours and positioned around the old farm house on the property, seemed to be a simple and clever way to help people have a reference to help them navigate back to where they lived. Large grassy areas and walkways separated the five clusters of row houses. SUDS are used throughout the neighbourhood to reduce flooding risk from cloudburst events, primarily through the use of unpaved surfaces and landscape features, not concrete channels.

Off-grid technologies could be seen in various areas around the community, such as the anaerobic digester, the wood chip boiler, rainwater collectors for use in the laundry rooms, and the separating toilets used to separate urine for separate treatment before being discharged to agricultural purposes (Holm et al. 2008). The waste separation station was also adjacent to the second-hand swap centre. The most visible monument to their collective efforts was the centrally located, white, community-built, straw bale, village meetinghouse with its post-and-beam construction, cathedral ceiling on the inside and its breathable clay walls with the mollusc-shell roof on the outside.

From a climate change perspective, the most promising aspect of this community is the combination of simple approaches used to reduce emissions. When the design of the built environment is put together with

the social support for low impact, low waste, low carbon living, there is a sizeable reduction in the ecological footprint. A 2009 Danish study by Pöyry A/S Environmental Consultants of three Danish eco-village communities found emissions were "a full 60% below the national average" (Hansen 2009).

3.4.4.2. Current resident access to urban agriculture

Munksøgård is situated in a peri-urban environment on the edge of rural fields. In developing the village, efforts were made to provide gardening opportunities. Each unit has either a backyard, or a greenhouse and a backyard. Fences are fairly rare, so most backyards open up into a communal shared yard space. In addition to having gardening close at hand to the row houses, ideal for growing herbs and spices for quick harvesting before mealtime, there is also a large community garden area where residents can have allotments. When I inquired during the narrative walking interview about the use of the gardens with permaculture techniques, Ms. Diekmann replied, "I think the youth house was trying that out. I'm in the family house, and we're not doing permaculture, but everyone is using organic agriculture. We want to avoid using chemicals. I think the best garden you see over there belongs to the seniors' house. They have a lot of dedication and put more time into it. It's good to ask them for tips" (Diekmann 2014).

Ms. Diekmann also explained that some residents are raising animals on the lands adjacent to Munksøgård where they have leased land for grazing.

3.4.4.3. Additional resident options for social access and equity

Munksøgård is entirely self-operating, self-governed and self-maintaining. Participating in teamwork and group activities is expected as part of the culture of living together. This design provides many different

opportunities to participate in community social activities, as well as in decision-making about maintenance and other governance issues.

One option created to increase social inclusion is the making and sharing of meals in the large, common dining room together. Ms. Diekmann explained the way the community dining works as follows:

> There is a common fee you pay every month that goes into the fund for the communal dinners. You certainly don't have to go every night, but going a few times a month is good. There are also times for people to rotate to help prepare meals together. But sometimes, with smaller children who are fussy eaters, it can get tricky! If we need to stay home, then we can just do that, and it's fine. The great thing about the shared kitchen and dining room is that it is a great way to share the work for making meals so you can get a break, especially if you've been at work all day, and then you get back here, and you can join everyone for a nice meal together. It's really convenient and it really does help parents with busy schedules to have this as an option when you get home (Diekmann 2014).

Employment opportunities on-site are limited; one business is the community-run convenience store that has been set up in one of the old farm buildings. Another option is to help in running the community car sharing enterprise, which includes taking care of maintenance on the mixed fleet of hybrid and electric cars. Some residents commute to Copenhagen by train to pursue employment.

Although there are no public transit stops either inside the neighbourhood or on the most adjacent streets, there are some options for transportation. Residents can either use the car share, or use the paths that are suitable for walking and biking in order to get to Trekroner, approximately 800 meters from Munksøgård, where local buses pass through the main shopping area, and the main commuter rail station allows connections to Copenhagen and other parts of Denmark. Other amenities in nearby Trekroner include Roskilde University and its library, a large supermarket, a coffee shop, a florist, a school for children with special needs, and an assisted living apartment building for seniors. The combined amenities in

Munksøgård and Trekroner provide a variety of opportunities for social access for people at different life stages and with different abilities.

