A Future in Sustainable Development

Backcasting the SDGs

MIKAEL ANGELSTAM
Abstract
In 2015 the 17 Sustainable Development Goals were adopted by 193 member states of the United Nations. The SDGs are highly ambitious and their underlying processes are interconnected by causal relationships. Work towards fulfilling them therefore requires considering how solutions for one goal will impacts others. In this study target-oriented backcasting is applied to examine set goals in the future, as well as to determine the current state and trends of development. This is done in an effort to determine conflicts between targets and resource limitations of future development. The findings suggest that the current paradigm of giving GDP growth highest societal priority, leads to a causal relationship where development occurs at the expense of sustainability at the global level. In order to overcome this, the fulfilment of the SDGs has to be given higher priority than the size and growth rate of the GDP.

Sammanfattning
Table of Contents

1. Introduction .................................................................................................................. 1
   1.1 Research question ................................................................................................... 1
   1.2 Aim .......................................................................................................................... 1
   1.3 Objectives .............................................................................................................. 1
   1.4 System borders and delimitations ......................................................................... 1
   1.5 Definition of sustainable development ................................................................... 2
       Sustainable Development ....................................................................................... 3
   1.6 The Sustainable development goals ....................................................................... 4

2. Theory and Methods ..................................................................................................... 5
   2.1 Futures studies ....................................................................................................... 5
   2.2 Backcasting .......................................................................................................... 5
   2.3 Methodological reflection ...................................................................................... 6
   2.4 Scenario building in this report ............................................................................ 6

3. Results ........................................................................................................................... 7
       Assumptions .............................................................................................................. 7

   The world in 2030 - Demography ............................................................................. 7
   Scenario Goal 1 - End poverty .................................................................................... 10
       Poverty ..................................................................................................................... 10
   Scenario Goal 2 - End hunger .................................................................................... 11
       Malnourishment ...................................................................................................... 11
       Agriculture ............................................................................................................. 12
   Scenario Goal 3 - Healthy lives for all ....................................................................... 13
   Scenario Goal 4 - Education for all ........................................................................... 13
   Scenario Goal 5 - Gender equality ............................................................................ 13
       Human Well-Being ................................................................................................. 14
       Education ............................................................................................................... 14
       Gender equality .................................................................................................... 15
   Scenario Goal 6 - Water and sanitation for all ......................................................... 15
       Water and sanitation ............................................................................................. 15
   Scenario Goal 7 - Energy for all ............................................................................... 16
       Energy .................................................................................................................... 16
   Scenario Goal 8 - Economy for all ............................................................................ 18
       Economy ............................................................................................................... 18
   Scenario Goal 9 - Built environment ....................................................................... 18
   Scenario Goal 11 - Sustainable settlements ............................................................ 18
       Cities, Settlements and Infrastructure ................................................................... 19
   Scenario Goal 10 - Reduce inequality ..................................................................... 19
       Inequality ............................................................................................................... 19
   Scenario Goal 12 - sustainable consumption and production .................................. 21
       Sustainable consumption and production ............................................................. 21
   Scenario Goal 13 - combat climate change ............................................................... 22
       Climate change ...................................................................................................... 23
   Scenario Goal 14 and Goal 15 - Sustain the environment ........................................ 26
       Environment .......................................................................................................... 26
   Scenario Goal 16 - Sustainable societies and institutions ....................................... 28
   Scenario Goal 17 - Implementation ........................................................................... 29
       Institutions, implementation and measuring development ................................ 29

4. Discussion ..................................................................................................................... 32

5. Conclusion ..................................................................................................................... 38

6. References ..................................................................................................................... 40

Appendix 1 ......................................................................................................................... 43
1. Introduction
In September 2015 the 2030 Agenda and its 17 Sustainable Development Goals, SDGs, were adopted by 193 member states of the United Nations. The SDGs are a comprehensive set of goals, each containing a set of targets, clearly including and integrating ecological, social and economic aspects of sustainable development (UN, 2015). The SDGs continue and expand upon the Millennium Development Goals, MDGs that were active during the time period 2000 to 2015. The MDGs constituted 8 different goals covering social, economic and to some extent ecological aspects of sustainable development (UN, 2000). The SDGs are expanded to 169 targets that span over 17 goals, see table 2 and Appendix 1.

The SDGs have been unanimously adopted by UN member states, but are not yet well integrated in national policy. Because of their inseparability and interconnected nature, it is essential to consider how solutions to one SDG will impact the others when implemented. The intention of this thesis is to improve the knowledge in sustainability science, as well as to provide the reader with an understanding of what fulfilling the SDGs means and what important considerations has to be made in order to do so. The general structure of this report is inspired by the essential guide to doing your research project by Zina O’Leary (2014), and the results and scenarios specifically are inspired by “The geography of Europe’s futures” by Masser, Svidén and Wegener (1992).

1.1 Research question
How can the 17 Sustainable Development Goals be fulfilled?

1.2 Aim
To apply the futures studies technique target-oriented backcasting in order to identify synergies and conflicts between the individual SDGs (Table 2). The focus will be on the respective goals, omitting a deep analysis of the 169 targets.

1.3 Objectives
• Develop 17 target based scenarios for a single future in which the SDGs are fulfilled
• Investigate how the different goals relate to each other in order to identify synergies and conflicts between the individual SDGs
• Highlight considerations that have to be made in order to improve policy coherence when working to fulfil the SDGs in order to avoid negative rebound effects.

1.4 System borders and delimitations
The spatial system boundary of the study is the global level and the temporal is between 2015 and 2030. The level of spatial detail used is mainly confined to the global level, though in order to more clearly explain regional differences, the scale of geographical regions and nations are used to some extent. This choice of delimitations is made to correspond to the ones included in the Agenda 2030 and the Sustainable development goals (UN, 2015). It should be noted that the time frame of implementing Agenda 2030 is set to the 15 years between 2016 and 2030. However, due to this as well as limitations of data availability, the year 2015 has been set as a base year, although in some cases slightly older data has
been used due to limitations of currently available data. The level of detail on the other hand has been set in order to make it feasible to include all of the SDGs into the temporal limitations of a 30 ECTS\(^1\) Master thesis.

1.5 Definition of sustainable development
In this thesis a broad and strong definition of sustainable development is used (See table 1). Broad means that the two dimensions (Figure 1) of sustainability and development are included and strong that natural capital is considered partially irreplaceable due to its inherent properties of complexity and irreversibility (Gudmundsson and Hőjer, 1996; Holden, 2007 and Høyer, 1999).

![Figure 1](image)

**Figure 1.** The two dimensions of sustainable development, in order to meet its requirements development has to occur within limitations set by sustainability (Figure adopted from Gudmundsson and Hőjer, 1996).

This stance of broad and strong sustainability is well in line with the comprehensiveness of the Sustainable Development goals of Agenda 2030 (Appendix 1). What is sustainable can be determined as the spatiotemporal limitations to the throughput of human activity or carrying capacity. This determines scale of resource input and size of the global economy at a given point in time. The second consideration is a normative social floor for equitable inter and intragenerational distribution of resource output. To achieve sustainability the allocation of resources as limited above should be optimised to maximize net benefits to humanity (Raworth, 2012; Gudmundsson and Hőjer, 1996).

\(^1\) ECTS are European Credit Transfer and Accumulation System credit points used to define the duration of University courses in Europe. 30 ECTS are equivalent to 20 weeks of fulltime studies.
**Sustainable Development**

Increasing and ensuring the equitable distribution of human well-being, while ensuring the inter and intragenerational availability and option value of natural, human and man-made capital (Table 1).

*Table 1.* Description of the four basic principles of the two dimensions of sustainability and development (Adopted from Gudmundsson and Höjer, 1996 with complementation from Höjer, 1999 see D_b)

<table>
<thead>
<tr>
<th>Sustainability</th>
<th>Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>S_a</td>
<td>To safeguard a natural resource and biodiversity base within critical loads, levels and usage patterns.</td>
</tr>
<tr>
<td>S_b</td>
<td>To maintain the option value of a productive capital base for future generations. Including <em>natural, human</em> and <em>man-made</em> capital</td>
</tr>
</tbody>
</table>
1.6 The Sustainable development goals

The 2030 Agenda includes 17 SDGs (table 2) that in turn are divided over 169 targets (UN, 2015, see Appendix 1). It is deemed too comprehensive to include all targets in this thesis and in order to make this manageable; the targets within each goal have been condensed into target-fulfilling scenarios in the results. These scenarios are based on the highest level of ambition among targets within each SDG, to ensure that reaching the scenarios equates to meeting all targets.

Table 2. List of sustainable development goals (UN, 2015). For the entire list of SDGs and targets see Appendix 1.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>End poverty in all its forms everywhere</td>
</tr>
<tr>
<td>2</td>
<td>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
</tr>
<tr>
<td>3</td>
<td>Ensure healthy lives &amp; promote well-being for all at all ages</td>
</tr>
<tr>
<td>4</td>
<td>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</td>
</tr>
<tr>
<td>5</td>
<td>Achieve gender equality and empower all women and girls</td>
</tr>
<tr>
<td>6</td>
<td>Ensure availability and sustainable management of water and sanitation for all</td>
</tr>
<tr>
<td>7</td>
<td>Ensure access to affordable, reliable, sustainable and modern energy for all</td>
</tr>
<tr>
<td>8</td>
<td>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</td>
</tr>
<tr>
<td>9</td>
<td>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</td>
</tr>
<tr>
<td>10</td>
<td>Reduce inequality within and among countries</td>
</tr>
<tr>
<td>11</td>
<td>Make cities and human settlements inclusive, safe, resilient and sustainable</td>
</tr>
<tr>
<td>12</td>
<td>Ensure sustainable consumption and production patterns</td>
</tr>
<tr>
<td>13</td>
<td>Take urgent action to combat climate change and its impacts</td>
</tr>
<tr>
<td>14</td>
<td>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</td>
</tr>
<tr>
<td>15</td>
<td>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</td>
</tr>
<tr>
<td>16</td>
<td>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</td>
</tr>
<tr>
<td>17</td>
<td>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</td>
</tr>
</tbody>
</table>
2. Theory and Methods

2.1 Futures studies

Futures studies is a scientific field devoted to studying the future. Within it there is a large methodological diversity and its roots go back far in history (Börjeson et al. 2005). In this thesis the categorisation of scenario studies presented in Börjeson et al. (2005) is used. It consists of three different categories; predictive (forecasts and what-if scenarios), explorative (external and strategic scenarios) and finally normative (preserving and transforming scenario) techniques. The 2030 Agenda and its SDGs are normative targets that have been set for the future. Since the current trends of development arguable only has the potential to solve a minority of the SDGs, and the prevailing system structure is counter productive, large scale structural changes are needed in order to solve all of them. These two facts place the 2030 Agenda into the realm of normative transforming scenario techniques according the categorisation above.

