Futures Beyond GDP Growth

Final report from the research program 'Beyond GDP Growth: Scenarios for sustainable building and planning'

Beyond GDP-growth

Scenarios for sustainable building and planning

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Preface

This report was produced as part of the research program 'Beyond GDP Growth: Scenarios for sustainable building and planning' (www.bortombnptillvaxt.se), which is a strong research environment funded by the Swedish Research Council Formas. The research program ran from spring 2014 to fall 2018.

The project has brought together many researchers from different disciplines, organized into different work packages. The following researchers have participated in the research program: professor Göran Finnveden (KTH), project manager and director of the *Sustainability Assessment* work package; docent Åsa Svenfelt (KTH), project manager and co-director of the *Scenarios* work package; professor Alf Hornborg (LU), director of the *Sustainability Goals* work package; docent Ulrika Gunnarsson-Östling (KTH), co-director of the *Scenarios* work package; researcher Eva Alfredsson (KTH) and docent Mikael Malmaeus (IVL), directors of the *Economic Modeling* work package; researcher Åsa Aretun (VTI), director of the *Mobility* work package; associate professor Karin Bradley (KTH), director of the *Everyday Practices* work package; senior lecturer Paul Fuehrer (SH), director of the *Work and Welfare* work package; docent Tove Malmqvist (KTH), director of the *Built Environment* work package; adjunct professor Karolina Isaksson (VTI/KTH), director of the *Policy and Planning* work package; researcher Katarina Buhr (formerly of IVL); doctoral student Åsa Callmer (KTH); researcher Eléonore Fauré (KTH); researcher Pernilla Hagbert (KTH); researcher Åsa Nyblom (IVL); doctoral student Jens Portinson Hylander (VTI); research engineer Kristian Skånberg (KTH); researcher Peter Stigson (formerly of IVL); doctoral student Erika Öhlund (SH). Marie Hedberg (formerly of IVL) and Kerstin Kristoferson (IVL) served as communicators for the project. Nicolas Francart and Aurore Fransolet participated in the research efforts.

A reference group consisting of societal partners from various public agencies, municipalities and organizations was also affiliated with the research program. The following participants were included in the reference group during all or part of the program period: Botkyrka Municipality, Kalmar Municipality, Norrköping Municipality, Sollentuna Municipality, Tanum Municipality, Region Västra Götaland, the Ministry of Enterprise and Innovation, JAK Members Bank, Transition Network Sweden, Club of Rome, FOI, MSB, and the Swedish Environmental Protection Agency. Valuable feedback on a draft of this report was provided by several members of the reference group. An advisory group of international researchers consisting of Ivana Milojević, Kate Raworth and Peter Victor has also been of great importance to the project.

A number of degree projects at the Master's level have been carried out during the project that have contributed in various ways to the research. The authors of these are: Jihyun An, Nicolas Francart, Adi Musabasic, Vishal Parekh, David Pettersson, Vincent Prats, Tina Ringensson, Carlos Ruiz-Alejos and Gulia Torri.

In addition to funding from Formas, other funding bodies have contributed through support to researchers that have joined the project along the way. Funding for the project has thus also been received from the Swedish Foundation for Strategic Environmental Research (Mistra), the Swedish Society for Nature Conservation (SSNC), and the Foundation for Baltic and East European Studies.

Contents


Some say I should meet someone else but my growth economy has promised that everything will be different after we get back from vacation and that I just need to be patient and get better at compromising and that it WILL give up fossil fuels, but that it's not really a good time right now and that it actually had a rough child hood and cant I stop fucking nagging for once!

Summary

A future society no longer based on economic growth – what would that look like?

The research program "Beyond GDP Growth: Scenarios for sustainable building and planning" (www.bortombnptillvaxt.se) is a strong research environment funded by the Swedish Research Council Formas, which has run between 2014 and 2018. In collaboration with societal partners, the program has gathered researchers from different disciplines to explore key issues and conditions for planning for a sustainable future beyond GDP growth. This is a relevant contribution to a largely under-researched area, where few scientific studies have explored what a sustainable society could look like, and what a sustainable economy that is not based on growth might actually mean.

In economic and political discussions, the notion of continuous economic growth is often taken for granted and seen as a prerequisite for a safe and sustainable societal development. At the same time, a blind faith in and expectations surrounding growth can constitute a threat to the development of a sustainable society if growth declines. Also an optimistic prognosis from the OECD indicates that it is likely that future GDP growth will be lower than what has come to be seen as the normal level during the second half of the 20th century. Declining economic growth could mean risks for increased social gaps and unemployment. However, economic models show that the possibilities for handling these risks increase if there is an awareness of them, and if this is addressed politically. Therefore, it is important to not just assume continued economic growth, but to plan also for alternative scenarios.

A starting point for the research program has been an understanding of the significant transitions needed to approach a safe and just operating space for humanity within planetary boundaries. Four goals that should be met in order to consider the societal development sustainable were specified: two environmental goals related to climate and land use, and two social goals regarding power, influence and participation, and welfare and resource security.

Four scenarios for Sweden 2050 were developed, which show the different directions society could take to reach the set sustainability goals. The scenarios illustrate future societies that do not have to build on the current economic logic, but that instead are centred around four alternative strategies:

- Collaborative Economy
- Local Self-Sufficiency
- Automation for Quality of Life
- Circular Economy in the Welfare State

So, can we reach the selected sustainability targets in the four future scenarios? A transformation of historical proportions are needed – and it needs to start immediately. According to the sustainability assessment conducted within the project, the environmental goals of climate and land use can be reached in all scenarios, even though it demands changing multiple parameters at the same time. Nothing points to it being impossible or generally difficult to achieve the social goals in the four scenarios, however there might be different aspects that are particularly tricky. There are both development potentials and risks, which can be diametrically opposite for different social groups and parts of the country, depending on the local prerequisites.

Many different images of sustainable futures are needed. The scenarios should be seen as a tool for discussion and analysis when it comes to planning for a sustainable societal development beyond GDP growth. They challenge notions of what is possible, what changes that can and should be made,

what decisions that are needed and what should be prioritized. The scenarios all suggest a large change compared the current development trajectory, and for example all point towards the need for redistribution of resources. It might involve economic resources, but could also relate to power and influence over production, or the possibility to use land for production of food, materials and energy. This redistribution could happen according to different principles in the different scenarios.

In all the scenarios, the consumption of goods and of meat is reduced. Flight travel also needs to be drastically reduced to reach the climate target. There is furthermore a need for reducing the construction of both housing and road infrastructure, although to varying extents in the four scenarios. Other aspects such as working hours, the organization of welfare systems, the characteristics of the built environment and the amount of infrastructure needed are on the other hand different in the different scenarios.

The research program has explored what a development that isn't based on economic growth, in line with the strategies that are depicted in the scenarios, would mean for rural as well as urban conditions. Three case study municipalities were selected with regards to their different geographical location, built form, economic development and size of the population: Övertorneå, Alingsås and Malmö. In some sub-studies in these different contexts, descriptions emerged of cognitive as well as structural barriers, a sense of powerlessness and a weak capacity for transition among different actors. This is connected to expectations and general assumptions regarding growth, partly irrespective of the context. Municipalities and companies to a large extent plan for and expect a societal development that builds upon a further expansion of infrastructure, transport and consumption. Despite visions for sustainable development, in practice this often leads to a reproduction of current unsustainable structures and ways of life.

At the same time, specific empirical studies within the project point toward stories of self-sufficiency, of regional upswings and that the population is more important than GDP. There is an increased awareness and a multitude of examples of experimenting with new sustainable practices that constitute seeds for change. Critiques against planning for continuous growth is being taken more seriously and clearer political visions are demanded. New forms of organizing the economy, society and welfare are also being developed. Some examples include working from a perspective on socio-ecological justice, integration of sustainability targets in all planning, and developing new roles for consumers and producers. These ideas can be seen as windows of opportunity, but also show that change can happen within the current system.

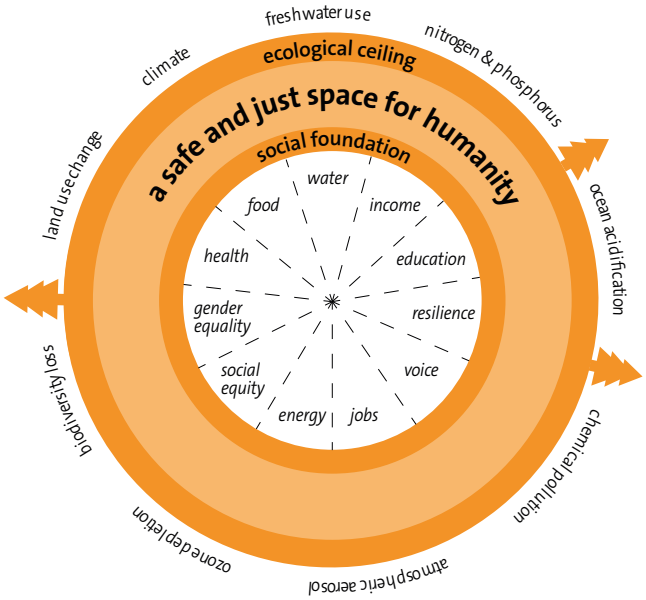
The future means change. In this research program, we point towards some possible futures that aim at reaching certain sustainability targets. The scenarios and the discussion and analysis that they have brought about show that there is an opportunity to move towards a sustainable development with maintained or even increased well-being – provided that the understanding of well-being is based on other values than those of our current society. For these possible future trajectories to gain support, there is a need of political instruments and measures that actively drive the development towards a just and safe operating space for humanity.

1. The need for a different future

A sustainable future society that is not based on economic growth – what could that look like? This research project has explored four tentative scenarios for Sweden 2050 that must all meet basic sustainability criteria, such as a just operating space within planetary boundaries. These future societies do not need to build on current economic logic. Instead, the scenarios have been guided by goals that are crucial for long-term sustainable societal development.

Transition to a society within planetary boundaries

There is only one Earth and there are limits to what it can withstand if the conditions for our civilization are to remain. The concept of planetary boundaries was developed to describe the limits for emissions and other environmental impacts that the planet can handle[1]. If these limits are exceeded, there is a risk of large-scale and rapid changes in the environment that will be increasingly difficult or impossible to restore. A number of boundaries have already been crossed in terms of climate change, altered land use and biodiversity loss. To stay within the planetary boundaries and address the environmental changes that are already happening, we need to transform the organization of society towards more sustainable forms of production and consumption. Yet despite this need, there is a lack of clear political strategies at all levels to help us achieve the adopted climate and sustainability goals.



To link planetary boundaries with a social justice perspective, British economist Kate Raworth (2012) proposes what she calls "doughnut economics." This donut model can be seen as a space in which we can create a sustainable future and illustrates humanity's operating space between the social foundation we want to guarantee and the ecological ceiling we do not want to breach. (Modified from Raworth, 2012).

There is today great awareness about environmental and climate problems. Nevertheless, there is a lack of political initiatives focusing on radical societal transformation. Society's institutions are furthermore not adapted for the type of transition processes needed, and are often based on a logic of staying on the beaten track. This presents a dilemma because environmental and social issues that affect our future and that increasingly worry people are not addressed and handled in a collective and forceful manner.

1 Steffen et al., 2015

Economic growth – security or threat?

Previous research shows the need for a more developed environmental and climate policy agenda, and one that explores different trajectories for development than those often taken for granted in local, regional and national policy and planning. One thing in particular that is increasingly emphasized is that lock-ins in the prevailing economic paradigm and focusing on growth makes it more difficult to act resolutely in a way that challenges established systems, expectations and assumptions about what type of future we want to strive for.

Economic growth is often presented as a goal in and of itself, and one of the arguments used for this is that higher GDP brings increased revenues to the state, which then makes it possible to solve environmental problems and finance welfare services. Economic growth is often seen as a prerequisite for security and sustainability. At the same time, a growing number of critics since the 1970s have claimed that it is precisely this heedless confidence in growth that is threatening our security and sustainability. The need to examine what happens if we shift focus has been a point of departure for the research program *Beyond GDP Growth: Scenarios for sustainable building and planning.*

GDP – gross national product - *is the way we measure the value of goods and services that are produced and go to final use in the formal economy in a country during a year. When GDP increases, we usually say that we have economic growth. GDP is not a measure of welfare or wellbeing, however, but only a measure of the total economic activity as regards consumption, investments and export minus import.*

Growth can be turned to degrowth

In the project, researchers have conducted an overview of what economic growth can be expected over the next 50 years. The analysis shows that there are few long-term forecasts, but that optimistic growth forecasts from the OECD indicate a lower future growth rate than that which policy has come to view as a normal level based on historical averages over the second half of the 20th century. Many ecological economists, and also conventional economists, point to factors such as demographic developments, access to natural resources and climate change, which some argue will lead to significantly lower growth, negative growth, or downright collapse. This means that there are several reasons why society should plan not only based on a scenario with high continuous economic growth, but also according to alternative scenarios.

Images of a different future

One overall aim of the project has been to examine what would happen if economic growth was not a prerequisite, and to identify other development trajectories for sustainable building and planning in Sweden. In short:

What could a future sustainable society that is not based on economic growth be like?

Because there is not only one possible future, it's important to show several different scenarios. One assumption that has formed the basis for the project is that it is possible to influence the future through, for example, policy, planning and decision-making. Future societies thus do not have to be based on current economic logic and assumptions about growth, but can instead have completely different starting points and values. If we instead start from politically determined goals for societal development and what it should entail, it gives us a basis for discussing the need and opportunities for change.

Opinions differ, however, concerning which values and goals are important, and which tools we should use to achieve them. Some argue that growth must continue, in a greener form, if we are to achieve sustainable development[2]. Others say that growth must decline or even become negative and that the economy, i.e. the total amount of production and consumption, must decrease if we are to stay within planetary boundaries[3].

2 World Bank, 2012
3 D'alisa et al., 2014

Yet another perspective is that growth in itself doesn't matter at all, that GDP is not important, and that the focus instead should be directed at sound environmental and welfare policy, regardless of its impact on economic growth[4]. Alternative images of the future can play a big role by showing different perspectives and various ways of steering the development and solving different problems.

Different actors can also see the implications of adopting a certain perspective and using a certain solution, and compare these with other perspectives and solutions.

What assumptions of growth are made? What are the past and future implications of this focus on economic growth for social and ecological systems? Is GDP growth a prerequisite for change or an obstacle for transition?

Sustainability goals guided the project

In the first phase of the project, four sustainability goals for societal development were identified and specified as a common platform for the entire project. These are described in more detail in Chapter 2. Four different scenarios for Sweden 2050 were then developed in a second phase of the project, which are also described in Chapter 2. The scenarios illustrate different paths that society could take to reach these goals.

The research in the program has highlighted different perspectives of sustainable societal building and planning, across sectoral boundaries. More comprehensive studies have touched on the requirements and implications for continued growth or degrowth, as well as what it would mean to reach the sustainability goals. In-depth empirical studies have examined key issues regarding the organization of everyday life, the development of the built environment, land use, mobility, time use, and challenges for policy and planning. This has highlighted the perspectives of different actors regarding the scenarios and investigated which strategies or lines of action are needed to create a sustainable society beyond growth.

Different conditions in rural and urban areas

The project has aimed to examine what a development that is not based on economic growth would mean in different contexts, in both rural areas as well as small and large cities. Three case study municipalities were selected based on their geographic, population and economic characteristics: Övertorneå, Alingsås and Malmö. Some sub-studies within the project have examined all or individual case study municipalities, while others have taken a more general national perspective.

Övertorneå
- *Area: 2 490 km²*
- *Inhabitants: 4 500*
- *Rural municipality with declining population (-12%*)*

Alingsås
- *Area: 550 km²*
- *Inhabitants: 41 000*
- *Part of the Gothenburg region, increasing population (+10%*)*

Malmö
- *Area: 330 km²*
- *Inhabitants: 336 000*
- *Core in a strong growth region, increasing population (+ 19%*)*

** Demographic change 2007-2017 (SCB)*

4 van den Bergh & Kallis, 2012

From goals to opportunities

This report can be read as a cohesive narrative or broken down into different aspects of what sustainable building and planning beyond GDP might entail.