Ms. Diekmann pointed out that there is actually a waiting list for people who want to get into one of the rental units, and that there is very little turnover, so it is quite difficult to get into the community, but once someone gets in, they are likely to move between the houses depending on their life circumstances (Diekmann 2014). For example, someone might start off in the youth house, but then they start a family and apply to get into the family house. Having different occupancy tenures, namely owner-occupied units versus rental units (Holm et al. 2008), also makes the area more accessible to different income levels and people at different life stages. The support system for this community seems to foster a sense of belonging and inclusion.

Neither specific emissions targets, energy buy-back schemes, nor Kyoto Protocol style market mechanisms, such as carbon offsetting or pollution permits, were used to either motivate the City in their decision-making or incentivize the residents who now occupy the community. Refer to the *Appendix* to review the detailed qualitative summary table comparing the elements present within the context of the socio-ecological interactions in Munksøgård to the other three case sites.

This examination of the Munksøgård community in the Trekroner district of Roskilde provided a look at an eco-community that is operated within the Danish, peri-urban context. This study also illustrated a mix of social arrangements that provide for community diversity as well as a way to creating a supportive, inter-generational atmosphere in which people can learn from each other while living in a low impact, low ecological footprint way. It also shows a way of building and planning the incorporates the person who will reside in the community in the early planning stages so that planning can support low carbon values, which can then be built into the community from the ground up. The role of urban gardening is most

visible in this case site, both for food production and as a tool to facilitate social equity, inclusion and access. The waiting list for people wanting to move into Munksøgård indicates there is unmet demand, and provides a hint for how to create regenerative, supportive communities with rich socio-ecological arrangements, both for new and retrofitted communities.

3.5 Summary of key decision makers and who benefited

Two of the case sites had key decision makers who were also direct beneficiaries as future residents, namely the Urban Villas in Bo02 and the Munkesøgård eco-community. Both of these cases used a building community strategy, where residents found their own architect to build the homes they designed together. In both cases, City officers were also engaged in a collaborative process with the building community, while also ensuring consistency with the Master plan for the city. Some aspects of the collaboration also resulted in modifications to the local district plan. Of the one hundred units in Munkesøgård, twenty are owner-occupied by the original members of the Munkesøgård Association, who designed the development. The remaining eighty units were provided as co-housing units of different sizes that could be rented through the City of Roskilde. Of the seven units in Urban Villas, the original building community bought four units, while the remaining three units were offered for sale.

The Quality Programme and the Creative Dialogue at Bo01 and Bo02 were both led by City officers as key convenors, but there was involvement from Malmö residents, the energy company E.ON, architects, builders, and contractors. The process was more stringently regulated in Bo01. The Bo02 process evolved into a more consultative one, particularly once the financial crisis began and builders encountered financial roadblocks. Those who benefited as future residents were generally not participants in this collaborative conversation. Many units in Bo01 were privately purchased and are now owner-occupied, enabling the property developer to collect revenues. The remaining units are rented through MKB, who collects the revenues. In Bo02, over 65% of the units are rental apartments.

Augustenborg had a highly collaborative process involving existing residents as well as people who worked in the neighbourhood. With most of its units rented through MKB, the revenues primarily go to MKB. Most of the units are eligible for social housing rental rates.

8 House was built as a private land development. While St. Frederikslund Holding bought the land from By & Havn, decision making was done by BIG and St. Frederikslund Holding, as the owners who commissioned the building, in accordance with the regulations and requirements of the Master Plan and District Plan that was overseen by the City as well as By & Havn for Ørestad area. There is no social housing provision for 8 House. Future owners were not involved in the development of the community. After construction, the units were offered for private sale to individual owners. Revenues from the initial sale of units went back to the building owner, St. Frederikslund Holding.

4. Theoretical discussion

All of the case sites presented in the Öresund region of Scandinavia were either self-identified or labelled by others as being an eco-city or eco-community. All emerged under this label as a model for others to follow sometime after the 1992 Earth Summit in Rio and the launch of the UNFCCC climate talks in 1994. However, they differ in size, scale, ownership, funding arrangements and location. Which theoretical framework best explains why so many eco-cities and eco-communities have emerged in these different contexts at these different scales over the past 20 years, in spite of the stalemate of national governments at the inter-governmental climate talks? I will now evaluate the empirical findings from my case sites against two theoretical frameworks, namely Critical Institutional Theory and Strategic, Values-based Planning Theory.