2.2 Backcasting

Backcasting is a type of transforming scenario technique and there are various different types of backcasting approaches to choose from (Börjeson et al, 2005 and Höjer, Gullberg & Pettersson, 2011). Typically in backcasting studies participation of stakeholders is a natural part as well as the development of several alternative future scenarios (Dreborg, 1996). In working with the SDGs however it can be seen as that the participation has already occurred during the process of developing, agreeing on and adopting the Agenda for 2030 its SDG’s. Due to the time limitations and the aim of this study the methodological step of participation as well as developing scenarios describing several different alternative futures is omitted in this study. Instead scenarios for a single target-fulfilling future, where the SDGs are fulfilled by 2030, are developed and presented in the results section below, using target-oriented backcasting.

Typically backcasting studies take place over longer time horizons than 15 years, however when looking at transformative change and goal fulfilling scenarios, normative techniques are needed (Börjeson et al. 2005). Furthermore, according to Höjer and Mattsson (2000) backcasting is applicable if the current trends as well as forecasts for the future development do not meet the set targets within timeframe (figure 2 below). This is true for several of the SDGs, which is why backcasting is used in this study. Backcasting studies usually consists of four steps, see figure below (adopted from Höjer and Mattsson, 2000 and Höjer, Gullberg & Pettersson, 2011). According to Höjer, Gullberg & Pettersson, 2011, step 1 and 3 receives most focus in target-oriented backcasting studies.
2.3 Methodological reflection
Target-oriented backcasting was chosen as the methodology for this study after concluding that it doesn’t seem possible to reach the SDGs following the current path of development. Looking at trends some indicators are moving too slowly in the right direction, while others are in fact moving away from the set targets. However, target-oriented backcasting allows focus on a potential future where all the SDGs have been fulfilled universally at the global level. In order to reach this target-fulfilling future through development, solutions have to be implemented which enables indicators to move unanimously towards targets at adequate speed. The main weakness of this thesis comes with the inherent difficulty to investigate all 17 SDGs simultaneously as well as trying to grasp how they influence each other. On the other hand looking at all 17 SDGs makes it possible to identify conflicts and draw conclusions that would have been overlooked if limiting the study to one or a few SDGs.

2.4 Scenario building in this report
The structure of scenarios has been inspired by the book “The geography of Europe’s futures”, by Masser, Svidén and Wegener (1992). In this thesis 17 normative scenarios, one for each SDG, have been developed and together they present a future where all SDGs have been fulfilled. Each scenario summarizes the targets of the respective SDG. The focus is on what target fulfilment actually implies.

This is followed by a description of the state and trend of the related field of topic that the respective goal affects or touches on. This approach is similar to the one used in the book mentioned above, and is intended to help the reader by layering in relevant knowledge for each section along with the scenario itself. This knowledge includes relevant information about the topic, as well as data on the state and rate of change in the base year.
3. Results
The SDGs and their targets give a picture of what future the United Nations member states want to have in 2030. Limitations of personal preferences and technology are difficult to predict. However by connecting physical characteristic of the world with quantitative data and trends, it’s possible to develop a coarse description of how the development has to change in order to meet the set targets in the future.

Assumptions
In order to anchor the SDGs to the physical characteristics of the earth, which is setting boundaries for human development and sustainability, a set of assumptions have to be made below. Assumptions about the future are per definition uncertain, but without them it’s not possible to make or rely on available forecasts.

- Governing institutions at the global and international regional level remain reasonably stable over time.
- No large-scale international and/or high mortality natural disaster or disease outbreak occurs.
- No large-scale international war breaks out
- Modern medicine maintains its efficiency and antimicrobial resistance is maintained at approximately current levels.

The world in 2030 - Demography
The SDGs cover a wide array of issues concerning human development. The United Nations Population Division has a good track record for making accurate forecasts of the population size (Keilman, 2001). In order to create a frame of reference for the conditions of the future scenario it’s logical to use demography as a basis, since the projections can be considered reliable based on the assumptions made. One can also argue for the fact that governing institutions will have little influence over the development of population size, whether it’s related to the fulfilment of the SGDs or any other reason.

The global population size is determined by the number of births and deaths. The replacement-level fertility is theoretically 2, but maintaining a stable population requires a birth rate of 2,1 children per woman, because of reproductive failure and mortality (Wright and Boorse, 2014; OECD, 2016). When looking at a population within a spatial delimitation also migration becomes an important factor. Some countries with low birth rates and low child mortality need immigration in order to main and or increase its population, and at the other end countries with high birth rates might have their population size grow at a reduced pace due to emigration.

In 2015 when Agenda 2030 and the SDGs were adopted, the human population was 7,3 billion, by 2030 the UN population division forecasts an increase to 8,5 billion globally (Fig 3-9 and Table 3) (UNDESA/PD, 2015a). The population growth will be unevenly distributed over the earth as factors such as the number of children per woman and child mortality are significantly different when comparing both extremes.
Figure 3. Population pyramid for 2015 with five-year age groups, showing female in magenta and male in cyan, projected change until 2030 shown in dotted black and white. Dotted black and white indicates an increase in the age group from 2015-2030, while solid magenta or cyan indicates a decrease in the age group during the time period (fig 3-9).

In order to understand where the majority of the change will occur figure 4-9 below shows the global population data broken down by geographical regions in accordance with the United Nations Population Division (UNDESA/PD, 2015b). In figures 4-9 the scale of the x-axis is equal for all regions to make comparisons easier. The population of Africa will grow by approximately the equivalent of Europe, evenly distributed over all age groups (fig 4). The same is true for Asia but here the main population growth will be in the age groups from 35 to 100+, while most of the age groups below 35 will reduce in size over the 15-year period (fig 5).

Table 3. Global population in millions for 2015 and projection for 2030 at the seven geographical scales presented in figures 3-9.

<table>
<thead>
<tr>
<th>Geographical Scale</th>
<th>2015</th>
<th></th>
<th>2030</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Total</td>
<td>Female</td>
</tr>
<tr>
<td>Africa</td>
<td>592.7</td>
<td>593.5</td>
<td>1186.2</td>
<td>837.4</td>
</tr>
<tr>
<td>Asia</td>
<td>2146.3</td>
<td>2247.0</td>
<td>4393.3</td>
<td>2411.3</td>
</tr>
<tr>
<td>Europe</td>
<td>382.3</td>
<td>356.2</td>
<td>738.5</td>
<td>378.9</td>
</tr>
<tr>
<td>Latin America and the Carib</td>
<td>320.9</td>
<td>313.5</td>
<td>634.4</td>
<td>365.4</td>
</tr>
<tr>
<td>Northern America</td>
<td>180.5</td>
<td>177.4</td>
<td>357.9</td>
<td>199.8</td>
</tr>
<tr>
<td>Oceania</td>
<td>19.6</td>
<td>19.7</td>
<td>39.3</td>
<td>23.7</td>
</tr>
<tr>
<td>World</td>
<td>3642.3</td>
<td>3707.3</td>
<td>7349.6</td>
<td>4216.5</td>
</tr>
</tbody>
</table>
Scenario Goal 1 - End poverty

The year is 2030, extreme poverty has been eradicated and all citizens of the earth have equal rights to economic, social and natural resources. This was finally achieved once national level social protection systems were in place in all nations, which helped set and maintain a social floor. All this was achieved through the significant contribution of development resources put forward by the nations and international community. It would not have been possible without the clear prioritization of putting poor and vulnerable women, children and men first. The impacts of climate change such as heat waves, downpours and flooding’s are more prominent and frequent now. As the poorest are the most vulnerable, the grand effort of eradicating extreme poverty has proved worthwhile and has greatly improved the well-being and resilience of humanity.

Poverty

Advances in a variety of different technologies such as agriculture, medicine, industrial and communications to name a few has led to magnitudes of increase in terms of economic growth. All of this has had a monumental positive impact on humanity and people’s quality of life. Arguably one could state that humanity has never had it better and never before has the proportion of people living in poverty been as small as it is today (Figure 10 and 11 below).

Figure 10. Development of the global population from 1820 to 2015 divided by those living on above or under 1,9$/day (PPP 2011) (Based on Roser, 2016).

Figure 11. Development form 1820 to 2015 with proportion of world population living in poverty, defined as 1,9$/day (PPP 2011) (Based on Roser, 2016).
When the SDGs were agreed upon, the internationally agreed extreme poverty line was set to $1.25/day, however only a few months later the World Bank finally raised it to $1.9/day (UN, 2015; World Bank, 2016). The UN has adopted the new definition, and it’s likely that the value will be raised further until 2030. One important note here is that the poverty line in reality is radically different in different countries, where you might survive on the 1,25 or 1,9$/day in the poorest countries on earth, in the middle income countries where most people live one would need more to sustain at a relative minimum level. Moving out of extreme poverty still leaves people in or within risk of social exclusion. Since there will always be some proportion of unemployment in all countries and at the population level some proportion won’t be able to make a livelihood, poverty won’t be solved before some form of social security and pension system is implemented in all countries.