Chapter 2 provides an account of the unsustainable societal development practices we currently employ and the links with economic growth we have seen in the past. This chapter also presents the sustainability goals that the project has selected. Following this are illustrated narratives of the four future scenarios that have been developed in the project and the different strategies and logics that characterize each.

Chapter 3 presents an analysis of whether, and if so how, the chosen sustainability goals can be reached in each scenario, what this would entail, and the goal conflicts that could arise.

Chapter 4 reports the results of the empirical studies, particularly the case study municipalities, which highlight the structures and norms that characterize development today and which can create barriers for change. In Chapter 5, however, this is set in the perspective of the transitions that are already underway, outlining different alternative economic activities and everyday practices that are being pursued, despite all, and which point to windows of opportunity illuminated by the project.

Finally, Chapter 6 provides an overview of the project's conclusions and implications for planning for a future beyond GDP growth.

A list of all scientific publications is provided at the end of the report. Other reports, such as a longer description of the four future scenarios (in Swedish), can be found on the project's website:

www.bortombnptillvaxt.se

2. A framework for the future

Our way of living and consuming in Sweden today is not sustainable. How can we create a society in which everyone can live a good life and which does not deplete the Earth's resources? In the development of future scenarios, the project used a framework that unites an external boundary, which relates to our relationship to our planet, with an inner boundary that ensures fundamental social requirements.

The Swedish way of life is not sustainable

Companies, organizations and others in Sweden today are working for a sustainable future, but our consumption stretches far beyond the country's borders. The Swedish population's consumption gave rise to almost 11 metric tons of greenhouse gases per person in 2015[1]. To achieve the Paris Agreement's aim of limiting the global annual temperature rise to 1.5 degrees Celsius above pre-industrial levels, per capita emissions must fall to below one metric ton per year before 2050, and continue to decrease thereafter[2].

We are seeing the same patterns when it comes to land use. In 2011, Swedish consumption required 3.5 global hectares per person, nearly triple that of the 1.2 hectares per person we need to get down to by 2050 if we are to stay within the Earth's available biocapacity (that is, the area of bioproductive land and water). This means that the Swedish way of life is at a level that is far from sustainable.

High GDP does not equal higher wellbeing

If Swedes begin to consume less, it will affect GDP. Analyses on the relationship between growth (increased GDP) and wellbeing show that there is a strong initial link between them, that is, that wellbeing in poor countries first increases with GDP growth, but that the correlation then fades and essentially disappears altogether when a certain GDP level is reached[3].

There are countries with relatively low GDP where wellbeing is considered high, and countries with a high GDP with a lower perceived wellbeing. There are thus many factors besides GDP that are important. In the Nordic countries, growth has been distributed through policy in a way that means higher economic equality and higher perceived wellbeing than in many other countries with the same level of GDP.

There has been a link between economic growth and increased average material living standards over the past century, and sometimes this has meant that growth has been automatically equated with public welfare and wellbeing. However, measurements of perceived levels of wellbeing do not show the same link with increased GDP growth above a certain level.

At the same time, economic growth might in certain respects be viewed as disappointing in countries that have experienced a high level of growth. Most people expect that growth will provide increased resources to the core welfare institutions of education and health care. The paradox is that growth makes these institutions, which are labor-intensive, relatively more expensive (which is a well-known phenomenon in economics called cost disease). Schools and health care facilities in Sweden are therefore struggling with under-staffing even though GDP has doubled in the past 30 years.

1 Swedish Environmental Protection Agency, 2017; SCB, 2017
2 Fauré et al., 2016
3 Easterlin, 1974; Inglehart, 1997

Insufficient decoupling between GDP growth and emissions

Historically, there has been a connection between increased GDP and greenhouse gas emissions[4]. While some decoupling of the link between economic growth and emissions has been seen in some countries in recent years[5], this decrease is far too insufficient in relation to the climate goals society has agreed upon. The ecological footprint calculated by WWF each year shows clearly that countries with high GDP typically have a higher footprint than countries with lower GDP[6].

Resources in the form of labor, capital, energy and raw materials are needed to produce goods and services for consumption. Effectively, GDP increases when we use more resources in production, because it means that production costs more overall. Efficiency improvements that reduce resource use in the economy would theoretically then reduce GDP. In practice, however, this hasn't happened because the overall use of resources has not decreased. It can be observed in individual sectors, though. One example is agriculture, where we today produce as much grain, milk and meat in Sweden as we did in the 1950s, but at a fraction of the cost. Agriculture's relative contribution to GDP has thus decreased. But the resources, primarily in the form of labor which was formerly delegated to food production, is instead used in other sectors of the economy.

Uneven distribution of the Earth's resources

Another problem is that consumption and use of natural resources is very unevenly distributed between different groups in society and between different countries worldwide. To take an example, if the entire planet lived at the same level as the average in the United States, we would need five Earths to support us all. But if everyone lived at the level of the average in India, we would only need less than half of an Earth[7]. One in eight people in the world still lived in extreme poverty in 2012[8].

So how can we deal with these problems and create a system that provides a good life for us all while still staying within planetary boundaries?

The donut as a framework for sustainable development

Goals and goal systems for sustainable development are often formulated to clarify what is considered sustainable and what should be achieved. The global Sustainable Development Goals and the Swedish environmental objectives are examples of this. The global goals comprise both environmental issues, such as reduced climate impact and ocean and marine resources, and social issues, such as fighting poverty and reducing inequality.

British researcher Kate Raworth[9] has taken both environmental issues and social issues into consideration in the development of her donut model for a safe and equitable space for sustainable development. It combines an outer limit based on the planetary boundaries for what we can take from and release into nature, with an inner limit of fundamental requirements that must be met for a good life. The model assumes that all aspects must happen simultaneously, particularly when it comes to drastically reducing resource use and emissions.

The boundaries can be seen as a floor and a roof, creating a space between where these issues are integral and where we can stay when we discuss how society should be developed. This reduces the risk of a society achieving environmental goals but simultaneously creating great inequalities, such as if the effects of emission reductions affect already vulnerable groups, for example.

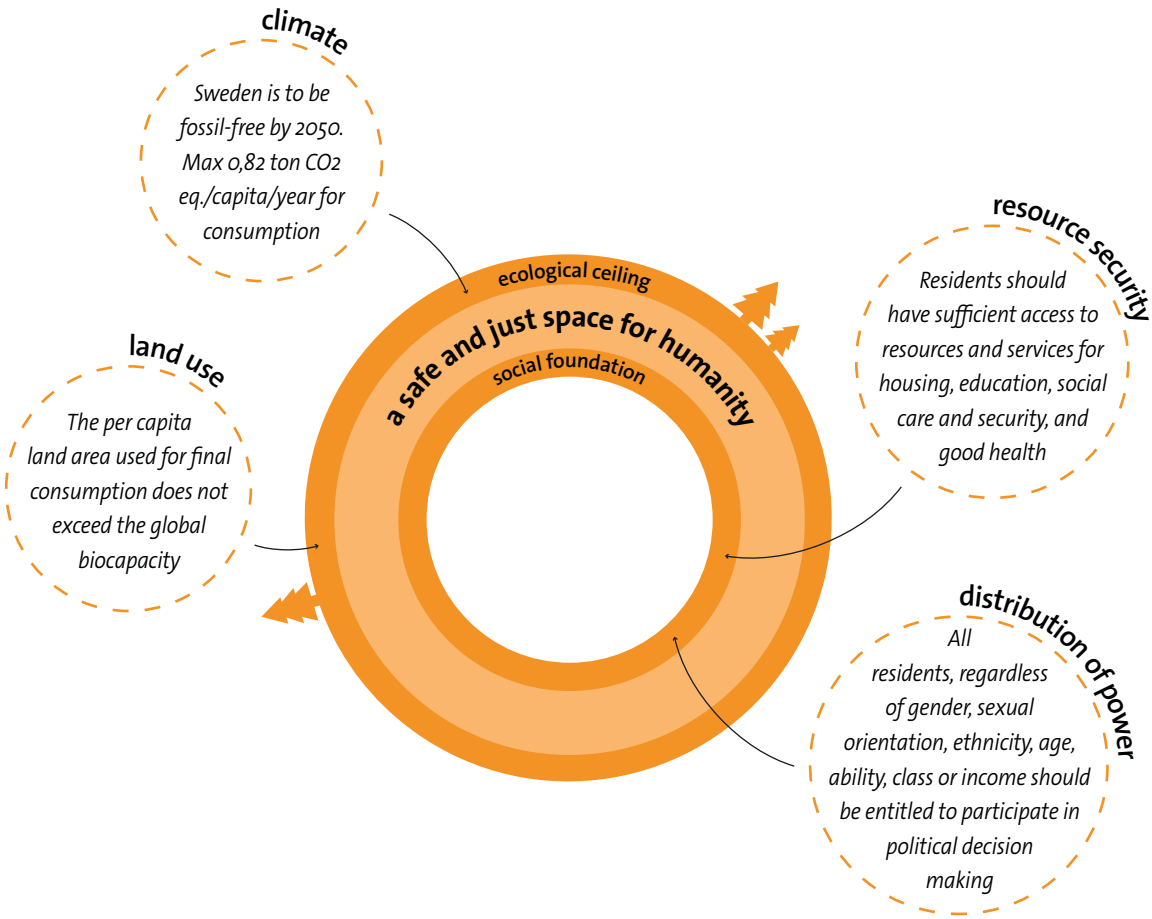
4 Raftery et al., 2017
5 Le Quéré et al., 2018
6 Fritz & Koch, 2016
7 Tukker et al., 2014
8 UN, 2016
9 Raworth, 2012

Four selected sustainability goals for Sweden 2050

In the first phase of the program, a number of goals were specified that must be met in a future society if it is to be considered sustainable. While selecting only a few goals do not encompass the complexity of a sustainable development, it does provide a way to see how things are connected. An aim was to select both social and ecological goals that were easy to operationalize and particularly relevant for policy and planning for a sustainable societal development.

Four goals were selected – two related to the environment and two social goals:

- Climate: Sweden will be fossil-free by 2050[10]: no fossil fuels will be used as fuel or in industrial processes. Consumption must not give rise to more than 0.82 metric tons carbon dioxide equivalents (GHG) per person and year (to not exceed the 1.5 degree goal).
- Land use: The amount of land per person used for consumption will not exceed the global biocapacity. This means a reduction from 3.5 to 1.2 global hectares per person.
- Power, influence and participation: All inhabitants of Sweden, regardless of gender, gender expression, sexual orientation, ethnicity, religion, age, disability, class or income level, have the right to participate in and influence political elections and decision-making that affect their lives.
- Resources and welfare: Inhabitants of Sweden will have adequate access to resources and services that can create opportunities for housing, education, social care and social security as well as favorable conditions for good health. These resources and services are distributed according to principles of justice and fairness.



10 Under Sweden's 2017 Climate Act, Sweden is to have zero "net emissions" of greenhouse gases into the atmosphere by 2045, and should thereafter achieve "negative emissions."

The two environmental goals have a global distribution perspective because they are based on an even distribution of greenhouse gas emissions and land use per person across the globe. Equal distribution does not always mean fair and just distribution. An argument could be made for basing the goals on other fairness perspectives, for example whether Sweden's share of emissions would decrease further if we were to also take into account historical emissions. But the goals still entail a radical reduction and a big challenge for Sweden. The social goals could also be used for other countries or regions, but have been specifically applied to inhabitants of Sweden because the scenarios are meant to describe Sweden.

Drastic environmental goals and threatened social goals

The environmental goals mean a drastic reduction in comparison with today's figures. By 2050, greenhouse gases from Swedish consumption would need to decrease by 92 percent, and land use for consumption would need to be less than half of what it is today. The percentage of fossil-free energy in Sweden would need to increase from 53 percent (2014) to 100 percent[11].

In terms of meeting the social goals, Sweden as a whole is quite far ahead. But there are differences between groups; the power distribution between men and women and health status between different socioeconomic groups, for example[12]. The challenges here can become even greater, however, depending on how the future develops, particularly if the tax base for public welfare services decreases. It is therefore extremely important to safeguard the social goals in future scenarios beyond GDP growth.

What is already planned and built seems final. But is that really the case? Can it be transformed, and if so, how? What visions should it be based on, and what conditions and resources are needed? Which sectors and actors are affected and what roles do they play in the transition to a sustainable society?

How do we want the future to look?

So how can sustainable societal development be achieved? When the problems are so big and challenging, we need to think in new ways and explore options for a greater societal change based on different logic. We don't know what the future has in store. But it can be influenced through initiatives such as policy, planning and decision-making. Future societies do not need to be based on economic growth, but can instead be founded on completely different premises and values. If we start from what we want to achieve, and how society would look if we achieved this, it forms a basis for discussion about the needs and opportunities for change.

Four scenarios for Sweden 2050

The project has developed four qualitative scenarios, intended as a starting point for further discussions and analysis. These are what are known as normative backcasting scenarios, which means that they show future conditions in which the four sustainability goals should be met. The scenarios describe, in text and numbers, how Sweden could look in 2050, and can be examined in a longer version in an earlier report from the project[13]. The scenarios are based on four different strategies:

Collaborative Economy

Local Self-Sufficiency

Automation for Quality of Life

Circular Economy in the Welfare State

11 Fauré et al., 2016, p. 8
12 Ibid., pp.10 & 12
13 Svenfelt et al., 2019; Gunnarsson-Östling et al., 2017

Future scenarios enable to think in different ways

In this project, future scenarios are used as a method to pave the way for a discussion on possible development trajectories. Working with future scenarios can be perceived as difficult and abstract because they deal with complex issues with great uncertainty and long time perspectives. The method does not provide any answers about how the future will be, and consitutes only a few examples of an endless number of possible solutions. The idea is that the method should prevent us from getting locked into present-day structures and problems. The method can help shed light on what needs to be done and what considerations and trade-offs may be needed.

The scenarios make it easier to think more strategically and with a long-term perspective. In comparison with a regular planning process, the time horizon in a future study is longer – often 30-50 years ahead. This means that those participating in the process can think more freely and more radically because they are not basing their ideas on the present-day situation, but instead on how things might be when the goal has been reached.

Future scenarios are more likely to be able to show the big picture. Because they simultaneously integrate multiple important sectors that may have contradictory goals or interests, it becomes easier to identify risks and opportunities. The method can also create processes to identify and quickly involve different interest groups that may have not normally been part of the decision-making process, and give them the opportunity to influence developments. Because several possible futures are presented, the participants can present bigger and more radical proposals than if there was a finished plan that the interested parties could only suggest minor changes to.

Collaborative Economy

Digitalization creates opportunities to share resources

People in Sweden have become aware of the downsides of consumer society in the form of environmental impact and low wages among workers in far-away countries. At the same time, digitalization has created good opportunities to share the resources that are already in circulation, so that we can share, rent, borrow and trade with each other instead of owning and buying. Sharing existing resources brings benefits such as increased resource efficiency and better private finances. It is often also socially invigorating, as it means more interaction with other people. The economy has become increasingly characterized by cooperation rather than competition. Access to goods and resources is more important than individual ownership and production means and material resources have been moved from the private and public sector to shared forms of ownership.

Collaborative solutions on different levels

Citizen power, informal economic activities and collaborative solutions have become increasingly important and made possible by digitalization, open data and development of digital commons. Collaborative solutions do not need to take place locally. Instead, there are both small-scale and local as well as national and international digital platforms. Much of the previous wage labor has been replaced by unpaid and voluntary work in the form of initiatives for various types of collectives (e.g. housing associations). People's total working time (paid and unpaid work) is governed by their living situation. Time banks can be used to provide buffers for periods with less work. The consumption of goods has decreased and is needs-driven, and there is an ethics of fairness and justice in which people do not want to outclass those around them. Many production units function as an extended family and supply services such as child care, elderly care, etc. New business models have been developed that enable the sharing of companies and coordination of large-scale ventures. IT is one of the prerequisites for dissemination and sharing, but the technology is otherwise understandable, manageable and controlled by its users.