4.1. Critical Institutional Theory (IT)

According to Douglass North, "institutions are the humanly devised constraints that structure political, economic and social interaction [...] consisting of both informal constraints (sanctions, taboos, customs, traditions and codes of conduct) and formal rules (constitutions, laws, property rights)" (North 1991, 97). Building on this broad definition of institutions makes it possible to consider socio-cultural and political factors that go beyond narrow definitions that often become trapped in “bricks-and-mortar” definitions, that are confined to the semantics of branding specific companies, institutes or projects.

Viewed in this light, Institutional Theory is "an approach to understanding organizations and management practices as the product of social rather than economic pressures. [As a theory, it] is valuable because of its ability to explain organisational behaviours that defy economic rationality" (Suddaby 2013, 379). In essence, Institutional Theory focuses on social structures mediating access to opportunities and possibilities for participation to reproduce a desired outcome. For example, the desired outcome could be obtaining a particular ecological,

social, or cultural objective. Critical Institutional Theory applies a critical theory lens to Institutional Theory by questioning underlying socio-cultural causal mechanisms, particularly about the access of different groups to power and privilege, in order to identify winners and losers as part of a broader human emancipatory agenda (Suddaby 2014, 1). Traditional Institutional Theory rests on the old foundational institutional theorists argument that casts human agency as entirely subordinate to "shared norms" once the individuals become institutionalized (Meyer and Rowan 1977). Critical Institutional Theory can be used to apply a reflexive socio-cultural lens to identify power and privilege in order to enfranchise the disenfranchised and marginalized, as well as to identify areas where power needs to be balanced and restrained.

From the perspective of Critical Institutional Theory, the emergence of the eco-cities and eco-communities at the four case sites in this area is likely to be viewed as examples of the on-going importance of institutions in providing legitimation to new and existing actors, and for creating legitimated channels for sharing ideas or concerns among stakeholders. At each step, designated bodies were either assigned or newly created to manage the rollout of particular mandates. In Ørestad, the City of Copenhagen and the Danish Government created what would eventually be called By & Havn to oversee the implementation of the Ørestad Act, the Master plan and the District plans. Both Ørestad and Malmö had international competitions as an institutional setting to mediate how the Ørestad Master plan and the Western Harbour Master plan respectively would be selected. Ekostaden Augustenborg launched as a project before work was begun on site in the neighbourhood itself, and the Munksøgård Association was formed to initiate the beginning of their formal search for a property. Through the Critical Institutional lens, it becomes possible to also see the strategic approach of City officers who were empowered to actively incorporate normally disenfranchised actors into their property (re)development projects, particularly in the case of Augustenborg, where new norms and codes of conduct were forged with existing residents, from food waste separation and collection for biogas to urban gardens. Institutional theory also helps by providing a way to explain how the 8 House and Bo02 projects continued to proceed, even though the financial crisis made

economic conditions considerably more difficult. One possible explanation, as seen through the lens of this theory, is that due to the institutionalisation process of building project-specific norms, codes of conduct, and identity, the private sector actors had found additional reasons, *beyond the usual economic justifications*, to finish their projects, such as prestige, a personal connection with the project team, or a commitment to realizing a shared green utopian vision with teammates.

Critical Institutional Theory successfully provides a good starting point for understanding the sociology of the project teams when it comes to legitimizing institutions once they are in place. However, Critical Institutional Theory does not sufficiently explain how such disparate groups of people are initially engaged, brought into the process, and motivated to continue.

4.2. Strategic, Values-based Planning Theory

When seeking possible ways to explain what took place at these four sites, it is necessary to consider what created the hook to bring stakeholders into the process in the first place. Given that institutionalisation is part of a longer process, it is necessary to find another explanation for how people can be motivated to stay engaged in conversations about competing land-use interests, culture, space and place, particularly for contentious and emotionally charged discussions about climate change. From the Strategic, Values-based Planning Theory perspective, we might view the process at all four case sites as being part of a planning process that started with the key stakeholders providing their values up front, at the beginning of the process, in order to ensure the plan would incorporate elements that community members want to see in the places and spaces where they live and work.