**Scenario Goal 2 - End hunger**

It’s 2030, we can all eat without guilt and go to sleep at night without a heavy heart, because through all the effort put into the second green revolution of sustainable agriculture and diets, we have ended hunger. No longer are there infants, children, adults or elders suffering from malnutrition. Alongside the reduced suffering it has created many sustainable livelihoods, and many have enjoyed the development from nutritious to delicious. Climate change is still one of our biggest problems, but through our efforts we have managed to increase the carbon uptake in our soils and in the process made our food supply more secure and resilient to the adverse impact we encounter.

**Malnourishment**

Globally 11% of the population or around 800 million people are undernourished (Fig 12), as a share or the global population this has decreased by 3% per year over the last decade (FAO, 2015). At the same time almost four times as many are overweight or obese, increasing at a rate of roughly 1,5 and 3% per year respectively (WHO, 2016a; WHO, 2016b). This indicates that in order to solve undernourishment while meeting our goals for health and environment, we need to tackle both sides of malnourishment and food allocation.

**Figure 12.** The approximate proportions of the population that is undernourished, overweight, obese and normal-weight (based on FAO, 2015; WHO, 2016a; 2016b)
Agriculture

Currently approximately 38% of the global land area is agricultural land, and the primary production output is determined by the soil characteristics and the efficiency of the current production system. For allocation between different types of production see figure 13. The overall projected yearly increase in production from 2015-2030 is 1.3%, compared to the projected population growth rate of 1% per year over the same period (FAO, 2015; Alexandratos and Bruinsma, 2012; UN, 2015a). Potential solutions to mitigate the spatial limitation of arable land are vertical farming and integrated production systems such as aquaponic and cultivating insects for animal feed and food. How many calories that reaches the mouth of a human and gives nutritional benefit is however determined by a number of different factors; food allocation, proportion of animal production, infrastructure and food waste to name a few.

![Agricultural land](image)

**Figure 13.** Allocation of globally available agricultural land into different types of uses. (adopted from FAO, 2015 in WWF, 2016)

When it comes to fulfilling the SDGs, there are several competing land uses such as; food, feed and fuel. Beyond this, we need to manage land to increase carbon sequestration in order to stand a chance of meeting the Paris agreement within SDG 13. In order to solve nutrition globally we need healthy and sustainable diets, redistribution of food and improved infrastructure in order to minimize waste.

Going back decades there is an on-going debate about which type of agricultural is more sustainable, organic or conventional farming. The Swedish National Food Agency (2016) compiled the results of 57 different LCA based studies of the competitive advantage of organic and conventional farming per kilo of produce (Table 4). The results are ambiguous at best beyond the fact that organic farming has a lower Eco-toxicological impact but higher land use requirement than conventional. Furthermore ecosystem services such as biodiversity and depletion of phosphorous are not considered.
Table 4. Lifecycle based environmental impact per kilo produced of different food types. *Green* organic farming performs better than conventional, *Blue* conventional performs better than organic and *Yellow* comparable performance. The numbers show how many different studies were compared (Adopted from Swedish National Food Agency, 2016)

<table>
<thead>
<tr>
<th>Food type</th>
<th>Climate change</th>
<th>Eutrophication</th>
<th>Acidification</th>
<th>Eco toxicity</th>
<th>Energy use</th>
<th>Land use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>32</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Beef</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Pork</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Chicken</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Eggs</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fish &amp; shellfish</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Arable Crops</td>
<td>21</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Vegetables</td>
<td>13</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Fruit &amp; Berries</td>
<td>22</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

The production of genetically modified organisms (i.e. GM, GE or GMOs) is also a highly polarized topic. A combination of a strict and expensive regulatory system, with an oligopoly of actors that cause high seed prices and hypothetical environmental concerns and public scepticism is halting implementation. While it could help alleviate vitamin and mineral deficiencies which approximately 2 billion people suffer from (Bradford, 2005; Bruinsma, 2003 and De Steur et al. 2015).

**Scenario Goal 3 – Healthy lives for all**

It’s 2030, we finally did it, after centuries or even millennia of suffering and a magnitudes of million lives lost, communicable diseases such as AIDS, tuberculosis and malaria are now in the statistical periphery. Beyond this our society has never been this safe, all the way from when you are born, grow up, live and age. The chance of living a long and fulfilling life has never been this good, and the spread of healthcare, information and education has empowered women and couples everywhere to plan their own family. Finally, the increased economic security of everyone, and especially those at the lower end, has radically reduced substance abuse.

**Scenario Goal 4 - Education for all**

What do you want to be when you grow up? What does your children want to be when they grow up? Well good news, regardless of gender or disability and cultural or economical background you now have equitable access to all levels of education!

**Scenario Goal 5 - Gender equality**

Gender equality is finally here! The long history of women suffering from discrimination and violence in all spheres of life is now in history. Girls and young women can grow up without worrying about or suffer from exploitation, female genital mutilation or harmful marital practices. Throughout life girls and women are empowered to participate and lead at all levels, as well as to make all decisions self whether its concerning personal, family, work or any other.
Human Well-Being

SDGs 3-5 are closely related and they are covered together in this section. There are several different important factors that contribute to human well-being. Among them are health, education, social inclusion and financial security and wealth (Visani et al, 2011). These factors are all co-dependent for development, but to quote Hans Rosling (2006) “the speed of development is very, very different, and the countries are moving more or less in the same rate as money and health, but it seems you can move much faster if you are healthy first than if you are wealthy first... ...they got all the money; but health cannot be bought at the supermarket. You have to invest in health. You have to get kids into schooling. You have to train health staff. You have to educate the population.”

Humanity has undergone a tremendous increase in terms of health over the last decades. Life expectancy is increasing and each year is an all time high (UNDESA/PD, 2015c). This is due to the development and spread of medical science as well as a more peaceful situation in the world, only 0,3% of global deaths occurred in wars and conflict. While the occurrences of infectious diseases are decreasing, non-communicable diseases such as cardiovascular, cancer and diabetes are estimated to account for 70% of the 56 million deaths in 2015 (WHO, 2017).

Currently the life expectancy is 70 years at the global level, and fertility is down to 2,5 children per woman. Still 9% of the global population live in countries where the fertility rate is over 5 and economical development is at the lowest end (UNDESA/PD, 2015c). Their high fertility rates occur because its promoted by the sociocultural setting. According to Wright and Boorse (2014) there are five main contributing factors for high fertility; no old age security, high child mortality, need for more helping hands, gender inequality and inaccessibility of contraceptives. In low-income countries less than half of married women have their contraceptive needs met in order to meet their demand for family planning, which would also help reduce maternal deaths (World Bank, 2017c).

Following current projections of infant and child mortality we will overshoot the set targets in SDG 3 by several decades (UNDESA/PD, 2015c). Globally nearly ½ of the births and deaths occur without civil registration of age, gender and cause of death, this is a mayor barrier for making the right priorities on public health. To solve this, development and improvement of institutions and infrastructure is needed (WHO, 2014; WHO, 2017). For economic development to be sustained; equitable and inclusive development of society is needed. If development strategies are to be implemented successfully they have to be adapted to the local cultural and historical context.

Education

When it comes to enabling citizens to become self-supporting and living a fulfilling life, education is arguably one of the most important factors. Failing to supply schooling for all citizens might postpone the associated problems of not being self-supporting such as poverty and hunger for another whole generation. This would make meeting several SDGs on schedule impossible. Education has improved dramatically over the last decades and today out of those above 24 years of age,
women have spent 6-12.9 years in school while men have spent 8-13.1 years on average depending on the countries level of development (IHME, 2015). Globally 81.5% of women and 89.2% of men were literate in 2010. An increase from 76.9% and 86.8% respectively in 2000 (World Bank, 2017d; 2017e).

**Gender equality**

Gender inequality goes back far in history and it has both social and economical implications. Institutional gender discrimination is widespread, 87 countries have at least one law that discriminates by gender and an additional 63 countries have more than four. The laws vary from restricting women from property and business ownership and limiting choice of occupation, to subjecting women to domestic violence, marital rape and early marriages which cuts education short and all of these factors have an reinforcing effect in terms of poverty. (World Bank, 2017c; UN Women, 2015). Out of the 3.6 billion women alive today 450 million were married before age 18 and another 250 million before 15 years of age (UNCF, 2014). When it comes to democratic participation, great achievements have been made over the last century, today women have the right to vote and hold office in all but a handful of countries (UN Women, 2015).

In terms of education, in developing countries women get to spend on average 1-2 years less in school compared to men. While in developed countries the difference in education participation has closed in the last decades and is now down to 0,2 years (IHME, 2015). However, there is still very much to improve. Arguably all SDGs are about improving gender equality, and that fulfilling them all would greatly improve the quality of life for all girls, mothers and women in the world. This in turn would have large positive rebound effects on both society and economy (UN Women, 2015).

**Scenario Goal 6 - Water and sanitation for all**

How many are thirsty or just the opposite at any given time? Not to worry, now everyone everywhere can have a drink or use the facilities. Through global efforts to restore and protect our ecosystems, upstream as well as downstream, we can all enjoy drinking water and sanitation. This was a huge help for ending malnourishment and hunger and has increased the quality of life tremendously.

**Water and sanitation**

Monitoring of water and sanitation is difficult because of lack of resources, capacity and infrastructure. Estimates for 2015 show that almost 750 million people lacked adequate access to water, and upwards of a staggering 1,8 to 2,5 billion do not have access to basic sanitation and drinking water that is contaminant free. In terms of severe water scarcity an estimated 4 billion experience it on a yearly basis. Large investments have been made in infrastructure to deliver water, but a large proportion of projects fail after a few years as long-term maintenance is not included in projects and often local institutions are not developed or have the capacity to finance and maintain the infrastructure (UNWWAP, 2015; Mekonnen & Hoekstra 2016). A general problem for sustainable water management is that generally it's a free resource and therefore there are no incentives to spend money on solutions to reduce or minimize consumption.
When it comes to determine what sustainable water consumption is, *where* water is withdrawn and *when* during the year, can be equally important as the actual *quantity*. In order to develop a global standard for water footprint assessment, that accounts for these dimensions, the Water Footprint Network was founded in 2008 (WFN, 2017). They use a Water Footprint, defined as the consumptive water use through the supply chain to make a product as well as the water needed to dilute pollution caused by production, to determine total water consumption. It includes; *green* (precipitation), *blue* (ground and surface) and *grey* (pollution) water used both directly and indirectly (Hoekstra et al, 2011).