Creative clusters and polycentric development enable cooperation

People are digitally linked and the physical place plays a smaller role in citizens' ability to participate in the production of goods and services or to receive access to education. People live more scattered throughout the country, but gather in clusters and mid-sized cities so that they can more easily trade services and borrow things from each other. Creative centers revolving around production and consumption provide a polycentricity in the built environment, yet geographic localization is no longer dependent on large-scale infrastructure but is instead made possible by digital networks. Residential districts and suburban areas with apartment blocks have been densified and the private heated living space per person has decreased significantly. Households instead have access to larger shared spaces in the same building, neighborhood or district, which provides a more effective and flexible use of the built environment.

Power and production are distributed over many actors

The borders between private and public have largely been erased. Public governance is directed at further supporting the collaborative economy with the help of legislation and incentive structures promoting different types of sharing solutions. Power is distributed over many actors. Bottom-up initiatives and different forms of common administration based on reciprocity and active engagement are important principles.

Many actors are involved in production, which creates a diversity in what is produced, and production is often for the needs of the network rather than for export. Some of the production is still exported, however, in trade for that which cannot be produced in the local and national networks. Many people are prosumers, that is, both producers and consumers of goods and various services. The economy consists of both large-scale and small-scale production units.

Local Self-Sufficiency

Local resources and conditions are in focus

Local communities focus on security of supply and sustainable solutions based on local resources. The globalization and urbanization processes that were seen as essentially inevitable up until 2020 have come to a standstill. Export, import and consumption of goods have decreased dramatically, but the local markets are thriving. The communities and their residents have gained increasingly greater power and influence over the local resources and their own development. Many functions that used to be centrally governed are now governed at the local level. Electricity, for example, is often supplied locally and is not dependent on national grids.

Sweden has succeeded well in utilizing its resources and has a clean environment, so people can live good lives despite reduced import and reduced consumption. The transition to local self-sufficiency is due to the fact that people have voluntarily chosen to reduce their consumption to live within the boundaries of the ecosystem's capacity to support the society and absorb and clean emissions. The transition is also based on a desire for liberation from centralized business and decision-making models. The society is characterized by an open exchange of knowledge, do-it-yourself solutions and self-organization. Local knowledge about local resources is considered to provide better conditions for resource management. All residents of working ages are expected to participate actively in local provisioning activities such as the production of food and other necessities, but also in the maintenance of technical infrastructure and in welfare services such as child care, elderly care, education, etc. The workload is high, but over half of the working hours are spent in unpaid work and working hours vary greatly over the year.

Proximity to rural or urban cropland is important

Close relatives, parents or friends often live together in an extended family constellation sharing relatively large living spaces, or with different functions or housing units gathered in smaller clusters. Many live in the countryside and in small or spread-out cities in which agriculture and other production is possible. The pressure on urban metropolitan areas has decreased. Most of the people don't travel far, but instead live their lives in their local community. There are major differences between regions and local communities depending on the conditions of that specific region, so land use is diversified and diets can be very different in different parts of the country. Goods transports are minimal because the local supply of goods is large.

Earlier infrastructure investments such as broadband and cell towers are maintained so that communication can continue. New investments are not centrally coordinated, however, but are instead created according to local needs, e.g. in food production. Technology is small-scale and simple, often manufactured from reused materials, and virtually everyone can handle it and understands how it works.

Direct democracy within local decision arenas

Local decision arenas have a prominent role, and the role of the state has diminished. The local associations, which in most cases are smaller in area than today's municipalities, are tasked with providing basic technical infrastructure and organizing welfare services. The governing ideal is direct democracy, which entails, among other things, many local elections under the “one person, one vote” principle.

Adapted production and few imports

The economic activities are also adapted to the conditions in each local community and look very different in different regions. Production is directed primarily at local consumption. Some trade is carried out between regions, particularly in things dependent on regional differences, such as lumber and agricultural products. The volume of imported goods is small, which means that the dependency on land in other countries is almost nonexistent.

Automation for Quality of Life

Robotization has enabled reduced working hours

A major portion of financial profits are invested in ways to help people work less. Rapid technological development has meant that robots and digital technology have replaced human labor, which is seen as an opportunity for more free time rather than a threat to our jobs. Work is no longer the focus of public debate in society, which instead focuses on freedom, meaningful occupation and the right to do what you want to do. A lot of free time means that more people engage in social interaction with family and friends.

Health care is largely automated, as is the education sector. Nursing care also has an increased element of automation. Virtually all manual labor and even many routine administrative tasks are performed by robots and computers. Human labor is needed primarily for advanced administrative tasks, knowledge production and transfer, creative work and to stimulate social contact. Because many people are sharing the work tasks, average working hours are dramatically reduced and the 10-hour work week is the new norm.

Automation and digitalization mean that economic activity is relatively high, despite low gainful employment. At the same time, sustainability goals have meant significantly increased resource efficiency and reduced use of resources. Income and production are allocated to avoid greater gaps in wealth and income.

Daily life is connected and filled with experiences

Household work has also been automated and this has led to even more free time for the people. Technology has become increasingly integrated into people's everyday lives, and even into their bodies. Digital communication between not only people and organizations, but even things, is a given. Everything, and nearly everybody, is connected.

Digitalization and the opportunity to work less means that people are more spread out over the country, but still largely reside in big cities. Some people want other qualities in their lives, however, and choose to live outside the dense automated urban complexes. Completely new, highly developed and highly efficient urban city centers have also been built, where smart systems are applied to their full extent. Tracked and automated public transit forms the backbone of the transportation system, and is supplemented by walking and biking (including electric bicycles).

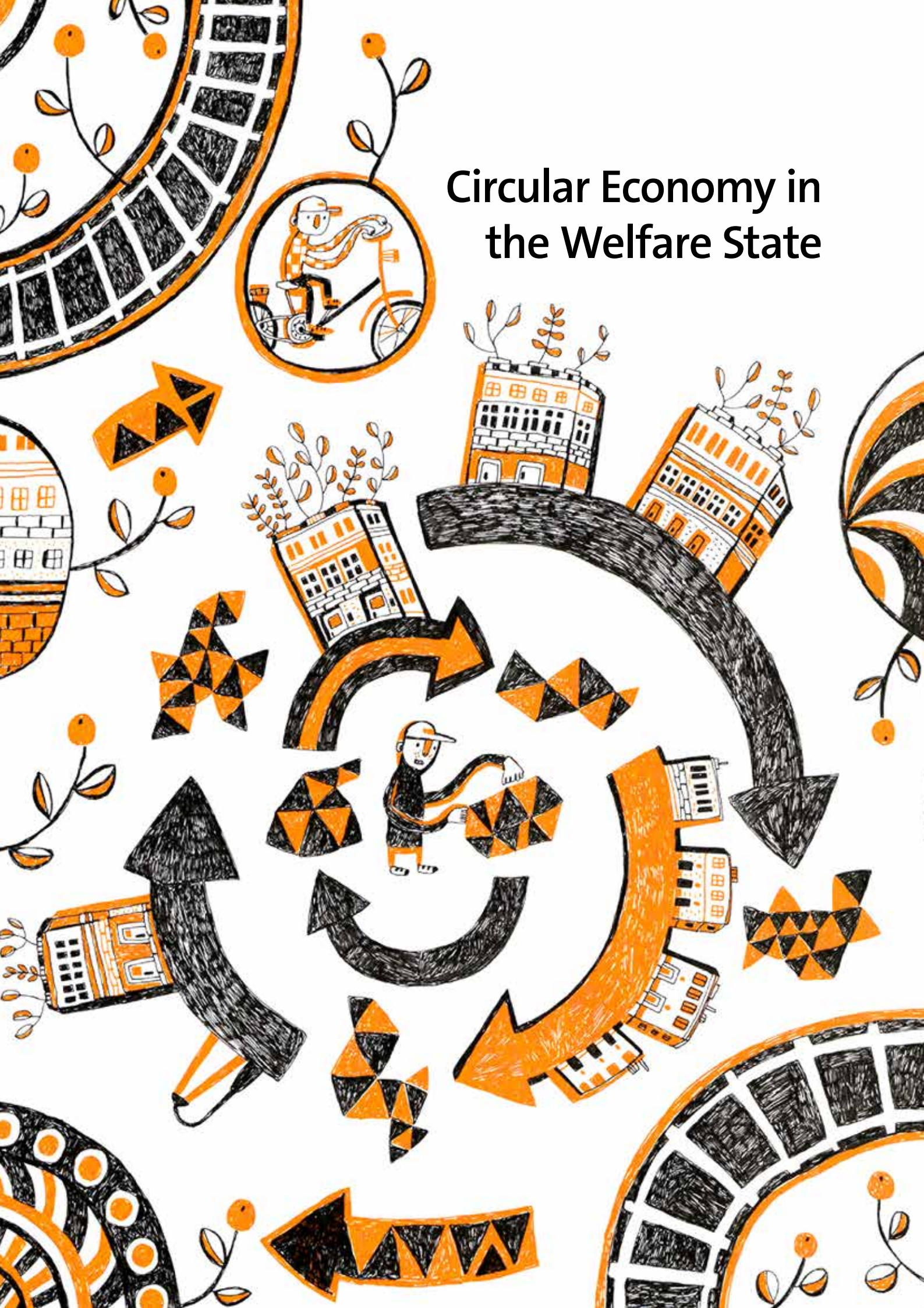
Because people are working much less, they spend a lot of their free time close to home. They want green and beautiful spaces around them, and although the built environment is dense and concentrated, there are still lots of parks and playgrounds. City squares and other physical gathering places are central. The differences between homes and places for social life and recreation have been loosened up and the spaces are used flexibly and for common activities.

Digitalization has increased opportunities for direct democracy

Political decisions are made on multiple levels. The state government works closely with different actors on the market (particularly innovators and technology developers) and researchers to continuously develop possibilities for automation in different parts of the society and to design tools that can stimulate continued automation within planetary boundaries. Digitalization has increased opportunities for direct democracy, but many citizens trust politicians and the technocratic elite who develop and control the digital operating systems.

Sufficiency characterizes people's lives rather than the hunt for material status, so material consumption is low. Production in Sweden is automated, digitalized and specialized. Specialization means that a lot of trade is carried out with other countries, both in the form of imports of consumption goods and raw materials for industry, as well as exports of goods and services produced in Sweden.

Circular Economy in the Welfare State



Waste is now a nonexistent concept

Insights on the limits for exploitation of ecosystems have driven stringent legislation promoting an eco-economy based on the reuse and circulation of materials. This circular economy means that the concept of waste no longer exists. The products used in Sweden are designed and optimized to be dismantled and reused. Recycling only takes place when the materials can no longer be reused. Consumables consist of biological ingredients or nutrients that can be safely returned to the environment. The economy is based to a greater extent on the consumption of services such as welfare, culture and outdoor activities in nature.

A strong state guarantees both circular systems and welfare services

The state has a strong role and is an important guarantee for creating conditions and incentives for the efficient use of resources. Policy is aimed at large-scale solutions to reward sustainable design and innovation, to reduce the extraction and use of raw materials and commodities, and to influence people's consumption patterns and lifestyles. A relatively large portion of economic activity is focused on the production of welfare services, which translates to high employment in this sector.

A lot of time is spent on paid work because the 40-hour work week is the norm. Social status and material consumption are no longer interconnected. Status is instead marked through the consumption of exclusive services or leisure activities, in which it is key to emphasize one's cultural capital in the form of in-depth knowledge about what goods/services/activities are the “right” or most sustainable in a certain context. Many value the chance for voluntary simplicity in nature (for example, no electricity or Internet connection). A strong welfare state and its institutions make sure all citizens have access to services that ensure basic security and comfort. The allocation principle has clear features of classic welfare policy, in which the state has a central role and all citizens are entitled to general welfare systems.

The population is centralized and concentrated in the metropolitan regions

Most people live in the metropolitan areas of Stockholm, Gothenburg and Malmö, but there are also hubs of activity in large regionally central cities with universities and colleges. Ecosystem services are important for circulating coal and nitrogen, and these services are therefore actively supported and maintained. Land in the cities is utilized intensively and the ecosystems included in the circulation process can be located far from the inhabitants. The countryside is sparsely populated but intensively used and supplies the population in the cities with goods and ecosystem services. Highly expanded rail networks, including stations, support local and regional construction and development. The population density provides the basis for a wide range of activities and private and public services that can be easily accessed by walking, biking or public transit. Many people only choose activities and destinations that can be reached by means other than by car. Car ownership has decreased dramatically, but it is common to be part of a car-sharing service. New buildings and developments are strategically densified in areas near public transit routes. Many people live alone in small, efficient apartments.

Governing with both carrot and stick

The state makes the majority of decisions concerning the governing of society and uses both carrot and stick to encourage resource efficiency in all parts of society. In the wake of more stringent control of resources, the power of both the state and the private sector has been strengthened vis-à-vis individual citizens. Trends have shifted from a “buyer's market” to a “producer's market,” as the companies own and control the resources used in production. Representative democracy prevails, but the citizens are not very politically active.

The economy is a mixed economy in which certain tasks are organized by the public sphere and other tasks are performed by private, cooperative or social enterprises. Governance toward a resource-efficient circular economy has led to relatively good access to material resources despite significantly reduced resource extraction. Goods are both exported and imported, with exports primarily consisting of forest products.

3. Would it be sustainable?

Can we reach the sustainability targets in the four future scenarios? Yes. According to the assessment done within the project, the goals related to the climate and land use can be achieved. The social implications are more complicated, however. New opportunities for influence are created, but there is also a risk that certain groups are left out. Yet what is central to all the goals is that a transition of historical proportions is needed – and that it needs to start immediately.

Different methods used for sustainable assessment

A number of assessments have been conducted to see whether, and if so how, the four selected sustainability goals (Chapter 2) could be achieved. There is no simple method that can be used to evaluate scenarios[1] so we have used different methods. For the social goals, the results are also dependent on which perspective of fairness is used, which is also something that emerged in studies of the case study municipalities.

The sustainability assessments have focused on the four selected goals to examine whether they could be considered to have been met and to explore what this could mean. For the scenarios to be considered "sustainable," however, several other aspects need to be included as well, such as biodiversity, water use and other aspects highlighted in the Global Sustainable Development Goals.

Both working hours and productivity change in the future scenarios

One key point of departure for being able to reason about whether the futures depicted in the scenarios could be said to achieve the sustainability goals is that several parameters would need to change at the same time. This is illustrated in the table below, which outlines some of the factors used to describe the scenarios[2].

Factors	Work per person	Production value per hour worked	Production value in relation to used capital	Capital use in relation to work	Material use in relation to capital use	Non-reused material in relation to material use	Energy use in relation to material use
Unit	*Index*	*Index*	*Index*	*Index*	*Index*	*Index*	*Index*
Starting value	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Collaborative Economy	*90*	*105*	*150*	*70*	*90*	*80*	*85*
Local Self-Sufficiency	*116*	*60*	*120*	*50*	*90*	*70*	*88*
Automation for Quality of Life	*65*	*210*	*120*	*175*	*60*	*80*	*80*
Circular Economy	*93*	*145*	*125*	*115*	*65*	*60*	*83*

Table 1: Some factors that describe the scenarios (based on Skånberg and Svenfelt, manuscript).