Strategic, Values-Based Planning Theory is founded on a framework for engaging in an approach to planning using a systematic, community-based decision-making process that incorporates local objectives to help determine priorities and allocate scarce resources (i.e. time, money and skills) to achieve agreed-upon

goals (UN-Habitat 2014, viii). This values-led theory of planning is based on a normative conceptualization of planning practice, whereby "good planning allows for participatory ways to incorporate local community values, or objectives, in addition to the objectives that may be present in existing city plans and strategies" (UN-Habitat 2014, 1). This could be seen as representing a variant of Communicative Planning Theory (also known at Collaborative Planning Theory), but instead of waiting to formulate objectives iteratively as part of participatory, deliberative discussions, the values-based approach starts with a set of core values that are identified at the beginning of discussions, so that those things that are most important to the participants can serve as guides to action as the discussions move forward in the community and other stakeholders join the conversation.

The limitation of this approach is found in the same criticism that is applied to communicative theory, which is that it is prone to power blocks capturing the deliberative process. Communicative Planning Theory is criticized for not recognizing the influence of power in capturing what were intended to be broadly participatory processes. According to Erik Olin Wright, a prominent professor of Sociology at the University of Wisconsin-Madison, "power is the capacity to do things in the world, to produce effects" which is essentially an "agent-centred" notion of power in which "people, acting individually and collectively, use power to accomplish things" (Wright 2012, 12).

Wright then further distinguishes three kinds of power, "namely *economic power,* rooted in control over the use of economic resources" (i.e. bribing people to do things), "*state power,* rooted in control over rule making and rule enforcing over territory" (i.e. forcing people to do things), and what Wright calls "*social power,* rooted in the capacity to mobilize people for cooperative, voluntary collective actions" (i.e. persuading people to do things) as part of the agent-centred notion of power (Wright 2012, 12).

For example, one particularly strong criticism of Communicative Planning Theory is that "this mode of planning takes the economic interests of investors and

developers as the point of departure, not as one particular issue among others to be modified and balanced against the public interest" (Bengs 2005a, 1). The values-based approach has the potential to reduce the risk caused by over-weighting commercial interests in deliberations, but this still requires full participation by community members who are able to take part with the assurance that they will not be victimized by the use of influence peddling, threats, or other coercive tactics from economically powerful interests.

From the Strategic, Values-based Planning Theory perspective, we might thus consider the completion of these eco-city and eco-community initiatives as examples of how important it is to anchor the planning process in the values of the community it is intended to serve. In some cases, the statement of values is essentially the Master plan and/or District plan, wherein the City has already included additional public feedback periods as part of their plan approval process before taking the plan forward by using representatives who work in 'the public interest' in talks with private developers, as arguably was the case in Ørestad. There are some references in the literature to the Values-based Planning Approach as having been introduced to the City of Malmö in 1995, which led to both the Quality Programme at Bo01 and the Creative Dialogue at Bo02, as part of the planning process anchored on "collaboration between the public and private sectors regarding the area's future" (DAC 2012). The values-based approach would provide an even more convincing explanatory framework for the interactions in Malmö between the residents at Augustenborg in their multi-stakeholder, community-focused dialogue, as well between the Roskilde kommun and the Munksøgård Association.

The Strategic, Values-Based Approach helps provide an explanatory framework for how multiple stakeholders were able to take ownership and move forward through to completion of all four of the case sites. Anchoring the process in a set of *values-based outcomes,* requested by the community and the City from the outset, was seemingly even more important than the city having set emission targets (either in percentages or in Gigatonnes of carbon dioxide equivalent values) for mobilizing actions. Thus, the combination of using Critical

Institutional Theory to expose and compensate for influences of power on deliberations, and the Strategic, Values-based Planning Theory approach together provides a persuasive explanatory framework to evaluate the four cases in this study.

5. Conclusions

The purpose of this study was to critically examine examples of climate action taken at the local level, as demonstrated through four eco-cities and eco-communities developed over the twenty-year existence of the UNFCCC, as a way of understanding how these initiatives have moved forward, while the climate talks remain gridlocked. Four case sites were studied based on their visibility in the English language digital media as 'model' projects within the Öresund region of Sweden and Denmark, promoting new "dreams, imaginaries and experiments" (Bradley and Hedrén 2014, 2).

I contended from the outset that action by cities in urban and peri-urban areas is likely to be traced to the use of ecological rationality that takes a longer view, while still taking action in the near term, as evidenced by their ability to complete each of the four eco-city/eco-community projects and make them operational.