In order to maintain human well-being, health and development, an estimated minimum of 1000 m$^3$ per capita and year is required, and above 1700 m$^3$ to avoid scarcity throughout the year. (Penuel, Statler and Hagan, 2013). As a reference the yearly average Water Footprint globally (from 1996-2005) has between estimated to 9087 Bn m$^3$ of which: 6500 Bn m$^3$ green water, 1000-2270 Bn m$^3$ blue water and 1400 Bn m$^3$ for grey water (Hoekstra and Wiedmann, 2014; Gerten et al, 2013). So far a sustainable consumption level has only been suggested for blue water, and depending on method it’s set at between 1100 and 4500 Bn m$^3$ per year (Gerten et al, 2013). This means that we have already entered the uncertainty range of sustainable blue water consumption. Going forward we therefore have to consider what impacts our strategies to solve other SDGs e.g. food, energy and climate change has on to water use. Finally, consumers need to consider the Water Footprint of goods that have been produced in areas suffering from water scarcity.

**Scenario Goal 7 - Energy for all**

What was life like before clean energy and electricity? Alive now are the last people who have had to experience it first-hand. Compared to 15 years ago, today over 1 billion people can get more hours out of every day. And more than twice as many have been able to move from a biofuel-fired stove to an electric one, with tremendous benefits in terms of health, human well-being and comfort. The universal access to clean energy has fundamentally facilitated the fulfilment of the SDGs.

**Energy**

The global primary energy consumption was 13,1 Bn tonnes oil equivalent in 2015, an increase of 1% compared with previous year. The yearly average increase of primary energy consumption over the last decade is 1,9%. Albeit renewable energy constitutes the majority of new installed capacity for power generation and it produces 6,7% of consumed electricity, so far it only contributes with barely 3% of the primary energy consumed in 2015, see figure 14 (BP, 2016). As of 2014 over 3 Bn people lacked access to clean fuels and 1,1 Bn people lacked access to electricity (World Bank, 2017c). We are still a tremendous way from being able to ensure universal access to clean energy and electricity.
Energy subsidies can be defined and quantified in different ways. One recent estimate by Coady et al. (2015), which is including post-tax value and attempting to internalize negative impacts of the subsidies, puts their cumulative global value at $5.3 trillion in 2015. On one hand the subsidies help ensuring access to affordable energy to people today. On the other they both inhibit the public sector and market from financing of the necessary substitution and expansion of sustainable energy production, and causes severe negative social, ecological and economic impacts. Correcting the negative influence of subsidies would likely help putting us on the right track towards reaching this and several other SDGs.

There are however significant risks associated with removing the energy subsidies as it; will hit the poor the hardest and might lead to increasing use of biological resources for energy which will have a negative effect on biodiversity and land use change. One way to look at fossil energy is that without it, we would arguably see much greater negative impacts to ecosystems, in terms of biodiversity loss and land use change, around the world than we see today. However, according to the chief economist of the International Energy Agency, Fatih Birol, (in Sukhdev, 2012) out of “global energy subsidies for fossil fuels, only 8 percent of funds reaches the bottom 20 percent of income groups; over 80 percent of subsidies end up supporting those with medium and higher income levels” (Sukhdev, 2012). This is important to note, and by coupling the removal of subsidies with policies to relieve the situation for the bottom 20%, negative rebound effects could be mitigated while at the same time significantly reducing CO₂ emissions.
**Scenario Goal 8 - Economy for all**

Putting an end to poverty and hunger as well as the universal availability of resources for basic needs, has created a boom of new micro-, small- and medium-sized enterprises. Our joint effort of policy and regulatory coherence, towards the future we wanted 15 year ago, has shifted all actors of the markets of the world to sustainable production and consumption, decoupling the enrichment of humanity from environmental impoverishment. Human trafficking and modern slavery as well as child and forced labour is now history.

Once completing a desired education everyone can find meaningful employment and make an equitable livelihood regardless of age, gender and disability.

**Economy**

According to the World Bank and IMF the global economy grew by 2.7-3.4% compared in 2015, reaching a cumulative GDP of 108.2 trillion in 2015, measured in PPP constant 2011 international $ (World bank, 2017a; 2017b; IMF, 2017). Following the current quantitative trend of economic growth the global economy is projected to have increased by 63% until 2030 (OECD, 2017). Similar to the population growth, the economy will increase in a geographically uneven manner. The highest rates of economic growth are projected to occur in Africa and Asia.

Economic growth comes with increases in productivity; this increase can be utilized in three main ways: increased salaries, reduced working hours or increased dividend on capital investments. Since humanity is limited by the amount of available resources, the most sustainable way forward for maximizing the development of human well-being would arguably be to decrease working hours over time.

**Scenario Goal 9 - Built environment**

If we're all on the same slowly sinking ship, isn’t it wisest to supply everyone the best available tools to repair it? Looking back it’s lucky that we realized it, and it’s only logical to ask why it took so long. The transfer of sustainable technology has finally reached all corners of the globe, and the resilient infrastructure we have built has facilitated the great leap forward for humanity we see today. Without the universal access and utilization of the Internet and other communications technology, information sharing and coordination of efforts would not have been possible, and imagine not achieving the fantastic results of development we see today.

**Scenario Goal 11 - Sustainable settlements**

Thanks to the end of poverty and hunger as well as universal access to education and policy that promotes equality, all humans finally have a home worthy of its name. Beyond this, everyone from urban or rural inhabitants has access to sustainable transportation to take them where they need to go, regardless of personal and economic ability. Not only is humanity’s impact on the environment lower, but we are also more much more resilient as a society against the impacts of any disaster that might occur.
Cities, Settlements and Infrastructure

By 2030 all citizens should have a safe, sustainable and resilient home, transportation and communication. It’s difficult to find data good data on this at the global level, but in terms of housing however looking back to SDG 6 the data on access to adequate sanitation should be usable as a reasonable proxy. According to this data 1,8 to 2,5 Bn people lack this infrastructure (UNWWAP, 2015). This suggests that 55%-77% more homes need to be built by 2030 compared to what exists today, on order to meet this goal for the projected 8,5 Bn people living then. This is discussed further under Climate Change.

In 2015, 44% of the global population had access to the Internet, this is very unevenly distributed and it is less than 13% of the population in the 48 least developed countries (World Bank, 2017c). In order to achieve SDG 1-12, infrastructure for personal, goods and information transport needs to reach everyone. Furthermore, without this infrastructure it won’t be possible to collect the data necessary to know whether we have fulfilled the SDGs or not.

Scenario Goal 10 - Reduce inequality

Looking back at the second half of the 20:th century it was impressive to see the inequalities between geographical regions shrink and the gap disappear. Now after 15 years of large efforts, we can finally rejoice of the fact that inequalities within countries are decreasing. This is not only true in economic terms but also when looking at the inclusion social and political spheres. Without the regulatory effect of the strongly opposed progressive financial and social protection policies, which premiered equality, the fantastic improvements we see today would not have been possible.

Inequality

To reduce national inequality, the income of the bottom 40% of the economy has to grow faster than that of the average income (World Bank. 2017c). Since 2011 there are currently 193 member states of the UN, but only 83 has available data for equality (UN, 2017; World Bank, 2017c). Therefore it’s uncertain to draw conclusions about the overall trend. However out of the 83 countries, 49 showed decreased income inequality while it was increasing in the other 34. In 19 countries the income actually decreased for the bottom 40% (World Bank. 2017c).

UNDP (2016) writes that at the same time inequalities within countries have remained or even increased, the economic inequalities between countries have decreased rapidly over the last decades. Data on GDP and population are more certain and by combining these with the Gini coefficients, Gapminder (2017) has made a tool to illustrate this (figure 15-16). As mentioned above there is limited data available on equality and it should be noted that these illustrations are approximations.
Figure 15. Number of people by income in $ per day in 1975, each colored field represents a country. Y-axis indicating the updated extreme poverty line at 1,9$/day at PPP 2011 as set by the World Bank (World Bank, 2016). In 1975, 2,04 Bn or 50,7% lived below and 1,99 Bn or 49,3% lived on above 1,9$ per day. (Based on free material from GAPMINDER.ORG, 2017, CC-BY LICENSE)

Figure 16. Number of people by income in $ per day in 2015, each colored field represents a country. Y-axis indicating the updated extreme poverty line at 1,9$/day at PPP 2011 as set by the World Bank (World Bank, 2016). In 2015, 830 M or 11,4% lived below and 6,47 Bn or 88,6% lived on above 1,9$ per day. (Based on free material from GAPMINDER.ORG, 2017, CC-BY LICENSE)
Scenario Goal 12 - sustainable consumption and production

It’s 2030, after 50 years the world overshoot day has finally been replaced by undershoot day. The awareness of, and demand for action towards, sustainable development of individuals, as well as private and public sector has now put humanity back within Earth’s carrying capacity. The linear “Take-Make-Dispose-economy” is extinct and instead the circular “Cradle-to-Cradle-economy” thrives in its place. Reincarnation has become reality, if only for physical products.