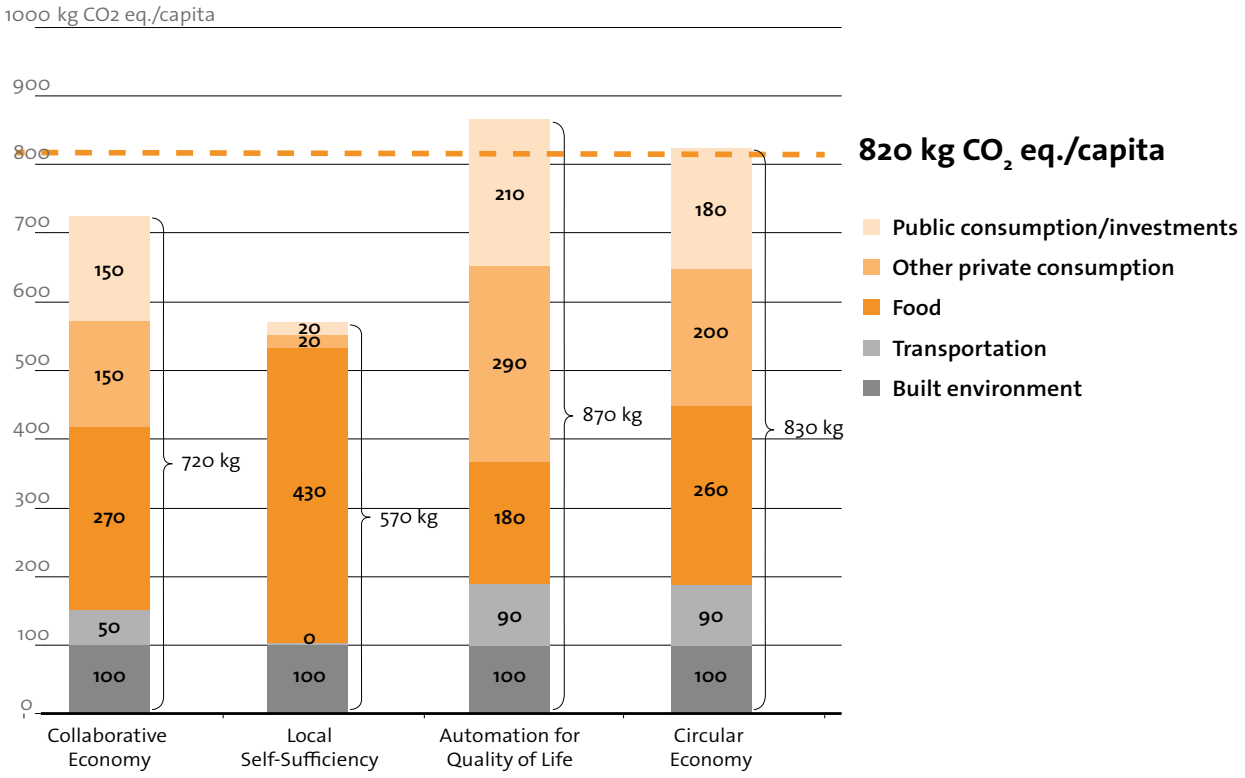
1 Fauré et al., 2017
2 Skånberg & Svenfelt, manuscript

Table 1 shows both similarities and differences in the scenarios. Total working time varies from scenario to scenario (and along with it also the proportion of paid working hours). The estimated production value per hour of work (a measure of productivity) increases to varying degrees in all scenarios except in Local Self-Sufficiency, where it decreases.

How much capital investment is used in relation to the workload varies from scenario to scenario. The material intensity for the investments made is assumed to decrease in all scenarios, however. The reuse of materials is assumed to increase in all scenarios, while the energy used to produce the materials is expected to decrease. The results show that multiple strategies are needed to reduce carbon emissions and increase material efficiency - several knobs need to be turned at once – not just one.

The climate goal can be reached

According to project estimates, the climate goal of 0.82 metric tons (820 kg) carbon dioxide equivalents per capita can be reached in all scenarios (see figure[3]). The results are sometimes slightly above or below the limit, but considering the great uncertainties involved, not too much significance should be read into these slight variations. What is more interesting is what type of change is needed to achieve the different results.



This figure (modified from Fauré et al., manuscript), shows total greenhouse gas emissions (CO_2-eq.) per capita in each scenario. The figure describes four of all of the possible scenarios that exist. It should be particularly noted that diet and food production technology vary slightly from scenario to scenario.

An important change in all scenarios is that Sweden is assumed to be fossil-free in 2050, but this is not enough to reach the goal. Food (meat and milk products from ruminants) and air travel are two major sources of emissions that will not decrease sufficiently solely by phasing out fossil fuels. Major changes are needed in these areas. Food accounts for the emission of methane and it is only in the local self-sufficiency scenario that meat and milk from ruminants are possible to fit in. In the remaining scenarios, a vegan diet is assumed. Aviation gives rise to high-altitude emissions of nitrogen oxides and water vapor, among other things and international air travel is excluded in the figure above.

3 Fauré et al., manuscript

Sweden's consumption is responsible for major emissions abroad

One key factor for climate assessment is how much of what we consume is imported. Although the scenarios focus on Sweden, global developments are important in whether or not sustainability goals can be reached. Nearly 65 percent of GHG emissions from Swedish consumption take place outside Sweden[4]. The percentage of imports from other countries and how quickly emissions are reduced in these countries will therefore be highly relevant to whether or not the climate goal can be achieved.

Local Self-Sufficiency is the only scenario in which the stated strategy is to relocate production, which makes it less dependent on these two factors. In all scenarios, however, the imported share of Sweden's consumption is assumed to decrease, though to varying degrees. The level of import in the scenarios are 50%, 10%, 50% and 75% of the the level in 2014, for the Collaborative Economy, Local self-sufficiency, Automation and Circular Economy scenarios respectively.

In all scenarios, emission are also assumed to decrease in the countries we import from, though in none is the decrease as much as in Sweden. The decreases are different in each scenario, and the final level is 45% , 85%, 25% and 20% respectively, of the level in 2014. Sweden is, to varying degrees, assumed to be at the forefront and reduce its use of fossil fuels faster than the worldwide average. If the rest of the world decreases its use just as quickly, it will give more room for consumption in Sweden.

In each of the scenarios, the transportation system is altered in different ways. The total passenger travel decreases the most in the Local Self-Sufficiency scenario, followed by the Collaborative Economy scenario, whereas it stays constant in the Automation scenario and increases in the Circular Economy scenario. All scenarios have a drastic reduction in the use of private cars, however. Total goods consumption is also reduced to meet the consumption-based climate goal. All scenarios involve major changes, but these vary for each area of consumption.

The construction sector can reach the climate goal

A more detailed study shows that Sweden's construction sector is able to meet the climate goal in terms of energy use and greenhouse gas emissions. There are big challenges involved, but these can be overcome with a broad application of technology and knowledge that in many cases already exist[5].

A combination of different strategies will be needed. Improving energy efficiency is important, but in the case of a nearly fossil-free energy mix, it is not necessary to bring the entire built environment to passive house standards in order to meet the climate goal. Instead, it becomes important to minimize emissions stemming from the production of new buildings and structures. More efficient use of building space therefore becomes an import reduction strategy. But if the energy mix is not nearly fossil-free, energy efficiency improvements in the existing built environment need to be considerably more far-reaching.

Strategies to reach the climate goal in the construction sector:

- **Nearly fossil-free energy mix**
- **More efficient use of building spaces**
- **Minimized new production**
- **Improved production processes (material)**
- **Energy-efficiency renovations of existing stock**

It is not possible to just focus on one of the strategies – all of them are needed to reach the climate goal. Different combinations of strategies can be seen in the scenarios. In the Automation scenario, meeting the goal means cutting the per capita housing and office space to half of what it is today. In the Local Self-Sufficiency scenario, it requires avoiding heating spaces that are not being used. Goal fulfillment in this scenario is also due to new buildings in 2050 being made of local, renewable materials such as wood and straw. This means that less extensive energy efficiency measures are needed than in the other scenarios.

4 Palm et al., 2019
5 Francart et al., 2018

Climate impact from investments plays a role

The level of private and public investments varies greatly between the scenarios, with the largest public and private investments in the Circular Economy and relatively high private investments in the Automation scenario. Both of these scenarios require different forms of new investments in buildings, transportation systems, production equipment and so on. One important question is whether these investments can fit within the framework for a safe (and just) operating space.

A sub-study has charted Swedish capital growth with regard to resource utilization (CO_2 emissions, energy use, use of iron, aluminum, natural gas and lumber)[6]. The analysis shows that current emissions from investments are unsustainable. A large part of the capital investments are investments in new buildings and infrastructure.

Another sub-study modeled investments specifically in new buildings and infrastructure for renewable energy production that would be needed leading up to 2050 to meet the construction sector's climate goal[7]. This shows that we should keep the climate budget in mind, but that it does not need to come in conflict with the climate goal. But this is true only if the previously described main strategies are fully applied. The total energy requirement is reduced through these strategies, even if the heated area is larger in 2050. Fewer new buildings are also needed than is often claimed in the current public debate.

Land use can meet the sustainability goals in all scenarios

Statistics Sweden reports that there were about 0.32 hectares of arable land, 0.05 hectares of pasture land and about 3.02 hectares of productive forest land per person in Sweden in 2010. The rest of the land consists of bogs, built-up land, etc. According to Global Footprint Network, arable land and pasture land roughly correspond to the land needed for the Swedish population's consumption, while we have much more forest land than we need. It is not certain, however, that the land used is actually located in Sweden. Even if the land in Sweden is sufficient for our needs, we still need to reduce land use for consumption by about 50 percent if we are to meet the land use goals for human consumption as a whole (see Chapter 2). Based on available land per person, a rough estimate of the land use in the scenarios is as follows:

- **Collaborative Economy:** *A portion of production is exported. A large portion of agricultural land is used for domestic consumption, but there is a dependency on imports. Forest resources are utilized through collaborative production and processing, and about 60 percent of the forest space is used for consumption and production in other countries.*
- **Local Self-Sufficiency:** *All available Swedish agricultural land and pasture land is used for domestic production. The volume of imported goods is small, which means that the dependency on land in other countries is almost nonexistent. Cultivatable land located near housing is an attractive resource and its use is regulated in local planning. There is a surplus of forest resources and more than 60 percent of the forest area is not used for Swedish consumption.*
- **Automation for Quality of life:** *A large portion of the automated production is exported, primarily that which is based on forest production. Only 30 percent of the forest is used for domestic consumption. Due to the rationalized agriculture, the use of pasture land within the country has decreased, but arable acreage has increased. Imports and exports of food and goods are common.*
- **Circular Economy in the Welfare State:** *Forest and farmlands are used intensively to create circular flows. Goods are both exported and imported, with exports primarily consisting of forest products (50 percent of the forest land). Food is both imported and exported.*

The Swedish agricultural land can be used in all scenarios, either for domestic consumption or for food exports. However, there is a surplus of forest land in all scenarios. In some, such as Circular Economy, forest products can be exported to other countries, while in Local Self-Sufficiency, this is not an option.

6 Alfredsson & Malmaeus, 2019
7 Francart et al., 2018

The question is, however, what this surplus of forest land should be used for. For climate reasons and depending on what type of land is not used, this could mean a potential increase in carbon dioxide uptake in Sweden due to increased carbon sinks. This has not been further analyzed though.

There are clear links between the climate goal and the land goal. A synergy exists in that the transition to a more vegan diet to reach the climate goal also leads to reduced land use. A potential goal conflict is whether or not the climate goal assumes increased use of biofuels. The scenarios we describe in the project do not involve any increase in the use of biofuels, however.

Social opportunities exist, but also the risk of exclusion

The social goals regarding power and resource seurity are achieved relatively well in Sweden today, although differences exist between different groups in society[8]. An economic downturn could present a risk for increased economic gaps, however, which could jeopardize not only the resource goal, which involves inhabitants' access to resources and services, but also the power goal, which is about the right to participate in and influence political decision-making. An awareness of these issues reduces the risk of increased gaps[9] The scenarios entail a number of challenges and risks for the social goals, but also opportunities. These social opportunities and risks have been evaluated in focus groups in the case study municipalities[10].

- **Collaborative Economy** *is based on people participating in different networks and partnerships. The relocation of means of production means that power is shared. In the focus groups, it was pointed out that this scenario could present an opportunity for people who are currently excluded or marginalized, e.g. people who are on partial disability leave or unemployed. It was also noted, however, that people who do not participate are at risk of being without access to both public welfare services and influence. This could entail a vulnerability in that networks and voluntary collaborations could break apart and people may not get the service they had counted on. Belonging to multiple networks could reduce risks and increase flexibility, but there is a danger that different networks could gain different degrees of influence and that the distribution of power could thereby become uneven.*
- **Local Self-Sufficiency** *means that most of the production and consumption of both welfare services as well as products and services is handled locally. More power thereby ends up with local actors. Societies based on closeness and trust can lead to well-functioning welfare, but when services and welfare systems are handled locally, there is a risk that there will be no actor who can guarantee the systems will work – people may not always want to help their neighbors. On the other hand, it was pointed out in the focus groups that this scenario could create a stronger sense of belonging. It would be difficult to gain access to advanced medical treatment that requires centralization, but this could potentially be solved through ICT. Different parts of the country have different resources.*
- **The Automation** *scenario is based on significantly reduced working hours. This means great opportunities for people to shape their own lives, to become engaged in the community and thereby help spread power and influence and participate in voluntary work, including providing services and welfare to others. The focus groups noted that it was positive for people to have more time for each other but also pointed to the risk that people will not feel needed if they don't have a job. Some could become isolated and have limited influence over their own situation and developments in society. There is also a risk that the power over the machines and production could fall into the hands of a select few.*
- **Circular Economy** *is the scenario that most closely resembles contemporary society. This is perhaps why the focus group discussions did not identify as many risks and opportunities as for the other scenarios. One risk is the increased polarization between urban and rural and that the countryside becomes excluded, with poorer access to welfare services as a result.*

In all scenarios, there are groups of people in jeopardy of being excluded or marginalized. In Collaborative Economy, this might include people with limited social skills and who therefore have difficulty gaining access to networks. It could also include those who do not have specific knowledge or skills, making them less attractive for others to want to collaborate with.

8 Fauré et al., 2016
9 Malmaeus & Alfredsson, 2017; Jackson & Victor, 2016
10 Gunnarsson-Östling et al., manuscript

In Local Self-Sufficiency, this could include people who are physically weak (elderly, sick, disabled), as well as those who do not have access to good land and water. In Automation, people who lack technical skills or who are isolated without a network or family could be marginalized. In Circular Economy, people in rural areas could instead find themselves excluded.

A Master thesis project has shown that two of the scenarios stand out in regard to gender equality. In the Local Self-Sufficiency scenario, there is a risk that gender equality will not be achieved. Because many people have multiple occupations in this scenario, there is a risk that those who earn less spend more time on unpaid work, and the scenario has no strategy for breaking today's unequal gender division between paid and unpaid work. The Automation scenario, on the other hand, offers opportunities for gender equality due to financial security in combination with a state focus on the allocation of resources[11].

11 Ruiz-Alejos, 2017

4. Hindering structures

Development that isn't based on economic growth – how does that work? This was one of the questions the project brought to the three municipalities Övertorneå, Alingsås and Malmö. Descriptions emerged of cognitive barriers, powerlessness and inadequate capacity. But also narratives of a longing for self-sufficiency, of regional upswings and that the population is more important than GDP.

Current systems and thought patterns may impede change

To move toward a future that meets both social goals and environmental goals, we have to also look critically at the structures and norms that characterize development today. These can create barriers for change, either through varying degrees of actual lock-ins in current systems or as cognitive limitations in what we see as possible or desirable. How future developments are talked about in public debate is also significant, not least in terms of what operating space politicians, planners or individual people believe that they have.

Zero growth does not have to mean economic crisis

An underlying assumption in various types of policy proposals is that increased GDP, as a measure of the tax base, is good (for the state budget), while decreased GDP is associated with the risk of increased unemployment, increased social gaps and decreased opportunity to finance welfare services and technological developments. This is often based on an experience that negative growth or zero growth occurs during crises, external (war, revolution) or internal (financial crises, currency crises).

There doesn't need to be an equals sign between a lack of growth and the negative implications of an economic crisis, however. The problems can instead be a symptom of significant economic problems such as overborrowing or asset speculation. Declining growth rates has a negative impact on short-term employment, economic equality and public finances. However, there is a lack of empirical support for how the causal relationships look, and it is uncertain if these are *effects* of zero growth[1].

A global slowdown in economic growth, or degrowth that persists for a prolonged period of time would be a completely new situation historically, which means that we cannot analyze its effects using historical data. Reduced growth has generally been local or temporary. The hundreds of years of growth that we have experienced means that society has adapted to it. Economic institutions have come to be based on an expectation of continued growth. If we would experience no growth or degrowth, the economy would likely adapt. The institutions designed according to expectations about growth will be exposed to stress and will need to adapt to new conditions.

Expectations about growth create financial behaviors, indebtedness and other lock-in effects that can temporarily prevent us from handling declining growth. By also including scenarios with low growth, no growth or degrowth, the resilience in the systems would increase and we could avoid long-term negative consequences. Piketty[2] has shown that negative growth likely leads to increased income gaps. Low growth therefore needs policy that counteracts it, such as active redistribution of income and wealth with progressive taxes in order to achieve social sustainability goals[3].