Here are the research questions I have addressed, along what a brief summary of the key findings that were uncovered during this qualitative study:

1) How can we explain these examples of local-level actions on climate change over the last 20 years even when climate talks have stalled?

While national governments have been waiting for carbon trading markets and other new market mechanisms to materialize, cities have been busily working with broad coalitions of citizens, developers, architects, research institutions, universities, non-governmental organizations, local businesses and energy companies. Guided by what could be described as an *ecological rationality*, cities are taking a longer-term view of the needs of their communities in order to reduce unwanted risks, increase desired outcomes and improve the quality of life of their citizens. My analysis of the empirical evidence, using both *Critical Institutional Planning Theory*, as well *Strategic, Values-based Planning Theory* provides a compelling framework for explaining key trends observed at each case site over the past twenty years.

2) Who were the key decision makers and who benefited?

At all four sites, the City and its designated property development office in its jurisdiction, played a role in connecting each project back to the local Master plan, District plans and related policy documents, such as the cloudburst water management plans, climate adaptation plans, and climate change policy documents. In three of the four developments, there were social housing provisions to provide access for people with lower incomes. Only 8 House did not have a social housing provision. Augustenborg had significant involvement from existing residents in the design and decision-making during the project through a process of constant communication. Both Urban Villas in Bo02 and Munksøgård featured future residents at the centre of decision-making from the very beginning of the project, prior to the beginning of construction. Neither Bo01 nor 8 House had any future residents involved in decision-making. The more resident involvement that took place during the key planning and decision making before construction, the more socio-ecological elements ended up in each space.

3) What lessons can these local actions teach us about equity?

When the UN climate talks continue later this year, discussions will resume about equity in the context of how countries in the Global North and Global South will take responsibility for their *common but differentiated responsibilities and respective capabilities* (CBDR-RC) as well as inter-generational equity considerations. To honour the Principle of Equity, we need look no further than the first seven words from Article 3: "*The Parties should protect the climate system*…", but the neoliberal trend towards the financialisation of social and cultural domains has resulted in an eroding of notions of intrinsic values, such as equity. Equity is a term that derives from notions of fairness and social justice, both of which are core values in Scandinavian culture. Having all four case sites in Scandinavian countries provides a common basis for comparisons of how equity manifests in these new eco-city and eco-community contexts. The following practical applications of equity were observed on each site:

- **Food security & urban gardening equity:** All sites have urban gardening either outside the apartment, or in community allotments nearby. Both community allotment gardens have waiting lists for residents.
- **Economic equity & intergenerational equity:** Social housing rent and/or co-housing purchase subsidies from the government are available at 3 out of the 4 case sites. This not only prevents economic discrimination. It also provides the added benefit of increasing social diversity by making it easier for seniors on fixed incomes, youth, singles and young families to be able to mingle and enrich neighbourhood life.
- **No new market mechanisms:** 0 out of the 4 cases used any market mechanisms from either the City or the utility company, so *monetary compensation* through market mechanisms is not a necessary prerequisite for taking action on reducing emissions. Some consider carbon taxes as a form of market mechanism. The carbon tax was enacted in Sweden in 1991, which pre-dates the study period that I am using, which is 1994-2014. The carbon tax was enacted in Denmark in 2002. Munksøgård pre-dates the carbon tax by two years since it was completed in 2000. While 8 House was built eight years after the carbon tax was instituted, the development of Ørestad South is based on the final Master plan approved in 1997. The Master plan of 1997 required a mixed-use approach, including an extended Metro line as public transit, to reduce the need for car travel. The Ørestad Master plan pre-dates the carbon tax by five years.
- **No targets required:** In all cases, there were no specific local carbon reduction targets in place *before* the eco-city projects began construction. As much as monitoring, evaluation, reporting and verification can be helpful, it is not necessary to have a complete carbon inventory and an official climate policy in place in order to get action to occur on climate issues.

- **Deliberative Democracy:** Discussions and consensus building is seen as central to social inclusion, and is essential in ensuring access of different voices in the discussion. 3 out of 4 projects used some form of collaborative discussions with multiple community stakeholders at some stage in the process. The consultative process was often accompanied by visionary leadership and values-based planning.
- **Master plan in the public interest:** 4 out of 4 projects had to work within the context of a pre-existing Master plan that had been approved by the City in consultation with local citizens before any land was sold. 2 out of 4 used an international competition as an institutional mechanism to generate interest, gain access to proposals, stimulate public discourse and create legitimacy prior to selecting a new master plan.