Sustainable consumption and production

When strictly studying national territorial statistics of resource use, emissions and GDP, it can be seen that the development of these parameters can be decoupled from each other. However, when looking at the global scale from 1970 to 2015, it can be seen that material extraction and GDP are correlated. During the recent time period from the financial crisis of 2008 until 2015, statistics show a recoupling rather than a decoupling of the two (Figure 17). However, since energy systems can depend on fuels with very different emissions; a study by Schlömer et al. 2014 shows that electricity produced by Coal and Natural gas has a median lifecycle emission of 820 and 490 gCO$_2$eq/kWh respectively, while for renewables such as solar, hydro and wind power the emissions are 45, 24 and 12 gCO$_2$eq/kWh. This shows that moving to renewable energy is a key factor to making the economy more sustainable, together with equally important efforts towards increasing energy efficiency and reducing energy consumption.

Also for resource use, the activities that make up the economy vary in the resource intensity of practices. Renewable natural resources such as forests, fish, soil and water will need to be used in more sustainable ways to reach the targets. When it comes to metals, minerals and other fossil natural resources; the key is to work towards closing the material loops and creating a circular economy, so that new products can be made from recycled rather than virgin material. This minimizes waste flows and maximized the utilization of embodied energy, which is energy used in refining and producing the material or product (Greadel and Allenby, 2010).

The relative relationship between magnitude of environmental impact and economic growth thus depends on what type of activity that is growing. The fossil fuel industry is not sustainable as it releases carbon into the air and changes the climate. The subsidies that continue to make fossil fuel production and consumption a large part of the economy is one main factor that makes economic growth problematic. Furthermore, the take-make-dispose nature of the current system of production and consumption leads to excessive material extraction. Absolute decoupling GDP growth from material and energy use is not possible at the global level (Ward et al, 2016). In today’s globalised world, products come with significant hidden impacts, which are more often than not felt outside the national boarders of the country in which they are consumed, even if territorial decoupling is achieved (Greadel and Allenby, 2010). According to ecological economics there comes a point where the marginal disutility exceeds the marginal utility of continued economic growth, what is important to emphasise however is that “Limits to growth do not necessarily imply limits to development.” (Daly and Farley, 2011).
Figure 17. The global material extraction in Billion tonnes and GDP in trillion US$ in 2005 prices from 1970 to 2015. Materials include biomass, fossil fuels, metal ores and non-metallic minerals. (UNEP, 2017 creative commons)

Today consumers do not have access to all relevant information to allow them to make informed decisions about which product alternative is more sustainable. Since sustainability is multifactorial and to some extent normative, it’s difficult to determine what information is needed and how to prioritize between different negative impacts. To avoid the shifting of burdens, a life cycle perspective of impacts should be applied, and in order to ensure covering aspects of the SDGs at a general level it would be preferable if greenhouse gas emissions as well as land and water use were covered in product labelling.

Another big problem is that for most products, their price doesn’t reflect their social and ecological impacts. This means that there are externalities, which will have to be paid by someone at some point in time. The reasons for externalities are several; foremost it’s practically impossible to internalize all costs and benefits, furthermore improper regulations and harmful subsidies add to the problem (Daly and Farley, 2011).

Scenario Goal 13 - combat climate change
Climate change now has the highest priority for the decision making of society and politics. It has forced us to plan and build better, safer and more resilient settlements for everyone. Severe and frequent weather events finally forced/nudged us to linking arms and creating a joint global effort for the knowledge and financing of producing and realising a forceful path forward towards limiting the negative impact of climate change. The monumental task of expanding production for the universal access to sustainable electricity, combined with replacing the existing production with renewable sources and improving efficiency has created millions of jobs, and boosted human well-being in general.
Climate change

The cumulative historic CO$_2$ emissions between 1870-2015 are estimated to be 2035 Gt CO$_2$ with an uncertainty of ±10%. Out of these emissions ¾ are from fossil fuels and ¼ from changes in land use (Quéré et al, 2015). Over the years 2013-2015 the yearly global carbon emissions have stabilized at just below 40 Gt CO$_2$ (Jackson et al., 2015). In order to stand an above 66% chance of staying under 2°C warming as set by the Paris agreement (UNFCCC, 2015), we have to limit our cumulative remaining total budget for CO$_2$ emissions from 1870 to 2900 Gt CO$_2$, or just 2250 Gt CO$_2$ if aiming to limit warming at 1.5°C (Figure 18) (IPCC, 2014). The latter being required to ensure that we don’t transgress an environmental tipping point where we are likely to loose coral reefs in the future as an example (Figure 19) (Schellnhuber, Rahmstorf and Winkelmann, 2016).

During this period, 1870-2015, we have built almost the entire physical infrastructure standing today. In order to meet the aims of all SDGs going forward from 2030 as a base level for all human development, it can be estimated that, as mentioned for SGD 6 and 11, we will have to double our current amount of infrastructure for sanitation and housing based on data from UNWWAP, (2015). It can be seen in data from the World Bank (2017c) that large increases in infrastructure for personal, goods and information transport as well as energy are also needed. Keeping in mind that there is then only 215-865 Gt CO$_2$ left in our carbon budget after 2015 in order to meet SDG 13 and stay within acceptable risk. This means that we have very limited time to act, considering that we need to radically expand and improve infrastructure globally in order to meet the SGS concerning food, water, health, housing, transport, communication and energy.

Figure 18. Probability of exceeding a global warming of 1.5°C and 2°C respectively at different magnitudes of cumulative CO$_2$ emissions after 2011. Reprinted by permission from Macmillan Publishers Ltd: [Nature Climate Change] (Schellnhuber, Rahmstorf and Winkelmann), copyright (2016) Licence number: 4110301445885
Figure 19. Temperature anomaly in °C over the last 22 000 years with a set of climatic tipping elements as well as their temperature thresholds for destabilization. Abbreviations are: West Antarctic Ice Sheet, Thermohaline Circulation, El Niño-Southern Oscillation and East Antarctic Ice Sheet. Reprinted by permission from Macmillan Publishers Ltd: [Nature Climate Change] (Schellnhuber, Rahmstorf and Winkelmann), copyright (2016) Licence number: 4110301445885

A recent study by Rockström et al. (2017), presents a transitional roadmap for fulfilling the Paris agreement and thus SDG 13. It builds on the premises that global CO₂ emissions peak within this decade, and that we manage to halve the global CO₂ emissions every decade that follow, by globally managing carbon sources and sinks; human as well as natural ones (Figure 20). Albeit plausible and encouraging, what they fail to address is that primary energy consumption is following a 10-year trend of 1.9% yearly increase (BP, 2016) and will most likely have to increase when supplying electricity to 2.2 Bn and clean fuels to 4.2 Bn more people before 2030 (World Bank, 2017c; UNDESA/PD, 2015a). Without radical improvements of energy efficiency, this yearly increase in primary energy consumption would have to be 4-5% over the 15 years in order to meet the targets set for a global population of 8.5 Billion, compared with the current 12% yearly growth rate of renewables.
Figure 20. *(Top)* A deep decarbonization scenario scientifically consistent with the Paris Agreement (3) and its associated carbon fluxes as computed with a simple carbon cycle and climate model (13). The “carbon law” scenario of halving emissions every decade is marginally more ambitious than the scenario presented. Meeting the Paris Agreement goals will require bending the global curve of CO2 emissions by 2020 and reaching net-zero emissions by 2050. It furthermore depends on rising anthropogenic carbon sinks, from bioenergy carbon capture and storage (BECCS) engineering (yellow) and land use (orange), as well as sustained natural sinks, to stabilize global temperatures. This scenario is broadly consistent with a 75% probability of limiting warming to below 2°C; a median temperature increase of 1.5°C by 2100; estimated peak median temperature increase of 1.7°C; a 50% probability of limiting warming to below 1.5°C by 2100; and CO2 concentrations of 380 ppm in 2100. *(Bottom left)* Nonlinear renewable energy expansion trajectories based on 2005–2015 global trends (13). Keeping the historical doubling times of around 5.5 years constant in the next three decades would yield full decarbonisation (blue area) in the entire energy sector by ~2040, with coal use ending around 2030–2035 and oil use, 2040–2045. Calculations, based on (5), are detailed in SM. *(Bottom right)* Decadal staircase following a global carbon law of halving emissions every decade, a complementary fall in land-use emissions, plus ramping up CO2 removal technologies.”. From [Rockström et al, 2017]. Reprinted with permission from AAAS. Licence number: 4110221123782

The magnitude of emissions that is attributed to a certain entity, such as per capita, a city, region or nation, is strongly dependent on the delimitations of accounting (Kramers et al, 2013). Sweden’s territorial emissions as an example were 53.7 Million metric tonnes (t) of CO2 in 2015 according to official statistics (SEPA, 2016a). Since the population is approximately 10 million, the per capita emissions would be 5.4 t per capita on a territorial basis, which is the mype of measure that is reported to the IPCC. However, if we instead consider the emissions caused by consumption, the per capita emissions are 11 t per capita, 4 t of which is attributed to emissions from the public sector (SEPA, 2016b). This means that in order for an
ambitious citizen to reach sustainable yearly emission levels of 1 to 2 t CO₂, his or her consumption related emissions would have to result in -2 t to -3 t CO₂ per year, in order to compensate for public sector emissions.

**Scenario Goal 14 and Goal 15 - Sustain the environment**

Over one tenth of coastal and aquatic ecosystems are now protected and the rest of them as well as terrestrial ecosystems have been restored and managed in a sustainable way. The world is finally neutral in terms of environmental degradation. These efforts have resulted in the total prevention of species extinctions and the levels of biodiversity are the same today as they were ten years ago. We can at last ensure the present and future delivery of all the natural resources and ecosystem services needed for human development and well-being.

**Environment**

The environmental problems induced by human activity are numerous, and arguably the two most topical are climate change and biodiversity loss. According to Wright and Boorse (2014) socioeconomic development affects the magnitude of environmental impact in three distinct ways (Table 5 and Figure 21). Climate change and biodiversity loss are both type C, but in the current paradigm we are treating them as type B, that if we all get richer, we can afford to solve the problems. However, so far there is no evidence of this fact at at the global level (see figure 17, 19 and 22). In fact we are in the middle of the sixth mass extinction and our planets temperature rises year after year (Ceballos et al. 2015; NASA/GISS, 2016). It’s even suggested that we have entered a new geological epoch, the Anthropocene, even if it’s yet to receive full scientific acceptance and be included in the International Chronostratigraphic Chart (Rockström, Klum and Miller, 2015; ICS, 2017).