1 Malmaeus & Alfredsson, 2017
2 Piketty, 2014
3 Jackson & Victor, 2016

Population more important than GDP for the municipalities

The strongly negative associations with the alternatives to continued growth make it difficult in current political debate to abandon the idea that increased GDP is a prerequisite for policy that is to be implemented at a national level. But this research project has found that the prerequisites for growth differ from region to region, and that GDP as a national measure is often not relevant when it comes to local development.

GDP growth is not something that defines daily activities for municipal and county authorities. Interviews in the case study municipalities show that it is population growth, rather than economic growth, that is the crucial issue at the local level. A stable population and employment for these residents is what gives the municipalities a tax base that ensures the maintenance of welfare services, which are core issues that both growing and shrinking municipalities must handle.

National crises can spark regional upswing

That there are still clear points of contact between discussions on population growth and economic growth is notable, however, not least in how notions of development and progress are presented at the national and local levels. In interviews with politicians and officials in the municipality of Övertorneå[4], there emerged a reflection on the relationship between rural conditions and the centralized power that current economic development was seen to bring. As one of the interviewees expressed it, when things don't go well for "Sweden Inc.," in periods of recession, things have gone relatively "better" for Övertorneå with respect to people moving back to the community. And vice versa. "Sometimes it's almost as if you wish there'd be a financial crisis like we had in the early 1990s."

One conclusion is that the narrative about growth in itself leads to negative impacts, lock-ins and missed chances to take advantage of decentralized solutions. First, the negative effects are caused by the economic systems' built-in expectations about growth, rather than the lack of growth itself. Second, the story about the strong link between growth and wellbeing makes it difficult to develop alternatives.

A life beyond employment – dreams and fears

One limitation that can be linked to the conversation about growth and employment is the idea of a future beyond today's employment. There was discussion in the case study municipality focus groups that people feel that they derive their identities and sense of worth and dignity through their choice of work (Gunnarsson-Östling et al., to be published). A future scenario such as Automation for Quality of Life, in which paid work only accounts for about one workday a week, opens up for questions on whether it is possible to have a sense of meaning and contribute to society if you don't have paid work as your main form of occupation.

People want a purpose, to do something meaningful with their lives. Many people do not find meaning in their current paid jobs. How can working life be changed into something more meaningful?

The dream of breaking the vicious cycle of employment's influence on our everyday lives is something that emerged in the project's research. Temporal wellbeing was brought up, which is largely about influence over the structure of everyday activities and the balance between employment, unpaid work and free time. But there is also another dimension in which it has been found that the experienced meaningfulness of the activities that individuals spend their time on can be perceived as forced even if it feels valuable, while some recreational activities are perceived as self-chosen although not particularly meaningful.

In several contexts in which the future scenarios were presented, the discussion turned to how a higher proportion of free time would be used. Although it emerged that many people see the opportunities presented by increased leisure time, it is also worth noting that others expressed a disbelief that people

4 Isaksson et al., forthcoming

would be able to handle only 10 hours of paid work a week and still find ways to fill their days with meaningful and rewarding activities. These views have been taken as the starting point in a study, based in the various scenarios, of the effect of employment on how people view the value of different activities[5]. The results show that many people in Sweden today dream of an everyday life that is less marked by employment. But due to the dominant role of paid work, they still find it difficult to imagine such a life. A future scenario with a lot of free time is perceived as threatening and many describe a worry about how meaningful life could be if it wasn't spent in gainful employment. This worry also applies in other dimensions of everyday life that are seen to be closely connected with paid work, such as identity and social status.

Sustainable development means different things to different actors

Another aspect is the actual interpretation of what is meant by sustainable development. Different descriptions of sustainability define problems differently and thus point to different solutions. These different perspectives in turn reflect different views on, for example, humankind's relationship to nature and on fairness and justice[6]. Concepts such as ecological modernization or green growth/green economy, which can be seen as narratives about sustainable development, have come to characterize political discussion and practice. These present a win-win situation (for humans, the environment and economic growth), largely within existing systems where more radical political changes are not required.

Other perspectives, such as local self-sufficiency or environmental justice, require more radical transformation. Alternative stories or framings of a sustainable future – and how to get there – are seen as difficult to manage because they challenge the consensus and current practices that actors have to relate to[7].

The urban lifestyle is the norm

Today's labor market, community services and transport infrastructure mean that it is often easier to live in cities[8]. The prioritization and cultural upholding of the urban lifestyle has been described in terms of the urban norm. There are political and market drivers for continued urbanization in Sweden, which makes it difficult for individuals who want to live a different kind of life outside the big cities.

What other stories about a sustainable life are there? What difficulties arise in the meeting between these practices and the prevailing norms regarding sustainable urban development?

Those who present the densified, efficient and high-tech city as sustainable often fail to take into account the forms of production and consumption on which the urban lifestyle is based. Instead of focusing on urban form and technical systems for optimizing the needs of the big cities, the discussion on sustainable urban and rural development needs to include questions on how society can be organized to drastically reduce resource use while still providing good living conditions in different parts of the country. Yet the land perspective can be difficult to incorporate in policy, where it can for example be difficult to calculate and control emissions from consumption and take them into account in urban development.

What does it mean to live sustainably?

Representations of sustainable development today often include some story about what it means to "live sustainably." Although social issues have begun to be emphasized more in building and planning, the focus in the construction industry has long been on technical solutions for increased resource efficiency and making it "easier to make the right choice"[9].

5 Fuehrer, to be published
6 Gunnarsson-Östling & Svenfelt, 2018
7 Hagbert & Malmqvist, forthcoming
8 Rönnblom, 2014
9 Hagbert & Femenías, 2016

At the same time, there is an interest in living in less resource-intensive and more varied ways – smaller, simpler and more collaboratively by sharing spaces and resources – that is not being met in what is currently being built[10]. A study of households trying to live in low-impact ways in Alingsås found that they defined sustainable living as a combination of self-determination, self-sufficiency and less dependency on fossil fuels. This is an alternative story to the urban technology-oriented understanding of sustainable housing that otherwise usually characterizes this discussion[11]. Such interpretations evolve despite prevailing structures, but are not encouraged – or are downright opposed – within the scope of current societal systems, in terms of both the built environment and in the formulation of political strategies or institutional prerequisites for transition.

Clear support is needed from decision-makers

Planning structures are slow, which (for both good and bad) creates obstacles for more radical change from current development trajectories. Prioritization and planning are driven largely by assumptions concerning growth, which characterize laws, rules and practice. Ideas about growth are very ingrained, which makes it difficult to break institutional lock-ins.

The project's analyses of the municipalities' ways of working for long-term sustainable development indicate that local policy and strategy documents may be showing signs of an interest in radical, transition-oriented development. At the same time, the more general, explicit and politically decided initiatives for sustainable development (such as those expressed in land-use plans and the like) are often general and imprecise, which in the end doesn't provide clear support or direction for comprehensive local transition efforts.

Interviews with politicians and officials in Alingsås and Övertorneå show that in certain cases there is local criticism toward, for example, the goal of sustainable development, which is perceived as worn-out and obsolete[12]. The interviewees call for more specific concepts and goals that can provide clearer support for them in transition efforts. More explicit national and regional guidance/support in local development efforts was also requested.

Distrust of perpetual growth – but powerlessness toward the system

Interviews with actors in the building and planning sector[13] show that there is a widespread understanding of the need for a radical transformation of society. Many of those interviewed express distrust that continued and perpetual growth would be a viable path toward a sustainable society. At the same time, many find it difficult to see how something could be able to change the prevailing order. Examples that were often referenced include that the pension system is dependent on growth, or that organizations need increased returns for their shareholders. Even municipal housing companies have financial profit requirements to take into account in their work with sustainability issues.

In several interviews, a clear tension emerges between personal convictions about the change needed, and the change these actors feel they have the power and possibility to work for in their professional roles.

The already-built is a barrier to change

An empirical study on strategic transport planning conducted in the Skåne region further shows that economic development and growth are unevenly distributed between municipalities, while at the same time population rates are rising dramatically and housing shortages are widespread[14].

10 Hagbert, 2016
11 Hagbert & Bradley, 2017
12 Buhr et al., 2018; Isaksson et al., forthcoming
13 Hagbert & Malmqvist, forthcoming
14 Aretun & Portinson Hylander, manuscript

The existing built environment constitutes a major obstacle to transition and the conditions for transitions to sustainable transport must also be understood in relation to the present situation, which can be quite different in different municipalities. Although the officials interviewed in the study take a positive view on using descriptive future scenarios connected to sustainability goals, these must be geographically specific and build on an in-depth analysis of how transition can take place in a specific municipal or regional context. Some larger municipalities, such as Malmö, serve as engines of growth for the surrounding area, in which other municipalities (after de-industrialization and transition toward a service economy) have become more commuter/residential areas with decreased or stagnant growth in their own geographic area.

The investments that are now being made in public transit (and in combination with walking and biking) are based on and reinforce growth hubs and routes, which is partly a consequence of the socioeconomic analyses used in national transport infrastructure planning. Municipalities and towns outside these routes have a hard time attracting actors and capital for the investments needed for transition. Many municipalities need to increase their population and change its composition, among other things to cope with caring for the aging population. They feel forced to build low and spread-out developments, more detached homes (which is what the developers can imagine in these locations), with connections to the road network, to bring in more residents in working ages and to cope with future needs for health and social care. The energy-inefficient, car-based traffic and building patterns are thus reinforced.

Alternative planning tools and assessment methods are needed, ones that take into account future sustainable development as well as alternative options for investments in building and infrastructure. This study shows that municipalities today are pretty much left at the mercy of both the international market forces that strongly influence regional development as a whole, and of the national transport infrastructure planning that forms the broader context when decisions on investments and co-financing are made. If the transition perspective is not prioritized in the overall long-term structuring, planning and financing of transportation, it will be difficult to drive such a development trajectory on the local level.

We can't afford unsustainable infrastructure

As discussed in Chapter 3, investment space is limited by a sustainable use of resources and a sustainable CO_2 budget. Investments consume resources and lead to carbon dioxide emissions, and considering the limited space in our carbon dioxide budget if we are to meet the goals of the Paris Agreement, investments in more sustainable infrastructure must also be weighed against their resource demands. If the investments are made in infrastructure that reduces resource utilization and emissions over the long term, such as rail networks and energy-efficient buildings, this can increase sustainability and the future consumption space despite the environmental impact at the time of investment. However, we cannot afford to invest in unsustainable infrastructure that locks us into unsustainable consumption.

Agriculture and housing are locked by the economy

Current loan systems and investment priorities also involve relatively concrete lock-ins. In focus groups and interviews with farmers, it emerged that an obstacle for transition on farms was the need for major investments. Many Swedish farms are already heavily mortgaged and unable to make additional big investments, such as building a dairy on the farm[15] or making the change from conventional to ecological livestock farming[16], even if they would like to.

Similarly, in the area of housing development, current mortgage systems and general financing make it difficult to drive or engage in alternative economic activities or everyday practices outside the formal wage economy. Rather than being a basic function (and human right), the home is more of a commodity and an investment object today.

15 Öhlund, manuscript
16 Öhlund et al., 2017

Homes are marketed to consumers as the purchase of a lifestyle, where dominant economic and social norms make it even more difficult to stay out of the housing market and risk not getting a foot on the property ladder[17]. Home ownership has also been promoted politically for a long time, which means that many households are highly indebted, particularly in metropolitan areas where housing prices are high. This leaves a large portion of the population confined and dependent on continued economic growth with inflation and low interest rates.

Both executives and farmers need to relearn

The roles different actors can take in the work to reach ambitious sustainability goals are not that clear cut. There is also a discrepancy between the skills needed to drive a transition to sustainable living and the laws and decision-making procedures that make it difficult for new ideas and perspectives to emerge.

Despite ambitious work with sustainability in many organizations, there is a lack of expertise in both environmental and social issues in management.

In interviews with actors in the building and planning sector, the importance of education in social and environmental issues is particularly apparent[18]. Whether or not this competence is represented in management contexts is considered to be crucial, and it is also noted that many high-ranking executives have rather homogeneous educational backgrounds in which global environmental and social justice problems are rarely addressed.

The problem regarding competence is also emphasized in the findings from the focus group discussions with farmers. Most farmers in Sweden today have not mastered the methods that would be needed in farming with more local resources instead of external (imported) agricultural inputs. Today's farmers are good at growing crops and raising livestock using big machines and advanced technology[19].

Important that public actors are pioneers

More and more actors are emphasizing the public sector's responsibility to contribute to the development toward a more sustainable future. Interviews with actors in the building and planning sector (municipal and private property owners and housing companies, consultants, and private and civil society organizations) indicate that a more extensive renegotiation of current relationships may be needed for the industry to move toward the achievement of social and environmental goals[20]. Greater breadth in the type and size of actors is for example needed, reflected in the debate surrounding opportunities for smaller construction companies or property owners. Co-housing and co-build groups should also be involved in developing alternatives.

Discussions at a more fundamental level are also needed concerning the relationship between purchasers and providers (in both the private and public spheres), where long-term thinking and clarity are important, but where inadequate or unclear political visions contribute to an uncertainty. It is considered particularly important that public actors take the lead. Although the construction industry has opposed or counteracted special environmental requirements from municipalities, it is conceded that high municipal ambitions play an important role in encouraging other actors.

Many interviewees considered the municipal housing companies to be important actors in the housing sector. But new legislation mandating municipal housing companies to act more "business like" seems to be viewed as obstructing opportunities for contributing to far-reaching social and environmental goals. Although this legislation provides the opportunity to justify things like extensive energy-efficiency improvements even if they will only be profitable in the longer term[21], few housing companies seem to have tested this opportunity.

17 Hagbert, 2016
18 Hagbert & Malmqvist, forthcoming
19 Öhlund, manuscript
20 Hagbert & Malmqvist, forthcoming
21 Langlet & Örnberg, 2012

Friendship-based welfare services both attract and worry

The scenarios contain examples of other ways to organize welfare, such as cooperative services, more free time and thereby reduced need of welfare services, or more health and social care services provided by family members.

One of the project's studies shows, however, that many people are skeptical of alternatives outside established systems (e.g. friendship-based elderly care)[22]. This is mainly due to the belief that different care providers are driven by different motives. Public actors are seen as being controlled by impersonal, ideological logic based on society's shared responsibility to help people in need. Private companies are perceived as being controlled by more market-oriented, profit-based interests. These two types of logic (social responsibility and financial profit) are described as being in opposition to one another, while at the same time both are perceived as reasonably stable grounds for the provision of welfare services.

Intermediate forms also come into play here, such as cooperative structures in preschools or home care. Alternative arrangements, such as care provided by friends or in collectives, are described as exotic structures that, while certainly interesting, are not something you could really count on. A problematic dimension in the assessment of these friendship-based welfare services is that they involve a mutual relationship between care receivers and care providers, and many interviewees express fears that people would feel guilty and indebted toward care providers because the care is not based on a regulated financial exchange.

Development must be driven by cooperating actors

The transition efforts in individual municipalities can sometimes prove to be driven by just one or a few individual officials[23]. In some cases, this can lead a municipality far, but if the transition work is not also actively supported by leading politicians and established more broadly within the municipal administration, this can become a vulnerable strategy. What happens if this official gets sick, switches jobs or disappears in some other way from the organization?

Interviews with local politicians and officials, as well as previous research, indicate that there is a need to look over the roles, mandates and interrelationships of different public actors[24]. It is really not so strange that actors at different administrative levels have somewhat different goals, incentives and priorities, but in order to strengthen the capacity to work for long-term sustainability goals, there is a need to review the best ways for interaction at different levels. One example is the county administrative board's role in monitoring land use over the long term, which sometimes conflicts with the municipal planning monopoly, or causes problems when an individual municipality sees the need to change an existing development plan but does not have the resources or expertise to do it. A thorough review is needed of public actors' formal roles, responsibilities and mandates in regard to initiatives and implementation for long-term sustainable building and planning.