In terms of future research, one possible topic would be to do a further exploration to compare how subnational governments define equity and justice, as compared to national governments. Another opportunity would be to explore the extent of ecological rationality at the subnational level in other environmental policy areas. A third opportunity would be to explore where policymakers are getting their information to support their decision-making to advance climate action.

Some of the practical limitations of this study come from the nature of this examination using qualitative, exploratory approaches. The research context is entirely based on four case sites in the Scandinavian context. As a reflexive, interpretive study, it is important to remember that there are no grand theories with a magic bullet to solve all problems in all cases when it comes to the social sciences, and this study is no exception. There are elements of the particular context in which this study was done to keep in mind. As a female, middle-class social scientist that spent her formative years in North America before moving to Sweden, I will concede that there are possibilities of some experiences that are closed to me as a non-Scandinavian, and that I may have missed some insights (or had different ones) due to my not speaking Danish or Swedish. However, this

study was intended to examine sites being promoted in the English language digital media, so having missing artefacts is expected, and is part of my research design. These case sites are also embedded in the context of the Global North; this is yet another area of consideration to avoid over-generalizing about these results when considering case sites in the Global South.

As the world prepares for the next round of climate talks in Lima in December 2014, leading to what is hoped to be a final agreement in Paris in December 2015, we are approaching a critical juncture in the UN climate talks. This study will hopefully provide some critical reflections on how to overcome key limitations in the current discourse, including the current privileging of economic rationality over ecological rationality in the current inter-governmental negotiations. In focusing on the inroads that have been made at the subnational scale, I hope I have revealed some of the opportunities that are available already to move away from ineffective strategies that risk perpetuating counter-productive myths on what rationalities actually motivate and catalyse actions on the ground.

The lesson for the inter-governmental climate talks here is clear. The emission targets, while necessary for tracking the science of climate change, are not what catalyse action among citizens as stakeholders. Market mechanisms also are not necessary as pre-requisites for change. As demonstrated with the failure of the Kyoto Protocol to reduce emissions, market mechanisms may actually be an obstacle to climate action. What motivates multi-stakeholder action is committing to action around specific values and priorities set by the communities themselves. We can declare a debt jubilee anytime we want to manipulate our human-made financial mess. But to tackle the threat of human-made climate change, we have to act now. Our future is not for sale. There is no Planet B.

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7. Appendix

Appendix 1

Qualitative comparison: Socio-ecological interactions by case site

		Eco-city/ eco-community District Case Sites			
Types of Local Socio-ecological interactions	**Elements (physical and social)**	Bo02 (Urban Villas) + Bo01, Western Harbour, Malmö	Augustenborg, Malmö	Munksøgård, Roskilde	8 House, Ørestad, Copenhagen
Energy	Sustainable Urban Mobility and Mixed-use layout *(pedestrian walkways, bike paths, public transit / Transit-oriented development (TOD), navigable waterways)*	●	●	●	●
	Waste-to-Energy *(incineration & biogas)*	●	●	-	-
	Renewable Energy *(independently or microgrid shared solar, wind, biomass, aquifer heating/cooling exchange)*	●	●	●	
	District heating-cooling	●	●	●	●
	Energy efficient envelope *(windows, insulation)*	●	●	●	
	Energy smart technology *(demand management thermostats)*	●	-	-	-
	Painted white roofs	-	-	-	-
	Electric car hookups	●	●	●	-
Waste	In-sink food waste collector	●	●	-	-
	Shared waste sorting	●	●	-	-
	Pneumatic waste collection	●		-	-
	Anaerobic (bio)digestion	-	●	-	-
Water	Sustainable Drainage System (SUDS) rainwater management	●	●	●	●
	Graywater system *(household graywater reuse on-site, i.e. garden)*	-	-	●	-
	Green roofs/walls & ground-level blue/green spaces	●	●	-	●
	Automated / Adjustable built storm-surge break walls, dams, weirs	-	-	-	-
	Fixed built storm-surge break walls, dams, weirs	-	-	-	-

		Eco-city/ eco-community District Case Sites			
Types of Local Socio-ecological interactions	**Elements (physical and social)**	Bo02 (Urban Villas) + Bo01, Western Harbour, Malmö	Augustenborg, Malmö	Munksøgård, Roskilde	8 House, Ørestad, Copenhagen
	Elevated structures	-	-	-	●
	Stone and/or concrete river, stream & creek channel erosion management	●	-	-	●
	Concrete underground storm sewers added or retrofitted for adaptation	-	-	-	-
Food gardens and other blue, green and brown carbon habitats	Community Supported Agriculture (CSA) farm using organic regenerative agriculture and/or permaculture techniques central in community design (agrihood)	-	-	●	-
	Common urban and peri-urban food gardens and/or food forests *(including plots nearby and plots onsite)*	●	●	●	●
	Private urban and peri-urban food gardens and/or food forests *(including multi-functional planters in front, side or back of structure)*	●	●	●	●
	Natural wetlands for blue carbon sequestration, biodiversity and fishing	-	-	-	●
	Multi-zone aquatic ecosystem *(shoreline to benthic zone)*	-	-	-	●
	Multi-level canopy terrestrial ecosystem *(trees to grasses)*	-	●	●	-
Planning & Construction Decision-making	Inclusive with resident participates defining values, problem, outcome	-	●	●	-
	Inclusive with multi-stakeholder participation defining values, problem, outcome	●	●	●	-
	Exclusive command and control by architect, developer, city property management & finance	-	-	-	●
Social Access & Equity	Urban form via zoning, regulations & subsidized construction by city (tax incent. or direct gov't subsidies for 'green' tech.	●	-	-	-

		Eco-city/ eco-community District Case Sites			
Types of Local Socio-ecological interactions	**Elements (physical and social)**	Bo02 (Urban Villas) + Bo01, Western Harbour, Malmö	Augustenborg, Malmö	Munksøgård, Roskilde	8 House, Ørestad, Copenhagen
	Planning for active recruitment for co-housing / collaborative housing associations by the municipality or city	-	-	●	-
	Community dialogue based planning	●	●	●	-
	Collaborative construction based on German concept of "byggemenskap" or "baugemeinschaft" or building community	●	-	●	-
	Planning for different tenure durations	●	●	●	-
	Planning for social housing	●	●	●	-
	Planning for different household sizes *(singles, couples, larger families or groups of friends)*	●	●	●	●
	Planning for Live/Work Mixed Use *(Pedestrian, transit & bike access to mixed use residential, work livelihood, health, education, recreation, cultural spaces, marketplaces & fresh food amenities)*	●	●	●	●
	Municipal housing authority governance / property management	●	●	●	-
	Private property management company + Condo Association	●	-	-	●
	Collaborative governance and property management	●	●	●	-
	Single-family housing	●			-
Market Schemes	Payment for Environmental Services (PES)	-	-	-	-
	Purchase Carbon Offsets	-	-	-	-
	Pollution permits (incl. Carbon) market trading	-	-	-	-
	Solar & wind power "buy back" market option to central utility grid	-	-	-	-

		Eco-city/ eco-community District Case Sites			
Types of Local Socio-ecological interactions	**Elements (physical and social)**	Bo02 (Urban Villas) + Bo01, Western Harbour, Malmö	Augustenborg, Malmö	Munksøgård, Roskilde	8 House, Ørestad, Copenhagen
Country	Denmark	-	-	●	●
	Sweden	●	●	-	-
Urban scale	Urban	●	●	-	●
	Peri-Urban	-	-	●	
Building typology	Hedonistic sustainability	-	-	-	●
	Green buildings as energy-saving devices **	●	-	-	-
	Grassroots eco-communities **	-	-	●	-
	Subsidized urban projects **	-	●		-
Site layout	Height: 1 or 2 levels	-	-	●	-
	Height: More than two levels	●	●	-	●
	High density spacing of built structures	●	-	-	●
	Medium density spacing of built structures	-	●	-	-
	Low density spacing of built structures	-	-	●	-
	New buildings	●	-	●	●
	Retrofit existing buildings		●	-	-
Digital Media	Self-described in media by themselves or described by others either as an eco-city or an eco-community*	●	●	●	●

Note:
* This is the "dependent variable" which represents the output or effect we are studying, namely the existence of the eco-city or eco-community.
** (Jensen et al. 2012)