The three categories are based on observed global patterns of development of environmental problems as per capita income increases (Table 5 and Fig. 21). Type A, such as problems with waterborne pathogens, reduces in frequency as economic development occurs. Type B, such as emissions of SO₂ and CO first increase with economic activity, until a point when cleaner practices can be afforded and regulation is put in place following which impacts decrease. Finally type C, such as resource input, waste output, GHG emissions and biodiversity loss, which have increased alongside economic development. All three types can be mitigated by the implementation of policy, laws and regulation, and don’t automatically solve themselves, as we get richer (Wright and Boorse, 2014).

For type C these solutions seem to be especially problematic to put in place, as all economic activity requires resource input (material and energy) and creates waste output, albeit at a significantly varying quantity. Even though shifting to renewables can significantly reduce CO₂ emissions, there is currently no way of producing energy without lifecycle emissions of greenhouse gases. Furthermore, the resource input and waste output leads to biodiversity loss through the conversion of ecosystems into plantations as well as the extraction of mineral and ore. With a continued strive for economic growth in combination with global trade; it’s unlikely that all these four examples of type C environmental problems are mitigated before most countries have implemented the necessary regulations.
Table 5. Three different types of environmental problems with examples and their solution (Wright and Boorse, 2014).

<table>
<thead>
<tr>
<th>Type</th>
<th>Impact characteristics</th>
<th>Examples</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>decreases alongside economic development</td>
<td>Waterborne pathogens</td>
<td>Developing stable institutions for the implementation and enforcement of public policy, laws and regulation</td>
</tr>
<tr>
<td>B</td>
<td>increases before reaching a tipping point after which it decreases</td>
<td>Emissions of SO₂ and CO</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>increases alongside economic development</td>
<td>Resource input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste output</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GHG emissions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Biodiversity loss</td>
<td></td>
</tr>
</tbody>
</table>

Figure 21. The magnitudes of environmental problems respond in different ways to economic development, they either; A - decrease, B - increase before decreasing or C - increase. (Wright and Boorse, 2014)

One way of calculating the surface area requirements of humanity to meet its demand for resources is Ecological Footprint and is measured in Global Hectares (gha). This unit it used since depending on land properties, land use and technology; the output from one hectare of land differs across the world. In order to correct for this and get a universal measurement, Global Hectares are determined by multiplying the physical area with both a local yield factor and equivalence factor. Global Hectares are also used to determine the planets Biocapacity to deliver the goods and services humanity needs to live and develop (Global Footprint Network, 2017a). In order to ensure that humanity has enough resources in the long term, it needs to stay within the biocapacity of the planet to deliver the goods and services we need (see Fig 22).
Ecological Footprint covers both biologically productive land and water areas and is divided into different land categories (Figure 22). The most recent data available is from 2013 and then the Global Ecological Footprint was 20.6 Bn gha while the biocapacity was only 12.2 Bn gha. The category named carbon is determined by the amount of Global Hectares that would be needed to sequester the emitted carbon (Global Footprint Network, 2017a). Since 1969 the Ecological Footprint of humanity has exceeded the biocapacity at the global level, causing an ecological debt to build up.

Looking at the 2013 global Ecological Footprint (Fig 22), shifting to a fossil free energy system would place humanity within the global available biocapacity. Along with creating large magnitude Anthropogenic carbon sinks (see Fig 20), ending fossil fuel use is necessary for reaching SDG 13. However, when it comes to biodiversity loss of the human induced sixth mass extinction, this is according to Wright and Boorse (2014) a result of habitat destruction, invasive species, pollution (e.g. nutrients, pathogens, novel entities), human population and overexploitation, and not climate change. While climate change exacerbates some of these factors, going fossil free alone still leaves these underlying factors in play.

Furthermore, attempts to replace fossil fuels and petrochemical products at global scale with bio-based substitutes will increase the ecological footprint and negatively impact biodiversity. Even without further CO₂ emissions, land use for sequestration of CO₂ still needed at a significant spatial and temporal scale to reduce atmospheric CO₂ levels because of its atmospheric residence time of beyond 1000 years (Azar, 2013).

Scenario Goal 16 - Sustainable societies and institutions
All new-borns are registered as citizens and welcomed into peaceful and inclusive nations. Children are safe from all types of exploitation and regardless of age or nationality you can feel safe, as rates of violence are the lowest in history. Legislation and agreements ensure access to non-discriminatory justice,
information and other fundamental freedoms. Everywhere this is delivered through trustworthy and accountable institutions. All citizens have equal right to participate in societal decision-making. The large institutional capacity and strong cooperation in and between countries has made it possible to fend our societies from organized crime and terrorism. Since all humans have a legal identity, we have complete data collection for the state of development of humanity and thanks to this we can be certain that all of the SDGs we set 15 years ago have been reached.

**Scenario Goal 17 - Implementation**

Looking back to the beginning of the implementation of the 2030 Agenda, there were many question marks. How would it affect our economies and societies? Who should pay whom and how much? How can we all reach agreement? Luckily we acted on the message from former UN Secretary General Ban Ki-moon “There is no plan B, because there is no planet B” (BBC, 2014). GDP was taken off the pedestal as measurement of development and since then there has been a tremendous mobilization of financial, technological and other resources, acknowledging and relieving past and accumulating debt.

The rigid institutions we have built have enabled universal monitoring of all relevant parameters of society, environment and economy. This is facilitating global policy coherence towards a truly sustainable development. Together with our finally equitable international system of free trade we now have a fair and resilient world, with the capacity to easily cope with any chock or disaster that might occur.

**Institutions, implementation and measuring development**

Even though the SDGs have been adopted by member states at the UN level, they are still far away having high priority in national politics. In order to ensure the consideration of future generations and other aspects of sustainability from table 1, we somehow have to implement institutional and democratic measures, which counteract humanities inherent property of time preference. One existing example of this is giving areas of nature the equivalent of personal rights under the law, which has so far been applied in Ecuador, New Zealand and India (Time, 2017).

It’s only possible to manage development and sustainability towards goal fulfilment if the necessary parameters are measured and monitored. Focus has to be on goal fulfilment and not single cumulative parameters such as GDP. One example of an initiative to create a combined measurement of societal development that omits the GDP is the Social Progress Index (SPI), developed by the Social Progress Imperative. It is a single index, however, unlike GDP, SPI is a measurement of where the state is relative to set targets. The SPI covers 52 indicators, spread over the three dimensions; basic human needs, foundations of wellbeing and finally opportunity (Social Progress Imperative, 2015). It covers both social and ecological aspects of sustainable development.

In 2015, Deloitte made a report by on behalf of the Social Progress Imperative, looking at the development of the SPI until 2030. In 2015 the global average SPI was 61/100, based on GDP forecasts of 3% annual growth, the SPI in 2030 would only have increased to 62,4/100. Doubling the growth rate would still only result in a SPI of 63,8/100 (Deloitte, 2015). This is because of the nonlinear relationship
between SPI and GDP per capita, i.e. the rate of social progress diminishes, as a
country gets richer. There is a significant difference between countries in how
effective they are at delivering social progress relative to their GDP. This strongly
suggests that we cannot rely on economic growth alone to deliver development,
and that learning from the best performers could speed up development.

Kubiszewski et al. published a study in 2013 where they compared another welfare
indicator called genuine progress indicator, GPI, to GDP over the period 1950 to
2003 for 17 countries covering roughly 50% of the human population and 60% of
global GDP. This study indicates that in middle and high-income countries, life
satisfaction has leveled off since 1975, while GDP has continued to increase
steadily. The authors write that there is a threshold for per capita GDP beyond
where quality of life levels off or decreases instead of increases. According to
Costanza et al. (2009) a main reason for the breakout of World War 2 was
economic instability and the lack of economic growth. To prevent future recurrence
of the same situation allied leaders agreed in 1944 to focus efforts to promote
economic growth and trade (IBIBLIO/AIS 1946 in Costanza et al. 2009). Economic
growth has been generally accepted because, albeit not distributing development
equally (D_b) it has improved the lives of most (D_a).

This has made increases in GDP highly prioritized in politics, since in society its
been seen as a way of making progress possible without it occurring at the expense
of someone else. However, looking back to the sections covering water,
consumption, climate change and environment (fig 17-22) it’s arguably evident
that the (material) affluence is starting to not only occur at the expense of future
generations but also on the current ones. This is likely to hinder the fulfillment of
the SDGs, and arguably it is time to start optimizing resource allocation for
optimum quality of life.

In table 6 below the SDGs have been plotted, based on the SDGs targets in appendix
1, against the four principles of sustainable development from table 1. This
indicates that some goals are more focused on the development dimension while
others include both sustainability and development. However, since the SDGs are
all interlinked and codependent, arguably it’s not possible to fulfill and maintain
some, without fulfilling all of them, as sustainable development requires all four
factors (S_a, S_b, D_a and D_b) to be fulfilled. (To facilitate reading table 1 is reproduced
below). This highlights the need to be aware of and consider all SDGs when
developing and implementing solutions for each of them.

| Table 1. Description of the four basic principles of the two dimensions of sustainability and
development (Adopted from Gudmundsson and Höjer, 1996 with complementation from Höjer,
1999 see D_b) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td>Development</td>
</tr>
<tr>
<td>S_a</td>
<td>To safeguard a natural resource and biodiversity base within critical loads, levels and usage patterns.</td>
</tr>
<tr>
<td>S_b</td>
<td>To maintain the option value of a productive capital base for future generations. Including natural, human and man-made capital</td>
</tr>
</tbody>
</table>

30
Table 6. List of the SDGs and their contribution to the dimensions of sustainability and development as presented in table 1 (goals taken from UN, 2015; dimensions from Gudmundsson and Höjer, 1996 with complementation from Høyer, 1999 see Db).