Civil society has an important role in the transition

The role of civil society and local communities in driving and initiating change is often emphasized. Examples from the transition movement[25] point to the importance of establishing alliances with the municipality, local businesses and various local organizations, but the state, EU or large companies are rarely expected to be drivers of change. This bottom-up perspective in terms of views on responsibility and change can be found in the scenarios Collaborative Economy and Local Self-Sufficiency.

22 Fuehrer, to be published
23 Buhr et al., 2018
24 Isaksson et al., forthcoming; see also Antonson et al., 2016
25 *British environmental activist and author Rob Hopkins is often credited with the founding of the transition movement, which has now spread to a number of countries. The principles of the movement are based on the need to transform energy systems and forms of food production to strengthen local resilience and enable a transition to a more sustainable, fossil-free society.*

5. Windows of opportunity

Criticism of continuous growth is being taken increasingly seriously. At the same time, new forms of organizing the economy, society and welfare have been developed. Some examples include working from a perspective on socio-ecological justice, integration of sustainability targets in all planning, and developing new roles for consumers and producers. These ideas can be seen as windows of opportunity, but also show that change can happen within the current system.

Growth criticism being taken more seriously

Throughout the industrial era, there has been a broad consensus among politicians, businesses and researchers that continuous economic growth and increasing production and consumption are fundamental prerequisites for creating general public welfare and happiness. The voices pointing to the costs of growth for the environment, animals, and people have been dismissed as being unrealistic and marginal.

In recent years, however, criticism of growth has been taken more seriously in both research and public debate. More and more people have become aware of the need for radical changes in society in order to create the conditions for the development of a truly sustainable society.

Frustration over focus on economic growth

The project's studies have shown the seriousness of the situation and that, both within and outside society's governing institutions, there is a growing frustration over what is perceived as too much focus on economic growth and too little work being done to achieve a long-term sustainable society. There is an awareness that we need to hurry if we are going to reach the goals for a sustainable future. But how do we do this? Do we work within the system to change it, or do we influence it from the outside? For change to be possible, there must be ideas about what we want to achieve.

The project Beyond GDP Growth does not attempt to sketch out a holistic description of a future society. Instead, the focus is on a number of future scenarios with very different attributes that can provide supporting elements for the emergence of sustainable societies that are not based on growth. The project has pointed out that this discussion – about what type of future we want, what characterizes a good society and a good life, and different ways to get there – is important and provides an opportunity to drive change.

Changes can happen despite the prevailing system

Historically, major societal changes have often come about when different (initially marginal) phenomena – new ways of thinking; changes in the view of the relationship between the individual, society and the environment; new technological opportunities and changes as a result of war, crises or natural disasters, etc. – have coincided and reinforced each other. There are practices and solutions already out there today that demonstrate new possible trajectories for everyday life, economy, policy and planning. These initiatives open up possibilities for the development of a sustainable society because they go beyond the usual structures that are currently viewed as "normal."

The new practices can also be seen as testbeds for new, sustainable ways of living and organizing the economy, social services and welfare. They can therefore be described as windows of opportunity – which can be scaled up or experimented with – but they also show that change occurs regardless of (or sometimes despite) the predominant economic and social logic of the prevailing system.

Influential economists who shed light on the ecological framework of the economy (such as Kate Raworth and Peter Victor) have in recent years highlighted the importance of understanding that today's globally dominant economic system is not the only possible system – and pointed to the possibilities for change: it is the combined activities of people that form the basis of the economy. It is we, through democratically established frameworks and laws, who determine how the system works. We should aim at shaping an economic system that both remains within planetary boundaries and meets the basic needs of all people, including a global justice perspective.

A holistic approach requires many tools

Below is a selection of different tools, approaches, practices and strategies identified by the project as opportunities to bear in mind in continued change efforts. These propose different ways of restructuring or reconceptualizing what is currently taken for granted or seen as possible within the scope of change. These strategies can thereby illustrate different windows of opportunity that clear paths around the obstacles identified in previous chapters.

The different findings and proposals that resulted from the project handle issues at different levels of society and in different areas, and are therefore relevant for different recipients. Some deal with political and economic instruments at a national level. Others show prerequisites for civil society and a transition based on everyday practices. A few pieces of the puzzle are provided, but on the other hand the project has only offered a glimpse into what will need to be explored and discussed in the formulation of a vision of and planning for a future sustainable society beyond GDP growth.

Social-ecological justice sees nature as a system that includes humans

Negative environmental impacts and resource extraction are far from justly distributed among different income groups or parts of the world today. At the same time, sustainable development is a multifaceted concept, with different ideas about what should be achieved, and different strategies for how to do this. There is therefore a risk that the focus will either be on environmental issues or on distribution and development issues, and that only some solutions will become relevant.

A holistic approach is needed to handle the interplay between ecology, economy and justice. One such approach is social-ecological justice, where nature is seen as a system that people are part of. This is combined with a view of justice in which both environmental resources and negative environmental impacts are distributed more fairly, both nationally and internationally. Planning and decision-making could be based to a greater extent on principles that create social-ecological justice. Its principles, listed in the box below, can be used as a checklist and tool for analysis[1]. They are anthropocentric, in the sense that they give power to humans, but it would also be possible to put other species in focus.

Principles for social-ecological justice in planning and decision-making:

- *Decisions are made based on how the system/project/action depends on and affects local ecosystems and social-ecological systems in other regions.*
- *Conflicts, complexity, change and uncertainty are clarified and addressed*
- *Ecosystem services and natural resources are distributed justly between and within groups and generations*
- *Negative environmental impacts are distributed justly between and within groups and generations*
- *Principles for just distribution are discussed and defined in consultation with users/citizens*
- *There is an awareness of where the power exists and who are included in decisions*
- *Affected groups should be able to influence decisions that affect the environment they are dependent on*

1 Gunnarsson-Östling & Svenfelt, 2018

Sustainability goals should be the benchmark in all planning

Municipalities have an important role in the Swedish planning system through the legislated planning monopoly, which gives municipalities the right to decide how land should be used and developed within municipal boundaries. Decisions related to zoning, land use and other plans are significant to community development and to the possibility of achieving different sustainability goals.

The Swedish Planning and Building Act aims to "promote societal progress with equal and proper living conditions and a clean and sustainable habitat, for people in today's society and for future generations"[2]. A unique study of Swedish land-use plans found that these plans were often prepared without first formulating clear goals[3]. This suggests that plans often end up just building on existing plans. It is essential that planning is governed by what the municipalities want to achieve. Depending on the municipality's specific situation, those aspects of sustainable development that are relevant in that particular phase can be prioritized without losing the overall perspective.

It has previously been suggested that the Global Sustainable Development Goals should function as a checklist when planning and when deciding what to prioritize in a specific situation[4]. It is important to then analyze whether the plans that have been drawn up actually lead to sustainable development and to identify any goal conflicts and possible synergies between different goals.

The need to plan for sustainable development also applies to other sectors and levels in a society. For example, state transportation planning and all budget work should be conducted with a focus on sustainable development and assessed on the basis of sustainability goals.

Redistribution of wealth through universal basic income

One conclusion of the work with the scenarios is that the redistribution of wealth and income may be essential to reaching the social sustainability goals in a no-growth economy. Without a growing economy, financially disadvantaged groups cannot strengthen their position unless resources are redistributed. This is also important from a marco economic perspective, as increased financial inequality makes it difficult to achieve a long-term balance between supply and demand in a market. Those with the highest incomes consume less and save more than low- and middle-income earners, which decreases demand in an economy and leads to lower growth.

There are a number of possible measures to financially redistribute resources, most of which go through the tax system. Another option is universal basic income, or "citizen's income," which would be paid out unconditionally to all citizens of a country (or those who have reached the age of majority). Basic income is often assumed to replace existing transfer programs and social security systems such as unemployment benefits or welfare payments. Whether base income is a more effective method for redistributing financial resources than progressive taxes, or whether it instead would lead to increased gaps, depends on both the size and design of the basic income, and on how the economy and its incentive structure are built.

Research on basic income can be divided into three phases. The first phase focuses on whether basic income is morally desirable, and the second on whether it would be practically feasible. A large part of the research is now being conducted in a third phase, which mainly discusses how a basic income could be implemented. One aspect that remains relatively unexplored is the real effects it would have, for example if labor-intensive goods and services become more expensive if people choose to work less. Likely, effects would vary between different future scenarios and economies. Compare, for example, the Automation scenario, where much of the production takes place with small inputs of human labor, with Local Self-Sufficiency, which is based on a high number of working hours, but not always paid employment[5].

2 PBL, Section 1
3 Balfors et al., 2018
4 Finnveden & Gunnarsson-Östling, 2016
5 Malmaeus & Alfredsson, forthcoming

Basic income in local currency – right design important

One suggestion is to reconcile the change in the social security system brought on by a basic income with a complementary currency for local use[6]. The idea is that this could reduce the vulnerability to non-growth and other crises. Another main idea is to challenge the prevailing logic of conventional currency systems that drive globally unequal development. Because the basic income is provided in the form of a currency that can only be used for the purchase of goods and services produced within a certain geographical radius from the point of purchase, it could serve as an alternative to the regular market to encourage more sustainable consumption patterns and contribute to the local economy.

Systems with basic income and complementary local currencies can be designed in different ways that have different implications for reaching sustainability goals.

The idea of a local currency has also been criticized, however, by those who argue that it would encourage unsustainable consumption patterns by providing incentives for small-scale and inefficient transports. If not designed properly, a local currency would also encourage black market exchange and illegal sales. A basic income could contribute both to increased income gaps (if it is at a low level and replaces existing social security systems) and to reduced gaps (if it is at a higher level and complements existing systems).

Being both producer and consumer creates equality

A number of grassroots movements proposing alternatives to the prevailing market economy have emerged in recent years. These include the collaborative economy and peer-to-peer economy movements. In short, these movements are about citizens moving from being passive consumers and workers to being prosumers, that is, active participants in both the creation and utilization of goods and services[7]. The traditional relationship between business owner and consumer is replaced with exchanges between two more equal users (peer-to-peer). Production is also organized according to use-value rather than exchange-value.

Sometimes these movements are described as alternatives or counter-movements, and sometimes instead as a complement to or part of the market economy. Law professor Yochai Benkler[8] argues that "commons-based peer production" is a growing "third" form of production, beyond the logic of capitalism or socialism. Similar arguments have been made about post-capitalist trends: the open-source movement in both software and hardware, open innovation, or movements such as Open Source Ecology, Fab labs and the maker movement where production is not profit-driven or based on private ownership, but is instead based on common use, horizontal collaboration and "sharing ethics" rather than competition[9].

Shared technology can lead to decentralization of power

There is a long tradition of shared technology in the digital world, with open-source software and digital commons like Wikipedia as prime examples. In recent years, digital peer-to-peer production has spread to other areas, such as the production of hardware, machines, digital cryptocurrencies, energy systems or buildings (for example, WikiHouse), not least with the aid of 3D printing. This can enable a democratization of the means of production (like the earlier democratization of information).

Some argue that this is revolutionary, as citizens are gaining access to hardware and production facilities that have previously only been in the control of large companies or governments – something that is predicted to lead to the decentralization of not only power but also production, energy supply and housing types[9].

6 Hornborg, 2017
7 Bradley, 2014; Kostakis & Bauwens, 2014
8 Benkler, 2006
9 Rifkin, 2014; Mason, 2016; Kostakis & Bauwens, 2014

Collaborative social care can be a complement

More collaborative forms are also being seen in social care, such as preschool cooperatives, home care cooperatives or co-housing for the elderly. Friendship bonds and close social relationships can complement today's social care work, which is based on either kinship or public institutions. However, since friendship-based forms of social care are seen as less reliable (in comparison with private or public care providers) and, moreover, socially problematic (experience of dependencies and feelings of guilt or indebtedness), they are today described mainly as a complement to today's welfare institutions, not as an opportunity to replace them[10].

These types of changes can strengthen people's influence and power over their lives and thus be in line with one of the sustainability goals that have been the focus of this project. There is a risk, however, that some will end up outside the different structures that are built and thereby lose their influence. Whether this type of solution also has an impact on the ecological sustainability aspects is more unclear.

Reduced consumption gives greater sense of freedom

Several consumption-critical trends highlight the quest for something beyond the prevailing logic surrounding production and consumption[11]. One example is the campaign Buy Nothing Day, which is a protest against the big shopping day Black Friday. Another is to have a longer period without shopping, such as a "no-buy year." Such voluntary scaling down of consumerism is often experienced as liberating – the positive experiences outweigh the difficulties of not being allowed to consume. The majority of "non-consumers" interviewed in a sub-study connected to the Beyond GDP Growth project said that it was easier than they thought. What was stated to be the most difficult part about non-consumption was social aspects, such as norms surrounding socializing and gifts, and not the actual "loss" of being able to consume. The majority also stated that they had continued or intended to continue to consume at a very limited and/or conscious level after the end of the no-buy period, which suggests that a shopping-free life is regarded as good in several respects.

This says something about dreams about a simpler and more resource-efficient life, which is still a good and maybe even better life than one at the high-consumption level. Similar ideas are found in movements related to alternative housing with e.g. "tiny houses," self-building and self-sufficiency[12].

The home – an economic experimental workshop

In interviews with households seeking other ways of living, the importance of this also needing to happen in areas outside the big cities' green flagship projects emerged. The home, as a hub for a more sustainable life, here becomes a point of departure for transition rather than an "object" on which different solutions can be applied[12].

Viewing the home as a starting point for sustainable transition challenges current market logic.

Actively trying to reduce one's housing costs provides an opportunity to engage practically in the transition to a fossil-free and more resilient society. By making themselves less dependent on large mortgages, households can spend less time on formal wage labor and more time on self-sufficient systems or self-building processes, which further reduces costs. In this perspective, the home is seen not only as an experimental workshop and an arena for alternative economic activities, but also as a place for inner transformation and an opportunity to develop practical, sometimes forgotten, skills. This could include things like building, farming and resource management together in a community to find solutions beyond today's market logic.

10 Fuehrer, to be published
11 Callmer, manuscript
12 Hagbert & Bradley, 2017

Simpler homes and shared workshops

There is a revived interest in living in less resource-intensive and more varied ways, including living smaller, simpler and more collaboratively by sharing spaces and resources. It is based on the idea of seeing residents as co-actors instead of housing consumers. This poses a challenge, but also an opportunity to re-evaluate prevailing power relations in housing development. Yet above all, it requires that we think about how we view the home, as part of more comprehensive visions for a sustainable society[13].

One of the case studies conducted in the project has shown how municipalities, in collaboration with civil society, can develop infrastructure for citizens to be co-creators. That in "maker spaces," repair workshops, bicycle kitchens and other sharing infrastructure, people can build, repair, share and work together to develop practical skills in order to live more resource-efficiently[14]. This helps to strengthen people's identity and skills within the "commons" sphere, that is, the ability to, together with others, create, manage and develop common resources (commons) beyond the market, the state and the individual household.

Institutions are needed to drive change

Institutional capacity is necessary to drive change. Functioning and long-term infrastructure, both institutional and physical, is particularly needed in order to broaden opportunities for people to engage in the alternative practices and economic activities shown in the scenarios. A study from Malmö shows what role municipal actors play in providing facilities for more collaborative activities[14]. New practices and ways of thinking in the area of planning must combine ambitions for reduced use of resources and more inclusive spaces and processes. The geographic location and organization of sharing services and infrastructure must be carefully considered to ensure that different groups can participate.

One challenge, however, lies in making interesting local initiatives part of more long-term transition. One possibility is institutional capacity or embedding. It has proven fruitful to call attention to the importance of knowledge resources, i.e. ideas, visions, concepts, goals and so on that permeate specific decision-making contexts[15]. It is also important to highlight and understand networks and links between different actors with important roles in the transition work.

Both the powerful and the pioneers need to push on

Building the capacity to drive societal development beyond GDP growth is dependent on actors with the influence, power and resources for social change supporting the central thoughts and ideas on which this project is based: thoughts and ideas that need to control decision-making, both within politics and within the private sector, civil society and among the citizens themselves.

It is possible to envision a change in this direction through different (local) alternatives being tested on a limited scale by pioneers, entrepreneurs, social movements, etc., which would then act as an opinion-forming force. More people latch on to the ideas and they grow organically until alternative futures are achieved for the entire society. This strategy can be viewed in the light of the insight that it is time to act now. The window of time is about to close on society's goals concerning, for example, limiting climate change.

The actors that today have significant influence over decision-making and the capacity to implement societal change – political parties, elected representatives and local, regional, national and international collaborations (within the EU, the UN, the OECD, the G7, the WTO, the World Bank, etc.) – must work methodically to achieve the targets of the 2030 Agenda and the Paris Agreement. Large companies, industries, business organizations and civil society organizations can also work toward these goals. Using these goals as their starting point, these actors can develop alternative future scenarios and roadmaps that are then implemented.

13 Hagbert, 2018
14 Hult & Bradley, 2017
15 Isaksson et al., forthcoming

New actors create greater diversity

Interviews with actors in the building and planning sector point to the importance of a nuanced understanding of different types of actors in different sectors[16]. For example, even if small private companies, social enterprises, cooperatives or non-profit organizations can act based on somewhat different logic than larger corporations, they are often still limited by the same financial structures and formal planning procedures. In this regard, it is interesting to note the attempts made with land allocation procedures and building credits or how municipalities can make things easier for smaller actors that can bring in other values.

An opportunity presents itself here to further review how different forms of business that challenge a profit-maximizing growth logic provide different conditions for working with influence, participation or more radically reduced climate impact and energy use, and how alternative processes can come about. It is also important to promote other types of constellations that connect public and civil society actors, such has resident-driven projects or local development projects.

Decision-making must be collaborative

The scenarios describe different conditions for different actors and also point to the need for new forms of cooperation. There is a mutual dependence between different actors and on different levels (local, regional, national, international) in implementing radical changes in society. The collaboration between them needs to be characterized by a rallying around common goals and visions, in which interests and drivers can interact with overall sustainability goals. It is reasonable to assume that the different futures expressed in the scenarios also include different opinions, interests and goal conflicts and that the dynamics generated because of this also characterize the process that has led to them. Grabbing hold and launching from these dynamics is an important opportunity strategy in itself.

Planning practices already handle challenges with stagnated growth

The need to integrate a future-oriented approach – and one not only based on continued growth – into decision-making and planning processes is something that emerges in the case study municipalities. At the same time, there is a gap between the political rhetoric surrounding expectations of continued growth and the local political and planning practices, which, particularly in some parts of the country, instead work with the opposite, in the form of managing a declining population and stagnated economic development.

There is a potential in using scenarios as a basis for gathering different actor perspectives, but this requires that alternatives to continued economic (and in some cases population) growth are given serious space. Municipalities could, for example, produce a "growth impact plan" to shed light on what non-growth would mean to achieving different sustainability goals at an overall level, and what implications individual plans or policy proposals would have for the possibility of creating a sustainable local economy.

Today's policy and planning often assume that there will be growth, but in some contexts local planning practices are already managing a declining population base and economic stagnation.

Development of policy and planning tools

One way to work with policy development is through different forms of experimentation. This may, for example, involve testing for a limited period and/or within a geographically delimited area such things as citizen's income, shortening of working hours, congestion taxes, etc. to then be able to evaluate the effects using empirical materials and obtain a better decision basis for whether the policy should be adjusted and/or introduced on a larger scale. In the development of technology, this is a well-proven method, but one that has traditionally been less used in public policy.

16 Hagbert & Malmqvist, to be published

There is a point in starting with the "low-hanging fruit" that already exists in the form of current systems and national goals and laws, but in which implementation is not quick or extensive enough. A follow-up of the Swedish Climate Act that came into force on January 1, 2018 should, for example, also examine how climate targets are taken into account in political decision-making at the local level. The implementation of this type of national law could involve municipalities and regions (on their own initiative or through requirements) adapting existing land-use and zoning planning or developing new climate plans in line with these goals, where environmental and climate policy frameworks are seen as a prerequisite for planning, rather than an obstacle.

Another strategic possibility is that more municipalities assume responsibility for meeting consumption-based environmental goals and implement initiatives such as those being carried out now by the cities of Gothenburg and Malmö. This means taking a holistic approach to how municipal organizations and activities can contribute to reducing the environmental impact not only from direct emissions from production and consumption activities within municipal boundaries, but also emissions from the total consumption of the municipality's residents, even if production takes place elsewhere.

Confidence in societal institutions affects conditions

The type of societal changes presented within the project must also be understood in a cultural and institutional context, where stories about futures beyond growth in Sweden may be different than those, for example, in Southern Europe where a lot of the growth-critical or degrowth-oriented literature was developed. This is related, among other things, to views on authorities and confidence in societal institutions. Alternative practices (urban farming, local currencies, time banks, barter, child or social care cooperatives, etc.) have also been developed in the context of economic crisis or where conventional institutions can no longer ensure basic needs, such as in Argentina, Greece and Catalonia. However, the point of departure may be different in societies not affected by similar crises and where trust in established institutions is higher.

The Swedish mentality towards the state and other institutions can be described as twofold: on the one hand, the quest for independence from traditional ties to religion, family or the social dynamics of rural society, on the other hand, according to consensus and similarity in opinions and views. Social networks are constructed around opinions and interests and the strong Swedish state has existed in parallel with high levels of involvement in civil society organizations, which is an unusual combination. Today, the relationship between the citizens and the state has partly changed into one that views the state as service provider and the citizens as consumers of these services. Swedish planning tradition over the past century has in turn built on the idea of developing centralized systems that are the same for all. Sweden in many ways already has a lot of infrastructure and institutions in place, as well as a high degree of digitalization. The question is whether these infrastructural "strengths" contribute to lock-ins or whether they enable the transformative change that is needed.

What is a Swedish story about the good life?

In some cultural contexts, prevailing norms concerning "the good life" have also begun to be questioned. Attention is instead being drawn to other concepts or traditions that link to fair and just development within planetary boundaries. Sweden has been a pioneer in sustainability in many ways and has a tradition of being at the forefront in environmental issues. How do we shoulder this legacy when our high individualism and consumption also make us far from what might be considered "adequate." At the same time, we have a number of relatively unique principles, institutions and features which, in an international context, may be worth protecting or developing so that they can help us to live "within the donut" of a safe and just operating space, and which create a kind of vocabulary for a society beyond growth. What could a Swedish story about the good life – one that links to the Swedish context and a sustainable development trajectory – be about?

6. Conclusions

There are many different futures that can be sustainable

Today's society is unsustainable. Among other things, climate change involves risks that are not reconcilable with sustainable development. In this research program, we have explored four alternative scenarios, each of which is based on different main strategies for achieving four specified sustainability goals.

The planning of future societies does not need to be based on current economic logic, but should instead be based on what we want to achieve.

The scenarios differ in many different ways. This indicates that there can be many possible ways to move toward futures that can be sustainable. The scenarios are a tool for discussion and analysis and an aid for planning for sustainable societal development beyond GDP growth. The scenarios challenge our notions of what is possible, what changes can and should be made, and what decisions need to be made.

Regardless of scenario, production and consumption patterns need to change

Although the scenarios are different in many ways, there are also things that they have in common. One aspect is that they all entail a significant change. All of the future scenarios mean a transition. Some of the changes are the same for all scenarios. One example is that material consumption is reduced in all the scenarios. In all scenarios, consumption of meat also needs to be reduced in favor of vegetable crops, and air travel needs to be drastically reduced. Each scenario also includes a reduction in the construction of both housing and road infrastructure, although to varying extents. No fossil fuels were used in the scenarios. Other aspects differ from scenario to scenario, such as working hours, the organization of welfare systems, the characteristics of the built environment and the amount of rail transportation infrastructure that is needed.

One thing that all scenarios have in common is that they entail a redistribution of resources. This might involve economic resources but could also relate to power and influence over production, or the possibility to use land for the production of food, materials and energy. This redistribution may be done in different ways in the scenarios, either through state governance or through voluntary undertakings in different ways.

A radical transformation of society is needed, but this transformation can take different forms depending on what policy and planning is implemented.

Important to readjust expectations and plan for declining growth

In economic and political discussions, continued economic growth is often taken as a point of departure. Despite this, there are surprisingly few forecasts and studies on what future economic growth trends will look like. Often, it is quite simply assumed that growth will continue. The studies that do exist, however, indicate that declining economic growth is fully possible and some studies point to risks for greatly reduced growth or even degrowth.

Declining economic growth poses risks for increased social gaps and unemployment. However, economic models show that the possibilities for handling these risks increase if there is an awareness of them and if this is addressed politically. The program shows that there is a lack of preparedness for non-growth, and thereby a risk that sustainability goals will not be achieved. Society needs to prepare and develop contingency measures to manage and plan for declining growth, so that we can plan our way to a sustainable future and not just cope with a crisis situation.

The scenarios present both risks and opportunities, which may vary depending on local or regional conditions.

The assessment of social goals shows no indication that it would be impossible or generally difficult to meet these goals in the scenarios. Certain aspects might be particularly difficult to reconcile, however, such as specialized health care with only local governance. On the other hand, there are opportunities for a calmer pace of life and closer relationships and social interaction between people.

The assessment shows many development potentials and many risks, but these can be diametrically opposite for different parts of the country depending on local conditions. There are thus potentials to take advantage of, but also risks in terms of equal access to welfare services and influence.

There are many structures today that present obstacles to the transition to a sustainable society. Many are linked to expectations. Municipalities and companies often do not plan for a sustainable society. Plans and expectations largely revolve around a society based on continued expansion of infrastructure, transportation and consumption and which by and large is just a continuation of our present-day unsustainable society. One important first step may therefore be to formulate sustainability goals that we want to achieve and then plan for these.

Images of the future are needed for a discussion on societal development

Relatively little research exists on how a sustainable society might look. There are many studies connected with climate research showing how the supply side of things might look in terms of energy and transportation. But there are fewer studies looking at how people might live, eat, work and reside in a sustainable society. In particular, there are very few studies on how a sustainable macroeconomy might look. Images of possible sustainable futures are needed, not as forecasts, but to better understand what needs to be done today so that we can move toward a more sustainable society.

The results show that it is not enough to only use one strategy to reduce emissions of carbon dioxide and increase material efficiency, but that multiple strategies are needed. In other words, several knobs need to be turned at once – not just one.

Overall, the project's various sub-studies point to a need to explore who should drive the development and how a more radical transformation can be achieved. Identifying hindering structures and limitations in how we imagine a sustainable future and our part in it gives us an opportunity to define alternatives and analyze what type of change is relevant. This should be in relation to both the present and to the future we as a society want to move toward.

The future means change

The current situation will not last. We cannot, for example, combine present-day emission levels with a stable future climate. A future without major changes is therefore not possible. In this project, we point toward some possible futures that aim at reaching certain sustainability targets. We believe it is crucial to continue this discussion and develop future scenarios, both ones that achieve sustainability targets and ones that describe possible futures if we continue along current trajectories. Such future scenarios are essential to democratic and fact-based discussions on societal development.

The scenarios and the discussion and analysis that they have given rise to show that it is possible to move toward sustainable development with maintained or even increased wellbeing. But wellbeing needs to be defined according to different values than it is in contemporary society. And for it to work, gain support and have an impact, political instruments and measures need to be developed and evaluated, providing a basis for discussing what type of future we want, and steering the way there.

References

Alfredsson, E. C., & Malmaeus, J. M. (2019). Real capital investments and sustainability - The case of Sweden. *Ecological Economics, 161*, 216-224.

Antonson, H., Isaksson, K., Storbjörk, S., & Hjerpe, M. (2016). Negotiating climate change responses: Regional and local perspectives on transport and coastal zone planning in South Sweden. *Land use policy, 52*, 297-305.

Aretun, Å. & Portinson Hylander, J. (manuscript). New opportunities for sustainable land use and transport in growing city regions? a case study of the Swedish city region Malmö-Lund.

Balfors, B, Antonson, H., Faith-Ell, C., Finnveden, G., Gunnarsson-Östling, U., Hörnberg, C., Isaksson, K., Lundberg, K., Pädam, S., Söderqvist, T. & Wärnbäck, A. (2018). Strategisk miljöbedömning för hållbar samhällsplanering: Slutrapport från forskningsprogrammet SPEAK. Swedish EPA.

Buhr, K., Isaksson, K., & Hagbert, P. (2018). Local Interpretations of Degrowth—Actors, Arenas and Attempts to Influence Policy. *Sustainability, 10*(6), 1899.

Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. Cambridge: Yale University Press.

Callmer, Å. (forthcoming, 2019) Exploring the possibilities of sufficiency: from imaginary to practice. PhD Thesis, KTH, Royal Institute of Technology, Stockholm.

D'Alisa, G., Demaria, F., & Kallis, G. (Eds.). (2014). *Degrowth: a vocabulary for a new era*. New York: Routledge.

Easterlin R. (1974). "Does economic growth improve the human lot?", in Reder D.P. & Reder M.W. (eds.), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*. New York: Academic Press.

Fauré, E.; Svenfelt, Å.; Finnveden, G.; Hornborg, A. (2016). Four sustainability goals in a Swedish low-growth/degrowth context. *Sustainability, 8(11), 1080.*

Fauré, E., Arushanyan, Y., Ekener, E., Miliutenko, S. and Finnveden, G. (2017): Methods for assessing future scenarios from a sustainability perspective. *European Journal of Futures Research, 5* (17).

Fauré, E., Finnveden, G., Gunnarsson-Östling, U. (forthcoming) Low-carbon futures for a Swedish society beyond GDP growth. *Journal of Cleaner Production*

FN (2016). The Sustainable Development Goals Report.

Francart, N., Malmqvist, T., & Hagbert, P. (2018). Climate target fulfilment in scenarios for a sustainable Swedish built environment beyond growth. *Futures, 98*, 1-18.

Fritz, M., & Koch, M. (2016). Economic development and prosperity patterns around the world: Structural challenges for a global steady-state economy. *Global Environmental Change, 38*, 41-48.

Fuehrer, P. (forthcoming). Horror vacui – the fear of too much leisure in a post-growth society. *Time & Society*.

Fuehrer, P. (manuscript). Do friends care? Informal and semi-formal relationships as a basis for care provision.

Gunnarsson-Östling, U., Svenfelt, Å., Alfredsson, E., Aretun, Å., Bradley, K., Fauré, E., Fuehrer, P., Hagbert, P., Isaksson, K., Malmaéus, M., Malmqvist, T., Buhr, K., Finnveden, G., Francart, N., Hornborg, A., Stigson, P., & Öhlund, E. (2017). *Scenarier för hållbart samhällsbyggande bortom BNP-tillväxt*. TRITA-INFRA-FMS 2017:01. KTH Royal Institute of Technology, Stockholm.

Gunnarsson-Östling, U. & Svenfelt, Å. (2018) "Towards social-ecological justice in planning, policy and decision making", in Holifield, R., Chakraborty, J. & Walker, G. (eds.), *Handbook of Environmental Justice*. London: Routledge.

Gunnarsson-Östling, U., Svenfelt, Å & Aretun, Å. (manuscript) Issues of power, influence and access to resources in low or no-growth societies.

Hagbert, P. (2016). *A sustainable home? Reconceptualizing home in a low-impact society.* PhD thesis, Chalmers University of Technology, Gothenburg.

Hagbert, P. (2018). "Rethinking home as a node for transition", in A. Nelson & F. Schneider (eds.), *Housing for degrowth: Principles, models, challenges and opportunities*. New York: Routledge.

Hagbert, P. & Femenías, P. (2016). Sustainable homes, or simply energy-efficient buildings? *Journal of Housing and the Built Environment, 31*(1), 1-17

Hagbert, P., & Bradley, K. (2017). Transitions on the home front: A story of sustainable living beyond eco-efficiency. *Energy Research & Social Science, 31*(Supplement C), 240-248.

Hagbert, P., & Malmqvist, T. (forthcoming). Actors in transition: shifting roles in Swedish sustainable housing development. *Journal of Housing and the Built Environment.*

Hornborg, A. (2017). How to turn an ocean liner: a proposal for voluntary degrowth by redesigning money for sustainability, justice, and resilience. *Journal of Political Ecology, 24*(1), 623-632.

Hornborg, A. (2019) *Nature, Society and Justice in the Anthropocene: Unraveling the Money-Energy-Technology Complex*. Cambridge University Press.

Hult, A. & Bradley, K. (2017). Planning for Sharing – Providing Infrastructure for Citizens to be Makers and Sharers. *Planning Theory & Practice, 18*(4), 597-615.

Inglehart R. (1997). *Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies.* Princeton: Princeton University Press.

IPCC (2018). Special Report on Global Warming of 1.5°C (SR15). http://www.ipcc.ch/

Isaksson, K., Buhr, K., & Hagbert, P. (submitted). Institutional capacity to work with 'other' development trajectories in Swedish local municipalities. *Environmental Innovation and Societal Transitions.*

Jackson, T., & Victor, P. A. (2016). Does slow growth lead to rising inequality? Some theoretical reflections and numerical simulations. *Ecological Economics, 121*, 206-219.

Kostakis, V., & Bauwens, M. (2014). *Network society and future scenarios for a collaborative economy.* Basingstoke: Palgrave Pivot.

Langlet, D., & Örnberg, Å. (2012). Affärsmässighet i kommunala bostadsbolag: effekterpå energieffektivitet och andra hållbarhetsåtgärder. *Förvaltningsrättslig tidskrift,* (3), 319-338.

Malmaeus, J. M., & Alfredsson, E. C. (2017). Potential Consequences on the Economy of Low or No Growth - Short and Long Term Perspectives. *Ecological Economics, 134*, 57-64.

Mason, P. (2016). *Postcapitalism: a guide to our future.* London: Penguin Random House.

Palm, V., Wood, R., Berglund, M., Dawkins, E., Finnveden, G., Schmidt, S., & Steinbach, N. (2019). Environmental pressures from Swedish consumption – A hybrid multi-regional input-output approach. *Journal of Cleaner Production, 228*, 634-644

Piketty, T. (2014). *Capital in the twenty-first century*. Cambridge: Harvard University Press

PBL, Planning and Building Act (2010:900) §1

Le Quéré, C., Andrew, R. M., Friedlingstein, P., Sitch, S., Pongratz, J., Manning, A. C., ... & Boden, T. A. (2018). Global Carbon Budget 2017. *Earth Systems Science Data, 10*, 405–448.

Raftery, A. E., Zimmer, A., Frierson, D. M. W., Startz, R., & Liu, P. (2017). Less than 2 °C warming by 2100 unlikely. *Nature Climate Change, 7*, 637-641.

Raworth, K. (2012). A safe and just space for humanity. Can we live within the doughnut? Oxfam Discussion Papers. Oxford: Oxfam

Rifkin, J. (2014). *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*. New York: St. Martin's Press.

Ruiz-Alejos, C. (2017). Sustainability Assessment of Scenarios: Beyond GDP growth. TRITA-SEED-EX 2017:19. KTH Royal Institute of Technology.

Rönnblom, M. (2014). Ett urbant tolkningsföreträde? En studie av hur landsbygd skapas i nationell policy. Umeå: Swedish Board of Agriculture.

SCB (2017). Demographics. https://www.scb.se/hitta-statistik/statistik-efter-amne/befolkning/befolkningens-sammansattning/befolkningsstatistik/pong/tabell-och-diagram/helarsstatistik--riket/befolkningsstatistik-i-sammandrag/ (accessed 180129)

Skånberg, K. och Svenfelt. Å. (manuscript). Decoupling Beyond Growth: Expanding the IPAT identity to quantify scenarios. Submitted to *Economic Issues*.

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R.; Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M., Persson, L. M., Ramanathan, V., Reyers, B., Sorlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347.

Svenfelt, Å., Alfredsson, E. C., Bradley, K., Fauré, E., Finnveden, G., Fuehrer, P., Gunnarsson-Östling, U., Isaksson, K., Malmaeus, M., Malmqvist, T., Skånberg, K., Stigson, P., Aretun, Å., Buhr, K., Hagbert, P., Öhlund, E. (2019). Scenarios for sustainable futures beyond GDP growth 2050. *Futures, 111*, 1-14.

Swedish Environmental Protection Agency (2017). Konsumtionsbaserade utsläpp av växthusgaser, i Sverige och i andra länder. http://www.naturvardsverket.se/Sa-mar-miljon/Statistik-A-O/Vaxthusgaser-konsumtionsbaserade-utslapp-Sverige-och-andra-lander/ (accessed 180129)

Tukker, A., Bulavskaya, T., Giljum, S., de Koning, A., Lutter, S., Simas, M., Stadler, K. & Wood, R. (2014). *The Global Resource Footprint of Nations*. Carbon, water, land and materials embodied in trade and final consumption calculated with EXIOBASE 2.1. Leiden/Delft/Vienna/Trondheim

van den Bergh, J. C. J. M., & Kallis, G. (2012). Growth, A-Growth or Degrowth to Stay within Planetary Boundaries? *Journal of Economic Issues, 46*(4), 909–920.

Världsbanken (2012). Inclusive Green Growth: The Pathway to Sustainable Development. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/6058

Öhlund, E., Hammer, M., Björklund, J. (2017). Managing Conflicting Goals in Pig Farming: farmers' strategies and perspectives on sustainable pig farming in Sweden. *International Journal of Agricultural Sustainability 15*(6), 693-707.

Öhlund, E. (manuscript). Exploring agricultural transformations in a degrowth setting: localisation and autonomy in Sweden.

Scientific publications within the program[1]

Published journal articles

Alfredsson, E. C., & Malmaeus, M. (2017). Prospects for economic growth in the 21st century: A survey covering mainstream, heterodox and scientifically oriented perspectives. *Economic Issues, 22*(1).

Alfredsson, E. C., & Malmaeus, J. M. (2019). Real capital investments and sustainability - The case of Sweden. *Ecological Economics, 161*, 216-224.

Bradley, K. (2018). Bike Kitchens - Spaces for convivial tools. *Journal of Cleaner Production, 197*(2), 1676-1683.

Buhr, K., Isaksson, K., & Hagbert, P. (2018). Local Interpretations of Degrowth—Actors, Arenas and Attempts to Influence Policy. *Sustainability, 10*(6), 1899.

Fauré, E., Svenfelt, Å., Finnveden, G., & Hornborg, A. (2016). Four Sustainability Goals in a Swedish Low-Growth/Degrowth Context. *Sustainability, 8*(11), 1080.

Fauré, E., Arushanyan, Y., Ekener, E., Miliutenko, S. and Finnveden, G. (2017): Methods for assessing future scenarios from a sustainability perspective. *European Journal of Futures Research, 5* (17).

Francart, N., Malmqvist, T., & Hagbert, P. (2018). Climate target fulfilment in scenarios for a sustainable Swedish built environment beyond growth. *Futures, 98*, 1-18.

Hagbert, P. (2016). "It's Just a Matter of Adjustment": Residents' Perceptions and the Potential for Low-impact Home Practices. *Housing, Theory and Society, 33*(3), 288-304.

Hagbert, P., & Bradley, K. (2017). Transitions on the home front: A story of sustainable living beyond eco-efficiency. *Energy Research & Social Science, 31*(Supplement C), 240-248.

Hornborg, A. (2016). Post-Capitalist Ecologies: Energy,"Value" and Fetishism in the Anthropocene. *Capitalism Nature Socialism, 27*(4), 61-76.

Hornborg, A. (2017). How to turn an ocean liner: a proposal for voluntary degrowth by redesigning money for sustainability, justice, and resilience. *Journal of Political Ecology, 24*(1), 623-632.

Hornborg, A. (2017). The magic of money and the illusion of biofuels: toward an interdisciplinary understanding of technology. *The European Physical Journal Plus*, 132:82.

Hornborg, A. (2018). The Money–Energy–Technology Complex and Ecological Marxism: Rethinking the Concept of "Use-value" to Extend Our Understanding of Unequal Exchange, Part 2. *Capitalism Nature Socialism*, 1-16.

Hornborg, A., & Martinez-Alier, J. (2016). Ecologically unequal exchange and ecological debt. *Journal of Political Ecology, 23*(1), 328-333.

Hult, A. & Bradley, K. (2017) Planning for Sharing – Providing Infrastructure for Citizens to be Makers and Sharers. *Planning Theory & Practice 18*(4), 597-615.

Malmaeus, M. (2016). Economic Values and Resource Use. *Sustainability, 8*(5), 490.

Malmaeus, J. M., & Alfredsson, E. C. (2017). Potential Consequences on the Economy of Low or No Growth - Short and Long Term Perspectives. *Ecological Economics, 134*, 57-64.

Nyblom, Å., Isaksson, K., Sanctuary, M., Fransolet, A., & Stigson, P. (2019). Governance and Degrowth. Lessons from the 2008 Financial Crisis in Latvia and Iceland. *Sustainability, 11*(6), 1734.

1 This list does not include opinion papers or conference papers. In addition, more papers may become published based on the research in this program.

Svenfelt, Å., Alfredsson, E. C., Bradley, K., Fauré, E., Finnveden, G., Fuehrer, P., Gunnarsson-Östling, U., Isaksson, K., Malmaeus, M., Malmqvist, T., Skånberg, K., Stigson, P., Aretun, Å., Buhr, K., Hagbert, P., Öhlund, E. (2019). Scenarios for sustainable futures beyond GDP growth 2050. *Futures, 111*, 1-14.

Forthcoming articles or manuscripts

Aretun, Å. & Portinson Hylander, J. (manuscript). New opportunities for sustainable land use and transport in growing city regions? a case study of the Swedish city region Malmö-Lund.

Fauré, E., Finnveden, G., Gunnarsson-Östling, U. (forthcoming) Low-carbon futures for a Swedish society beyond GDP growth. *Journal of Cleaner Production*

Fuehrer, P. (forthcoming). Horror vacui – the fear of too much leisure in a post-growth society. *Time & Society*.

Fuehrer, P. (manuscript). Do friends care? Informal and semi-formal relationships as a basis for care provision.

Gunnarsson-Östling, U., Svenfelt, Å & Aretun, Å. (manuscript) Issues of power, influence and access to resources in low or no-growth societies.

Hagbert, P., & Malmqvist, T. (forthcoming). Actors in transition: shifting roles in Swedish sustainable housing development. *Journal of Housing and the Built Environment*.

Hagbert, P., Nyblom, Å. & Isaksson, K. (manuscript). Approaching change: narratives on radical sustainability transitions in Swedish policy and planning. Submitted to *Environmental Innovation and Societal Transitions*.

Isaksson, K., Buhr, K., & Hagbert, P. (manuscript). Institutional capacity to work with 'other' development trajectories in Swedish local municipalities. Submitted to *Environmental Innovation and Societal Transitions*.

Skånberg, K. och Svenfelt. Å. (manuscript). Decoupling Beyond Growth: Expanding the IPAT identity to quantify scenarios. Submitted to *Economic Issues*.

Öhlund, E. (manuscript). Exploring agricultural transformations in a degrowth setting: localisation and autonomy in Sweden

Reports

Bonnier, E. (2017). Framtidsveckan i Alingsås 2016. IVL Swedish Environmental Research Institute, Stockholm.

Gunnarsson-Östling, U., Svenfelt, Å., Alfredsson, E., Aretun, Å., Bradley, K., Fauré, E., Fuehrer, P., Hagbert, P., Isaksson, K., Malmaéus, M., Malmqvist, T., Buhr, K., Finnveden, G., Francart, N., Hornborg, A., Stigson, P., & Öhlund, E. (2017). *Scenarier för hållbart samhällsbyggande bortom BNP-tillväxt*. TRITA-INFRA-FMS 2017:01. KTH Royal Institute of Technology, Stockholm.

Svenfelt, Å., Alfredsson, E., Aretun, Å., Bradley, K., Fauré, E., Fuehrer, P., Gunnarsson-Östling, U., Hagbert, P., Isaksson, K., Malmaéus, M., Malmqvist, T., Stigson, P. (2015). *Testversion av scenarier för hållbart samhällsbyggande bortom BNP-tillväxt*. TRITA-INFRA-FMS 2015:05. KTH.

Books and book chapters

Gunnarsson-Östling, U. & Svenfelt, Å. (2018) "Towards social-ecological justice in planning, policy and decision making", i Holifield, R., Chakraborty, J. & Walker, G. (red.), *Handbook of Environmental Justice*. London: Routledge.

Hagbert, P. (2018). "Rethinking home as a node for transition", i Nelson, A. & F. Schneider (red.), *Housing for degrowth: Principles, models, challenges and opportunities*. New York: Routledge.

Hornborg, A. (2017). "Resilience, Power and Money: Limitations and Prospects of Systems Ecology in Envisaging a Sustainable World Economy", i Chandler, D. & Coaffee, J. (red.), *The Routledge Handbook of International Resilience*. London: Routledge.

Hornborg A. (2017) "Redesigning Money to Curb Globalization: Can We Domesticate the Root of All Evil?", i Brightman M. & Lewis J. (red.) *The Anthropology of Sustainability*. Palgrave Studies in Anthropology of Sustainability. New York: Palgrave Macmillan.

Hornborg A. (2018) "The Root of All Evil: Money, Markets, and the Prospects of Rewriting the Rules of the Game", i Spyridakis, M. (red.), *Market Versus Society*. Palgrave Studies in Urban Anthropology. New York: Palgrave Macmillan.

Hornborg, A. (2018). "Waiting for Degrowth: How to think about the anticipated decline of economic affluence", i Chertkovskaya, E., Paulsson, A. & Barca, S. (red.), *The End of Growth as We Know It: Towards a Political Economy of Degrowth*. Rowman & Littlefield Publishers

Hornborg, A. (2019) *Nature, Society and Justice in the Anthropocene: Unraveling the Money-Energy-Technology Complex*. Cambridge University Press

PhD theses

Callmer, Å. (forthcoming, 2019). *Exploring the possibilities of sufficiency: from imaginary to practice.* PhD thesis, KTH Royal Institute of Technology, Stockholm.

Fauré, E. (2018). *Sharing the doughnut – Exploring sustainable and just futures.* PhD thesis, KTH Royal Institute of Technology, Stockholm.

Hagbert, P. (2016). *A sustainable home? Reconceptualizing home in a low-impact society.* PhD thesis, Chalmers University of Technology, Gothenburg.

Licentiate theses

Fauré, E. (2016). *Sustainability goals combining social and environmental aspects*. Licentiate thesis, KTH Royal Institute of Technology, Stockholm.

Francart, N. (2019). *Buildings' contribution to climate change: setting future targets and informing current practitioners*. Licentiate thesis, KTH Royal Institute of Technology, Stockholm.

Master Theses

An, J. (2017). Feminist Futures: Futures studies through the lens of feminist epistemologies. TRITA TRITA-SEED-EX 2017:14. KTH Royal Institute of Technology, Stockholm.

Francart, N. (2016). Climate Implications of a Collaborative Economy Scenario for Transportation and the Built Environment. TRITA INFRA-FMS-EX-2016:06. KTH Royal Institute of Technology, Stockholm.

Musabasic, A. (2015). Energy and climate scenarios within the doughnut?: Treatment of planetary boundaries, social foundations for human prosperity and economic growth in energy and climate scenarios. TRITA-FMS-EX-2015:08. KTH Royal Institute of Technology, Stockholm.

Parekh, V. (2017). A Fair Distribution of Global Biocapacity: The Potential in Swedish Environmental Policy. KTH Royal Institute of Technology, Stockholm.

Pettersson, D. (2015). Kan ekologisk och ekonomisk hållbarhet kombineras. En studie av en neoklassisk jämviktsmodell och dess relation till hållbarhet. Linköping University.

Prats, V. (2017). Södertälje, a gateway to degrowth: A prospective design scenario to visualise the transition. KTH Royal Institute of Technology, Stockholm.

Ringenson, T. (2014). The foundation upon which society is built? Socio-economic sustainability regarding jobs and income in municipal planning, now and beyond economic growth. TRITA-FMS-EX-2014:10. KTH Royal Institute of Technology, Stockholm.

Ruiz-Alejos, C. (2017). Sustainability Assessment of Scenarios: Beyond GDP growth. TRITA-SEED-EX 2017:19. KTH Royal Institute of Technology, Stockholm.

Torri, G. (2018): Beyond GDP Growth: Scenarios for the Swedish energy demand and electricity supply system. TRITA-ITM-EX 2018: 715. KTH Royal Institute of Technology, Stockholm.

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