<table>
<thead>
<tr>
<th>Goal</th>
<th>Name</th>
<th>Sa</th>
<th>Sb</th>
<th>Da</th>
<th>Db</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>End poverty in all its forms everywhere</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Ensure healthy lives &amp; promote well-being for all at all ages</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Achieve gender equality and empower all women and girls</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Ensure availability and sustainable management of water and sanitation for all</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Ensure access to affordable, reliable, sustainable and modern energy for all</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Reduce inequality within and among countries</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>Make cities and human settlements inclusive, safe, resilient and sustainable</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Ensure sustainable consumption and production patterns</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Take urgent action to combat climate change and its impacts</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Discussion

The type of economic system we have had throughout the industrial, green and medical revolution has contributed to immense progress and development of quality of life (Dₐ). However it has led to the continuous consumption and degradation of natural capital on the global scale (Sₐ + Sₜ), and the development has been unevenly distributed (Dₜ). The individual SDGs address different combinations of the aspects of sustainable development, and together they cover them all (Table 6). Fulfilling all of the SDGs therefore has a large potential of placing humanity on track and in line with sustainable development. The goals and targets of the 2030 Agenda are very ambitious as well as interlinked; I therefore argue that it’s not possible to completely fulfil and maintain over time some of them without fulfilling them all.

The reason why I make this statement is that the aim of the SDGs is to deliver development to all and to universally manage natural resources sustainably. And over a longer time perspective, doing one is not possible without the other. To exemplify, looking at the positive trends of development of poverty (SDG 1), undernourishment (SDG 2) or education (SDG 4), one could think that they will reach fulfilment in some decade with business as usual. However, these three SDGs are both closely interlinked and connected to peoples’ livelihoods (SDG 8) as well as institutions (SDG 16). Because of cyclical, structural and frictional unemployment, a market economy cannot deliver zero unemployment. Even with full employment a large fraction of the population is not working (Reiff, 2015). This means that without the establishment of stable institutions and a social security system, that takes care of young, elders and unemployed, neither of these SDGs will be fulfilled completely.

As shown in the section sustainable consumption and production, at the global level, increases in GDP inevitably leads to increases in material and energy use, which in turn lead to increased environmental impact. This causes a fundamental predicament, and out of the 169 targets of the SDGs; only half of one target, namely 8.1, arguably makes the fulfilment of the 2030 Agenda very improbable if not impossible. It states “Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries” (UN, 2015). Now the second half of this sentence is absolutely necessary for countries to afford social security, education, healthcare and so on. However, as stated by Daly and Farley (2011) since earth is a finite system ultimately limited by incoming radiant energy from the sun, infinite growth is not possible. The question is when an optimal global macroeconomic scale is reached and marginal disutility exceeds the marginal utility of continued economic growth. At which point the effort has to shift to optimizing resource allocation for optimum quality of life in order to reach the SDGs.

GDP is a measurement of total monetized throughput of the market per unit of time within geographic borders (Costanza et al, 2009; Daly and Farley, 2011). The “purpose of measuring GDP is to answer questions such as “how fast is the economy growing,” “what is the pattern of spending on goods and services,” “what per cent of the increase in production is due to inflation,” and “how much of the
income produced is being used for consumption as opposed to investment or savings” (McCulla and Smith 2007 in Costanza et al, 2009). Already “In 1934, Simon Kuznets, the chief architect of the United States national accounting system, cautioned against equating GDP growth with economic or social well-being.” (Costanza et al, 2009). Still GDP has become equated to progress and development, and widely used as one of the top indicators in public and private sectors (Costanza et al, 2009; Daly and Farley, 2011).

When making this thesis it has become evident that for many countries and therefore also at the global level, there is an extensive lack of data for a large proportion of important development indicators. GDP seems to be one of the indicators with the highest coverage of data over available time-series. This might be a reason for its popularity and wide use, not because of how appropriate it is but rather because of availability and as stated by Costanza et al. (2009) “the simplicity of the GDP makes it prone to misuse”. When comparing GDP to the four constituents of sustainable development (Table 1), it only covers monetized man-made capital (Sb) and quality of life to the extent of which consumption contributes (Da). This is definitely not surprising since it’s not the purpose of the GDP measurement. What is problematic however is that, firstly the development of the GDP is arguably the most highly prioritized societal indicator in politics and society, and secondly that economic growth i.e. increased GDP is deemed necessary for financing development.

I argue that so long as we use GDP growth as the main measurement and means of payment for development, we will not have sustainable development, as this places development in conflict with sustainability (Figure 19). The system structure of today leads to causality where development towards SDG 1-12 + 16-17, financed by GDP growth, occurs at the expense of development for SDG 6 (Water) and 13-15. We need to reassert that development means increased quality of all aspects of life, giving equal importance to the fulfilment of each SDG. In terms of progress ‘more of anything’ can’t be valued equal or over ‘more of what we actually need’, both today and in the future. The market of the economy only ensures access to goods and services; it has no way of ensuring that a minimum for human need is actually delivered in an equitable way.

Figure 19. We need to transform our socio-economic system from a structure where development occurs at the expense of sustainability, to a structure where development occurs within sustainable boundaries (Figure adopted from Gudmundsson and Höjer, 1996).
Moving away from the prioritization of GDP probably seems unrealistic, but I would argue that is equally unrealistic that the SDGs will be fulfilled by relative business as usual. Looking back to the UN Universal Declaration of Human Rights from (1948), the UN Convention of the Rights of the Child (1989) and the UN Millennium Development Goals (2000), still neither of them has been universally fulfilled, but would be if the SDGs were met. Albeit perhaps not in the UN, but according to Costanza et al. (2009) both the IMF, World Bank and nations have had GDP as their primary measure of progress and means to prioritize development funding. The current paradigm still fails to deliver a minimum for human need, though we have and have had the resources to do so.

Humanity has made great progress and we are taking on bolder goals, but societal focus needs to shift towards target fulfilment. Universally meeting the SDGs is only possible if those targets are prioritized higher, both societally and politically, than the size and growth rate of our economies. For the SDGs it is stated that it is the sustainable economy that should grow and replace the unsustainable economy, but the measurement is still the ordinary economy, which is dependent of fossil fuels and thus not likely to deliver a sustainable society. A major challenge for this transformative change is that many societal services like pensions are financed through dividend, taxes in general are collected from the throughput of the economy, as well as income tax and tax on capital, and thus to some degree quantitatively dependent on the size of the GDP. Furthermore, since productivity increases we also need growth to maintain unemployment within levels that are acceptable in society.

During this period of transformation sustainable development, economic growth will likely occur, while spending will through policy have to be significantly steered towards paying for the solutions and products with minimal impact. Much of what we have today in terms of professions in society are likely to be subject replacement to automation and artificial intelligence (Paul-Choudhury, 2017). In order to reach sustainable development I argue that we need to embrace the benefits of technological development and redesign our society to function in this new reality. I also encourage development of per capita budgets of for example GHG emissions as well as water and ecological footprint as targets that we can all works towards as individuals. Product labelling is then also important, even tough consumer choice is a small piece of the puzzle if the rules and subsidies are not changed on the whole.

Looking at natural resource use it seems in terms of food and diets we produce enough for human need, considering the different proportions within malnutrition and keeping in mind the significant fraction of food that goes to waste. Without sustainable management of natural resources we will struggle to guarantee food security. Without climate change mitigation, this is also strongly threatened. Sustainable consumption and production is fundamentally about being economical with resources, but it’s important to reaffirm that this doesn’t necessarily mean a reduction of life quality.

Globally humanity needs to make more with less, i.e. increase productivity and efficiency. However, depending on which income group a country is in; low income,
lower middle, upper middle or high income; it seems preferable from a sustainable development point of view that this increase is utilized in different ways. That there be a gradient from increasing purchase power and growing the economy to pay for health care and education, to working fewer hours where welfare is developed; since increases in purchase power tend to increase environmental pressure. A large proportion needs further development (Da and Db) to meet the SDGs, and other countries need to focus more on reducing impacts (Sa and Sb) while maintaining (Db).

We have to rethink our consumption behaviour, and on the production side design products choosing materials based on material recyclability and material hygiene in order to minimize waste flows and utilize embodied energy. Material products should be designed in a way that as close to 100% of materials can be reincarnated into another product. Ownership also contributes to inefficient allocation and utilization of resources, and examples of sharing economy shows that it enables us to derive additional utility from existing products. These are all important factors if we as stated in Gudmundsson and Höjer, 1996, are to optimize resource allocation for optimum quality of life.

The public sector also has a large responsibility to audit and shift its operation and activity to become sustainable, so that citizenship doesn’t automatically put individuals over per capita impact budgets. No country fulfils the requirements of the SDGs specifically or sustainable development generally. Data of SPI and other indicators show that some countries prioritise better than others and are thus more economical when it comes to delivering quality of life. In order to reach the SDGs and thus deliver improved quality of life shared universally while sustainably managing the planet, strong policies which disrupt business as usual are required. This could push us onto a pathway of rapid transformation, which in turn enables new business models that have the possibility to allow businesses to get on track with sustainable development.

The 2030 Agenda suggests that transformation is needed, and the results of this thesis agree with that. In order to reach all SDGs, the system structure has to change so that there is less negative causality between individual goals. However, when it comes to the political implementation of the SDGs, this process is attempted in linear and incremental steps as any other policy. As concluded in the methods section, the prevailing system structure is currently preventing the necessary changes. But is it then possible to apply transformative change to the system structure incrementally; to implement the SDGs as any other policy?

Today the successfulness of politics is mainly determined based on how well it manages facilitate the growth of the market; which can produce whatever is profitable so long as the throughput is consequently higher and higher each year. I argue that we need to reaffirm that the economy is a tool, that can be utilized for delivering what we as a global society need in order to solve the grand challenges we face. When evaluating policy we should include a wider range of quality of life measurements and thus also goals for development that is being proposed and implemented. These should in their scope cover ecological, social and economic aspects of issues.
To achieve sustainable development, there is a need to create long-term policy playing rules for the market, which makes it possible for all societal sectors to contribute to the future we need in order to ensure the long-term stability of humanity. The free market and its built in mechanisms are proven to help facilitate delivering solution to occurring problems. However, it is never proactive and can’t deliver equality, because of this it is incapable of solving many of the SGD's underlying problems on its own. In applying bold policy instruments by todays standard, that for example strictly limits GHG emissions and virgin resource extraction, it would be possible to push the scale in favour of innovation and wide implementation of more sustainable technology and business models.

According to Sukhdev (2012) corporations today are still run on a model from 1920, where profits are internalized and costs externalized. This is facilitated by the fact that natural resources are not properly valued (Sukhdev, 2012). This is also true for social cost, and today market transactions produce, depending on sector, small to significant ecological and social external costs. Albeit, working to internalize costs would greatly improve the situation, the partial irreplaceability of natural capital, due to complexity and irreversibility (Holden, 2007), as well as the lack of perfect information (Daly and Farley, 2011) makes it practically impossible to perfectly internalize costs. Furthermore, the issue of ensuring a resource allocation that guarantees a minimum level for achieving the SDGs would still be present, and important to consider as raising market prices hits the poor first and hardest.

Corporation 1920 as Sukhdev (2012) calls the model, follows the mantra that “more is better” and that “it needs and feeds that other central mantra of today’s dominant economic model, GDP growth”. Corporation 1920 is defined by the strive towards market dominance through size and scale, by using aggressive lobbyism, financial leverage and extensive advertising. This gives them significant power over both the private and public sector, which restricts: small- and medium-sized companies growing, poor consumers from public alternatives to private goods and importantly new innovation (Sukhdev, 2012).

Stern (in Sukhdev 2012) writes that “most of our problems lie in combinations of market failures and irresponsible and short-term behaviour” and that we need to change the environment in terms of institutions, policies and prices in order for business to evolve. In order to achieve this change to the business environment a list of four enabling conditions are proposed. The first is to disclose externalities of business and products to investors and consumers to improve decision-making. Second is resource taxation in order to “tax 'bads' rather than 'goods'”, in order to steer development. Third is “to provide real information to consumers, rather than just sales pitches” by introducing accountable advertising. And fourth limiting leverage by improving monitoring and controlling of financial leveraging, as well as including limitations for “too-big-to-fail” companies that create “systemic risk and costs for society at large” (Sukhdev 2012).

To achieve wide implementation and compliance with these four enabling conditions, as well as others, legislation, regulation and policy have to change. As
Sukhdev (2012) writes this “will require redefining success at the level of both corporations and nations, and implementing an array of policies that align the goals of corporations and society”. I would argue that changing taxation, regulation, government investment, public procurement and as well as achieving transparency, measurement, and disclosure from market activities could only be achieved by shifting public and thus political prioritization.

Today much of the social and ecological costs of products are not declared to customers. The “fault” of unsustainability has its roots in individual behaviour, facilitated by market failures and time preference, which cumulatively reaches unsustainable magnitudes at the global level. But putting the responsibility on the individual to solve everything by changing behaviour solves nothing today. Since we first need a transformation of society and business in order to allow consumers to make the decision to buy sustainable goods and services that do not yet exist on the market.

I argue that we the humanity desperately need a transformation of our societies, if we are to stand a chance meeting all SDGs and thus delivering quality of life for everyone and maintaining it for future generations within the physical limitations of the planet. For this change to happen the society needs to shift focus from GDP and instead giving target-fulfilment of the SDGs highest priority. Since the SDGs cover all four factors (Sₐ S₆ Dₐ D₆) required to of sustainable development, fulfilling them would be a good way of putting us on the right track for the future.
5. Conclusion
In 2015, 193 member states of the UN adopted the 2030 Agenda, its 17 SDGs give a comprehensive aim of future development. The SDGs build on the Millennium development goals, which were active from 2000 to 2015. The SDGs are much more comprehensive than its predecessors and since they cover most aspects of human activity on earth, this makes them clearly interconnected and inseparable.

Sustainable development is defined as a two-dimensional framework in this thesis, based on work by Gudmundsson and Höjer (1996). The SDGs can be divided into two groups, one that relates more to human development and another that relates closer to sustainability in terms of resources. When analysing the state and trend of development of the SDGs, and comparing it to this framework, it becomes evident that under the current GDP growth paradigm, there is a conflict between development and sustainability oriented SDGs.

Under the current paradigm GDP growth is given the highest societal priority, this is justified as needed to create jobs and pay for development. While GPD growth is contributing to the progress towards reaching development oriented goals, SDG 1-12 + 16-17, it is moving the more sustainability oriented goals, SDG 13-15, further from the set targets. To maintain the first set of SDGs over time, the second set of SDGs need to be met. Alternative development measures such as Social Progress Index (SPI) indicates that the projected 3% GDP growth, or even 6%, won’t deliver the human development that the SDGs entail. Furthermore, data on the Genuine Progress Indicator (GPI) shows that GDP growth only contributes to human development to a certain threshold, and that in middle and high-income countries life satisfaction has levelled off since 1975.

It’s possible to have both sustainability and development that meets human needs, but society needs to rethink how it defines and measures development at all societal levels in all sectors. Most importantly, target fulfilment towards the well-being of humans and environment needs to be prioritized before the well-being and growth of the economy. The current resource intensive linear fossil economy needs to be replaced with a circular renewable driven economy, in order to mitigate climate change and reduce the negative impacts of material extraction. Furthermore, policy coherence should be ensured when implementing measures towards reaching the individual SDGs to avoid negative rebound effects.

Important topics to highlight are gender equality and while voting rights have been greatly improved over the last century. Rights and empowerment of women needs much work, in terms of poverty eradication, family planning and access to contraceptives, early marriages and education as well as and property and business ownership and choice of occupations. Economic inequality is another important topic for solving many of the SDGs, not only poverty, but also food, well-being, education as well as sustainable resource management. While income inequalities between counties are decreasing, the inequalities within countries are in fact increasing in a significant amount of chases. It is therefore of great importance to consider implementing mitigation policies for the poorest, when removing harmful subsidies and implementing policies that raise commodity prices.
Decisive policy that pushes the direction of development is needed in order to fulfil the SDGs; there is no room for business as usual within the remaining carbon budget. Policy instruments and legally binding regulation have to be implemented that reduces and bans unsustainable products and practices. The true impact of products needs to become visible to consumers and combined with incentives to make sustainable choices the path of least resistance. For this to be achieved at large scale; public and thus political priorities have to shift from GDP growth to focus on development and equitable distribution of human well-being as well as sustainable management and maintenance of natural capital and biodiversity.
6. References


WHO. (2016a). Global Health Observatory data repository [online] available at:
WHO. (2016b). Global Health Observatory data repository [online] available at:
http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG
http://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD

Appendix 1
Goal 1. End poverty in all its forms everywhere

1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day

1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions

1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable

1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance

1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions

1.b Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly
managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed

2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries

2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round

2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

Goal 3. Ensure healthy lives and promote well-being for all at all ages

3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents

3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing
countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all

3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

**Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all**

4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries

4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States
Goal 5. **Achieve gender equality and empower all women and girls**

5.1 End all forms of discrimination against all women and girls everywhere

5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation

5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation

5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate

5.5 Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences

5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws

5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women

5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

Goal 6. **Ensure availability and sustainable management of water and sanitation for all**

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.b Support and strengthen the participation of local communities in improving water and sanitation management

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

7.1 By 2030, ensure universal access to affordable, reliable and modern energy services

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

7.3 By 2030, double the global rate of improvement in energy efficiency

7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training
8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms.

8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.

8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products.

8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all.

8.a Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries.

8.b By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization.

**Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry’s share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States.

9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.
9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

Goal 10. Reduce inequality within and among countries

10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average

10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status

10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard

10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality

10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations

10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions

10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies

10.a Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements

10.b Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes

10.c By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries
11.4 Strengthen efforts to protect and safeguard the world’s cultural and natural heritage

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels

11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

**Goal 12. Ensure sustainable consumption and production patterns**

12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

12.2 By 2030, achieve the sustainable management and efficient use of natural resources

12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products

12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

**Goal 13. Take urgent action to combat climate change and its impacts**

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

13.2 Integrate climate change measures into national policies, strategies and planning

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

**Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development**

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

*Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.*
14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.16

14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.

14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.

14.b Provide access for small-scale artisanal fishers to marine resources and markets.

14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want.”

**Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**

15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

---

16 Taking into account ongoing World Trade Organization negotiations, the Doha Development Agenda and the Hong Kong ministerial mandate.
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

16.1 Significantly reduce all forms of violence and related death rates everywhere

16.2 End abuse, exploitation, trafficking and all forms of violence against and torture of children

16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all

16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime

16.5 Substantially reduce corruption and bribery in all their forms

16.6 Develop effective, accountable and transparent institutions at all levels

16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels

16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance

16.9 By 2030, provide legal identity for all, including birth registration
16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime

16.b Promote and enforce non-discriminatory laws and policies for sustainable development

**Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development**

**Finance**

17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection

17.2 Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries

17.3 Mobilize additional financial resources for developing countries from multiple sources

17.4 Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress

17.5 Adopt and implement investment promotion regimes for least developed countries

**Technology**

17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology
Capacity-building

17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation

Trade

17.10 Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda

17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries’ share of global exports by 2020

17.12 Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access

Systemic issues

Policy and institutional coherence

17.13 Enhance global macroeconomic stability, including through policy coordination and policy coherence

17.14 Enhance policy coherence for sustainable development

17.15 Respect each country’s policy space and leadership to establish and implement policies for poverty eradication and sustainable development

Multi-stakeholder partnerships

17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Data, monitoring and accountability

17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries