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“Pathway towards a steady state economy through degrowth in Germany & Austria and how to measure its progress”

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ABSTRACT

Over the past years countries worldwide experienced an increase of economic, social and environmental problems resulting from the incapability of the current economic growth system to avoid crises. That has to be replaced by a more resilient and sustainable one, which supports individual flourishing and satisfies social needs without further environmental destruction. But despite the physical limits to growth, the majority of national governments, international organizations and financial institutions still favor economic growth as solution of choice to increase overall welfare and social security for their citizens—at the expense of the environment.

Today, the method of choice to measure economic progress and its falsely associated welfare is done predominantly by calculating national Gross Domestic Products—despite all critics and widespread acknowledgement of its inappropriateness. In a post-growth society the future of GDP is irrelevant and therefore an alternative methodological approach is needed to perform a sound evaluation of progress towards such an alternative society. This thesis outlines an attempt of putting a conceptional framework—worked out by the economist Dan W. O'Neill and partly adjusted throughout this work—into practice and evaluating its feasibility. Furthermore, the current state of progress towards a steady state economy via degrowing the total size of the economy—acting within planetary boundaries—will be examined. For that purpose, the recent trends of fifteen different social and biophysical indicators are individually examined for both Germany and Austria.

The core results of this study demonstrate that from 2004 until 2013 both countries show a desirable progress regarding the majority of the suggested social indicators. These include among others the *unemployment rate*, *working hours*, and *satisfaction concerning national democracy*. In contrasts, indicators describing biophysical accounts show mainly undesirable trends within the decade of interest, like *direct material input rates*, the *ecological footprint vs. biocapacity ratio*, and the *Livestock Production Index*. A direct comparison between Germany and Austria reveals that Germany shows a desirable progress in nine out of the fifteen indicators. In contrast, five indicator trends are evaluated positively concerning Austria. Despite the more desirable overall progress in Germany, the pathway towards a steady state economy is comparatively longer than in Austria by looking at absolute numbers and will require more effort to achieve.

Additionally, this study reveals a close correlation between several indicator trends and the financial and economic crisis beginning in 2008. In particular, the flow indicators (*greenhouse gas emissions*, *direct material input*, and *primary energy consumption*) have been significantly impacted by the crisis. But also social ones, like the amount of *working hours*, illustrate a clear offset within their trends.

Throughout this study it is demonstrated that the current economic growth model is no sustainable option for the future of humanity anymore and how the events of the crisis helped to achieve first steps towards a successful transition. Thereto, alternative approaches as proposed by leading scientists of the field are discussed to illustrate that the idea of a steady state economy through degrowth initiatives is no utopian dream and can be achieved by an international and cooperative attempt of all stakeholders.

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LIST OF ABBREVIATIONS

ACT	Area for construction and transportation
AST	Area for settlement and transportation
AT	Austria
BAFA	Bundesamt für Wirtschaft und Ausfuhrkontrolle
BaFin	Bundesanstalt für Finanzdienstleistungsaufsicht
BAU	business as usual
BGH	Bundesgerichtshof
BMF	Bundesministerium für Finanzen
BMFJ	Bundesministerium für Familien und Jugend
BMFSFJ	Bundesministerium für Familie, Senioren, Frauen und Jugend
BMWi	Bundesministerium für Wirtschaft und Energie
BPB	Bundeszentrale für politische Bildung
BRD	Bundesrepublik Deutschland
CASSE	Center for the Advancement of the Steady State Economy
ECB	European Central Bank
ECSE	European Commission: Standard Eurobarometer
ESS	European Social Survey
EU-SILC	European Union Statistics on Income and Living Conditions
G-20	Group of Twenty
GER	Germany
GDP	Gross domestic product
GHG	Greenhouse gas(es)
GNI	Gross national income
GNP	Gross national product
G&A	Germany and Austria
h	hour(s)
HRE	Hypo Real Estate
IPCC	Intergovernmental Panel on Climate Change

ISEE	International Society for Ecological Economics
LPI	Livestock Production Index
OPEC	Organization of the Petroleum Exporting Countries
PdRÖ	Parlament der Republik Österreich
PPP	Purchasing power parity
SGB	Sozialgesetzbuch
SMDP	Severely materially deprived persons
SSE	Steady State Economy
SSS	Steady State Scorecard
t.o.e.	Tons of oil equivalent
TTIP	Transatlantic Trade and Investment Partnership
UN	United Nations
UNDP	United Nations Development Programme
WKO	Wirtschaftskammer Österreich
y	year

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Thanks. Danke. Merci.

1 INTRODUCTION

1.1 MOTIVATION

Currently, the world is facing multiple crises. Globally, climate change and environmental problems are challenging the future of planet Earth. An increase of temperatures, destruction of habitats, biodiversity losses, extreme weather events, and a continuous rise of sea level can be observed. The scientific community agrees for the greater part that humans are the driving force of climate change—mainly due to their economic activity and exponential population growth. Therefore, immediate mitigation efforts—like reduction of greenhouse gas emissions—are absolutely necessary to avoid irreversible impacts and to achieve the internationally agreed 2°C goal (IPCC 2014).

But also on economic and financial levels the recent years have shown that the world's growth model and current monetary system are not resilient in times of crises and therefore might not be an option for a sustainable future. The financial crisis led to a significant drop of stocks, an increase of unemployment—especially concerning the youth—a tremendous loss of trust in the financial institutions and partly raised questions about the economic system in general. The growth machinery was slowed down and only massive interventions by governments, the highest finance authorities and forced adaptions by the private sector were able to bring the economy gradually back on track. While most economist and journalists saw the crisis as a result of mismanagement and blamed individuals (TIME 2015), others examined the cause of the crisis in the system's nature itself. Vicariously, the New York Times journalist Thomas Friedman questioned "What if the crisis of 2008 represents something much more fundamental than a deep recession? What if it's telling us that the whole growth model we created over the last 50 years is simply unsustainable economically and ecologically and that 2008 was when we hit the wall — when Mother Nature and the market both said: 'No more.'" (Friedman 2009).

Considering the unsustainability of the economic system itself and the dramatic environmental impacts it is causing, voices advocating towards an alternative one became louder in society—like the Occupy Movement—and during recent scientific conferences and discussions (Initiative Growth in Transition; CASSE 2010; ISEE 2010). Specific ideas of required social and institutional changes became more concrete during these processes, right up to essential ideas and theoretical guidelines for a transition towards a steady state economy (SSE) (Jackson 2009; Kallis 2011; Dietz and O'Neill 2013). Since the pioneers of a SSE came up with the idea itself and associated conceptual frameworks some decades ago (Daly 1973), the community of scientists promoting a SSE is expanding rapidly and developed significant principles (Jackson 2009; Latouche 2010; Kallis 2011; Victor 2012). The main argument against the growth favoring approach fighting against economic crises is reasoned by its

unsustainability in the long run (Schneider *et al.* 2010). It requires infinite growth within a finite system—planet Earth with a limited supply of resources. To put it straight, this perception is just not even unsustainable, it is physical impossible. Despite widespread knowledge about this contradiction since decades (Meadows *et al.* 1972), most of economists and governments still support the system of economic growth to achieve prosperity (European Commission 2010a; Bundesregierung 2014). The current situation leads to a dilemma. On the one hand, unlimited growth is unsustainable and on the other hand, degrowth within the current economic system is unstable (Jackson 2009). Throughout this paper it will be stated, that a SSE is the only option in the long run, whether it will be by design or disaster. In other words, it will happen whether governments want it or not—unplanned and catastrophic or managed and relatively benign (Douthwaite 2012). The laws of physics and biology cannot simply be overruled.

Today, humanity still has a chance to either make the transition towards a SSE socially compatible by organized sustainable degrowth or disastrous by unsustainable degrowth—namely by economic recession and all its consequential damages (Schneider *et al.* 2010). Although, if an idea is available about how a society under these conditions might look like, still need a solid method to track and evaluate the progress towards this goal is required.

1.2 Statement of the Problem

Despite the wide-spread knowledge that the gross domestic product (GDP) is an unsatisfying indicator to measure humanity's progress and well-being—it is still the one measure, that is dominating the economic and political landscape. Although, there are plenty of alternatives around—even initiatives developed by the European Commission—designed to be as clear and appealing as GDP, but more inclusive of environmental and social aspects of progress (Beyond GDP 2007).

The GDP includes costs for education and investment into infrastructure as well as war spendings and reconstruction costs after natural disasters. Therefore, it does not distinguish between economic activities which are improving human well-being and environmental conditions and the ones, which are actually harming and destroying it. Furthermore, it only counts monetary flows and neither the change nor depletion of resource stocks (O'Neill 2012). As US presidential candidate Robert F. Kennedy's stated, GDP "measures neither our wit not our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country. It measures everything in short, except that which makes life worthwhile" (Fioramonti 2013).

As exposed, the current indicator of progress is not a suitable measurement if a sustainable economy is the shared vision for the future. In order to reach a SSE as ultimate goal, today's developed countries—namely North America, most European countries, Australia, New

Zealand, Japan and South Korea—have to follow the pathway of degrowth. Their current economies and lifestyles extract resources from the environment and produce waste to such extends, which are not sustainable and have to be reduced immediately (Global Footprint Network 2011). Therefore, just shifting towards a SSE is not sufficient enough. Concretely, the Western countries are *over*developed—using natural resources at a too high rate and living already outside several of the planet's ecological boundaries (Rockström *et al.* 2009).

Many ideas to substitute GDP and to measure sustainability and wealth emerged over the last years—indexes, like the *Index for Sustainable Economic Welfare* (Daly *et al.* 1989), set of indicators, like the *Indicators of Sustainable Development* (UN 2007), and composite indicators, like the *Human Development Index* (UNDP 2010). In order to evaluate if degrowth is happening—and too what extend—a reliable concept of measurement and evaluation is indispensable. Similar to sustainability, degrowth is not a 'thing' that can be measured straight forward. It first becomes defined by the parameters that can be measured rather than the other way around. The chosen parameters are always based on an individual's vision of the underlying idea, which in turn can be changed depending upon the measurement mindset (Bell and Morse 2008). The recent approach by O'Neill (2012)—which will be used as foundation of this work—is a theoretical concept, which is based on ends and means. It contains a set of biophysical and social indicator. Overall, this set of 15 indicators helps to determine whether a country or region is on the right track towards a SSE or still follows the ideology of economic growth.

Some arguments against the attempt of measuring degrowth in the first place have to be mentioned. This includes among others the impossibility to measure in a straight forward attempt what the degrowth movement is trying to achieve, due to the qualitative and subjective nature of its goals (e.g. sense of community, balance or good citizenship). This could lead towards the problem of measuring mainly the things which are easy to measure, and not which would be important to measure (O'Neill 2012). Another one is the 'fallacy of misplaced concreteness' (Daly *et al.* 1989), the error of treating an abstraction as if it were reality—as happened to the GDP. These arguments have to be taken seriously, but can be solved by working carefully with suitable indicators.

On the other hand, reasons favoring measuring are predominant. O'Neill states three arguments. Firstly, that "measuring was necessary to demonstrate the need for degrowth, and it will be necessary to determine whether degrowth is being achieved". In other words, you cannot manage what you do not measure. For the same reason the gross national product (GNP)—predecessor of the GDP—was developed in the 1930s to help America to get out of the Great Depression. Back then, the government had no adequate data to evaluate its national economy, which made it quite difficult to know whether policies were working out as supposed to or not at all (Fioramonti 2013). Secondly, "what gets measured tends to get done and what is not measured tends to get ignored"—proven by the global chasing of GDP growth year after year, respectively ignoring environmental damages in great measure so far. And

finally, indicators are a useful and simple communication tool (e.g. the Ecological Footprint) to raise awareness about the need for degrowth policies.

1.3 PURPOSE

Following the call for a "development of new, non-monetary indicators (including subjective indicators)… to assess whether changes in economic activity contribute to or undermine the fulfilment of social and environmental objectives" (Research & Degrowth 2010), O'Neill's framework will be put into practice to determine the current progress towards a SSE concerning the two largest German speaking countries, Germany and Austria (G&A). Thereby, the time period of the last ten years (2004—2013) will be analyzed, focusing especially on the time of the start of the financial and economic crisis (2008/09). The major questions, which will be tackled within this thesis can be divided into three parts:

(1) Are Germany and Austria already on the degrowth path towards a steady state economy and can any differences be seen between both countries?
(2) Which of the applied indicators clearly reflect the crisis by an offset in their general trend over the past ten years?
(3) How did the authorities react towards the crisis, and were the taken actions and measurements in accordance with the idea of a degrowth approach towards a SSE? If not, what should have been done instead?

Towards the end this work, an educated elaboration of a steady state scorecard (SSS) for both countries will be carried out, assessing the efforts that have been taken towards a desirable steady state economy so far. This approach will help to summarize the current progress and make available an adequate tool for communication and comparison.

1.4 CONTEXT & BACKGROUND

In order to follow the purpose of this work a fundamental understanding about the concepts of degrowth and steady state economy is essential. Furthermore, some general background knowledge about the history of the major triggers and procedures concerning the financial and economic crises, which started in late 2008, will help to better understand the context in which this work is embedded.

1.4.1 Degrowth & Steady State Economy

Unfortunately, there is not only one explicit definition of *degrowth*. Its origin goes back to the French word *décroissance*, which literally means reduction and was established by activist in 2001—challenging the currently dominating economic model of growth. But it appeared already more than 40 years ago (Bosquet 1972) and was mentioned several times in the following decades. Over the years, its definition passed through many stages and is nowadays understood as an 'interpretative frame for a new social movement, where numerous streams of critical ideas and political actions converge' (DeMaria *et al.* 2013). Similar to catchwords like *sustainability*, also degrowth is not uniformly defined and depends on several conditions like type of questioning or country- and culture-specific circumstances. In order to ensure a good scientific purpose and comprehensibility it is inevitable to make use of a clear definition throughout this work. Therefore, the concise explanation as stated in the 'Declaration on Degrowth', worked out by several leading scientist in this field during the Degrowth Conference in Paris 2008, will be applied.

> *"We define degrowth as a voluntary transition towards a just, participatory, and ecologically sustainable society… The objectives of degrowth are to meet basic human needs and ensure a high quality of life, while reducing the ecological impact of the global economy to a sustainable level, equitably distributed between nations… Once right-sizing has been achieved through the process of degrowth, the aim should be to maintain a steady-state economy with a relatively stable, mildly fluctuating level of consumption."* (Research & Degrowth 2010)

Another reason for choosing this definition is that it already includes the goal of the degrowth process—a steady state economy. Without taking the ultimate goal of a SSE into consideration, advocating the pathway of degrowth is pointless due to their complementary relationship. Degrowth describes a *process*, whereas steady state describes its *product* or intended *goal*. Herman Daly, one of the modern pioneers, provides a practical definition of a SSE, which emphasizes the idea of constant throughput.

> *"Following Mill we might define a SSE as an economy with constant population and constant stock of capital, maintained by a low rate of throughput that is within the regenerative and assimilative capacities of the ecosystem. This means low birth equal to low death rates, and low production equal to low depreciation rates. Low throughput means high life expectancy for people and high durability for goods. Alternatively, and more operationally, we might define the SSE in terms of a constant flow of throughput at a sustainable (low) level, with population and capital stock free to adjust to whatever size can be maintained by the constant throughput beginning with depletion and ending with pollution."* (Daly 2008)

At this point, it should be emphasized that a decrease of economic activity is only necessary in countries or regions already exceeding the carrying capacity of the biosphere (Figure 1). These include nearly all of the so-called developed countries, but also some developing ones. Obviously, economic growth is still necessary throughout many parts of the world today (Kerschner 2010). Hundreds of millions of people in Africa and Southeast Asia are still suffering enormously due to the lack of basic human needs—supply of freshwater, proper housing, ensured security or basic medical treatment. Promoting economic growth in these regions is indispensable to establish humanitarian living conditions in the future (Sachs 2014).

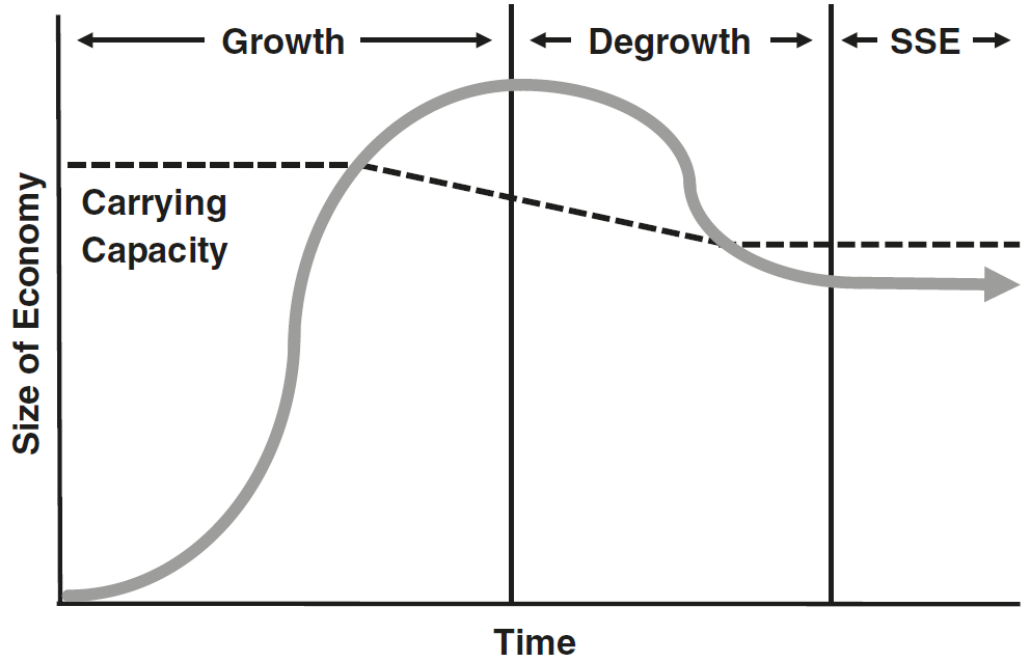


Figure 1. The degrowth transition to a steady state economy. Nations exceeding the carrying capacity of the biosphere have to follow the degrowth path to reach a SSE, maintaining the size of their economy within the biophysical limits of the planet. Adopted from (O'Neill 2012).

Unfortunately, the term *(economic) growth* is nearly exclusively mentioned in public media associated with an increase of welfare, well-being, and happiness. This repetitive preached dogma, that economic growth is the only solution for the future to establish or increase overall life satisfaction, leads towards a simple psychological problem. It automatically creates negative associations by hearing about *de*growth—literally the opposite of growth. Therefore, it is often misunderstood with poverty, dissatisfaction and sadness. But as can be seen by definition, the concept of degrowth itself is not simply the opposite of growth—it describes a more complex and multilayered idea. The same applies for *steady state*, which often conjures up stagnation in someone's mind. Therefore, several people advocating for an alternative term to use. In other words, rebranding the idea would help avoiding misunderstanding and negative prejudices in the beginning (Armstrong 2009). Regarding an alternative society, in German speaking countries the term *Postwachstumsgesellschaft (post-growth society)* is often used (Seidl and Zahrnt 2010; Paech 2013). It describes the whole idea of a satisfied society acting within Earth's biophysical limits quite well—without any prior charges.

Anyways, throughout this work the term *steady state economy* will be used predominantly due to its widespread acceptance within the scientific community.

Additionally, the concept of degrowth is often misunderstood by mainstream media and society as *recession* and *return to the Stone Age*. But in contrast to recession, degrowth describes a phase of equitable and planned economic decrease in the wealthy countries, until reaching an economy based on the rule of ecological law (Garver 2013). Furthermore, it should be added, that degrowth does not necessarily equals a decline of GDP. What happens to the GDP during transition towards a SSE is of secondary concern—ecological sustainability, equality and human well-being are of primary importance (Schneider *et al.* 2010). Yet, other scientists favor the idea of abandoning GDP completely—even if we do not replace it with another indicator—convinced to be better off without it (van den Bergh, Jeroen C.J.M. 2011).

1.4.2 Financial & Economic Crisis

Next to the approach of elaborating the current state of Germany and Austria towards a steady state economy, it will be analyzed what have been done by governments, the private and financial sector, and society itself during the recent years in this regard. The financial and economic crisis demonstrated the incapability of the current system to react and adapt towards internal and external disturbances. For a better understanding, what happened after 2007, a brief recap about the history of the crises will be given in the following. Additional information about how the resulting problems where tackled on different levels will be presented in the 'Results' section—completed by an assessment of the performed actions and suggestions about alternative measures that should have been taken in the 'Discussion'.

For the first time visible became the crisis in 2007 due to the burst of the US subprime mortgage bubble. But the creation of the bubble started already several years before. In the first years of the new millennia, a lot of cheap money was available in the US. Banks were able to give out credits to more or less everyone—so-called *ninja* credits (*n*o *i*ncome, *n*o *j*ob, no *a*sset)—to achieve their client's dream of owning a house. Due to rising real estate prices, people were able to pay off the mortgages by new credits for a while. Over time, the flexible interest rates of these credits escalated, in response to an increase of the Federal Funds Rate. People could not pay off the mortgages anymore. They had to sell their houses or the banks put them up for compulsory sale.

Nevertheless, banks and brokers continued trading American real-estate credits. They created so-called *Mortgage Backed Securities* and *Collateralized Debt Obligations* to continue trading of these risky funds. The result of pooling real-estate credits with other financial products led to a state of an unknown risk of these funds—even by banks themselves. After compulsory sales of many homes banks and other owners of these credit insured mortgages had to face huge financial losses. In September 2008 the investment bank *Lehman Brothers* had to

announce its bankruptcy. After that a vast number of banks, insurance companies and other institutions were facing gigantic financial problems. If they did not collapse, they were either nationalized or rescued by the help of their governments. In October 2008, the German Federal Government decided to provide 500 billion Euros to help out several cash-stricken banks.

The financial crisis was the trigger for the following economic crisis. Many industrial countries were facing the biggest recession after World War II. The consumption in general was slowed down and exporting countries—like Germany and the US—experienced an enormous decline of demand, especially regarding automobiles and machinery. Economic stimulus packages were the general answers by affected governments to stabilize the economy.

The other crisis, which emerged out of the financial one as well, was the destabilization of the common European currency—the Euro. Greece became symbol of the excessively increasing national debts within the European Union (Kaufmann and Bude 2013).

In the aftermaths of the financial and economic crisis more and more economists and analysts have been convinced that further growth is very unlikely to be maintained in the future. Richard Heinberg, one of the world's foremost experts on energy supply and use, believes that the age of economic growth is over due to three converging crises. Next to the already discussed long-term inability of the financial system, also the depletion of critical resources, like fossil fuels, and the accelerating costs of environmental impacts are contributing to the upcoming breakdown of the current system (Heinberg 2011).

2 METHODS

2.1 MEASURING PROGRESS IN THE DEGROWTH TRANSITION TO A SSE

As foundation for a practical framework to measure how close specific countries or regions are to the concept of a steady state economy, the designed framework of ends and means introduced by O'Neill (2012) will function as a starting point. His framework includes biophysical as well as social indicators ranked in a constructive hierarchy, grouped into four categories—ultimate and intermediate ends, respectively means (Figure 2). Whereas, "the biophysical indicators are derived from Herman Daly's definition of a steady state economy, and measure the major stocks and flows in the economy-environment system; the social indicators are based on the stated goals of the degrowth movement, and measure the functioning of the socio-economic system, and how effectively it delivers well-being" (O'Neill 2012).

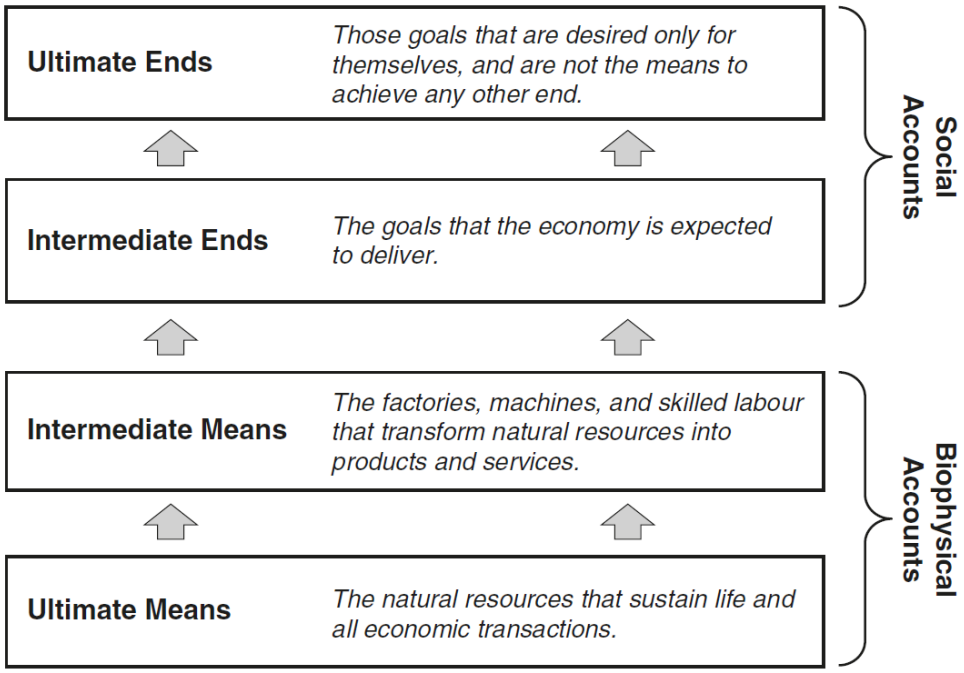


Figure 2 General conceptual framework. A set of social and biophysical indicators is chosen to measure progress in the degrowth transition to a SSE. The indicators are grouped in ultimate and intermediate ends, respectively means. Adopted from O'Neill (2012), based on (Daly 1977).

Within the framework, 'ultimate means' contain the important natural resources which sustain life and all economic transactions. Whereas 'intermediate means' contain all the factories, machines and skilled labor that is necessary to transform these natural resources into services and products. In other words, natural and built capital is separated this way. The goals that the economy is expected to deliver, are dedicated towards the 'intermediate ends', whereas the 'ultimate ends' contain those ones that are desired only for themselves. They are

not means to achieve any other end. Indicators are effectively separated into social and biophysical accounts within this framework. Generally, the Ends-Means Continuum states that for fulfillment of human needs a well-functioning and overall healthy ecosystem is essential (O'Neill 2012).

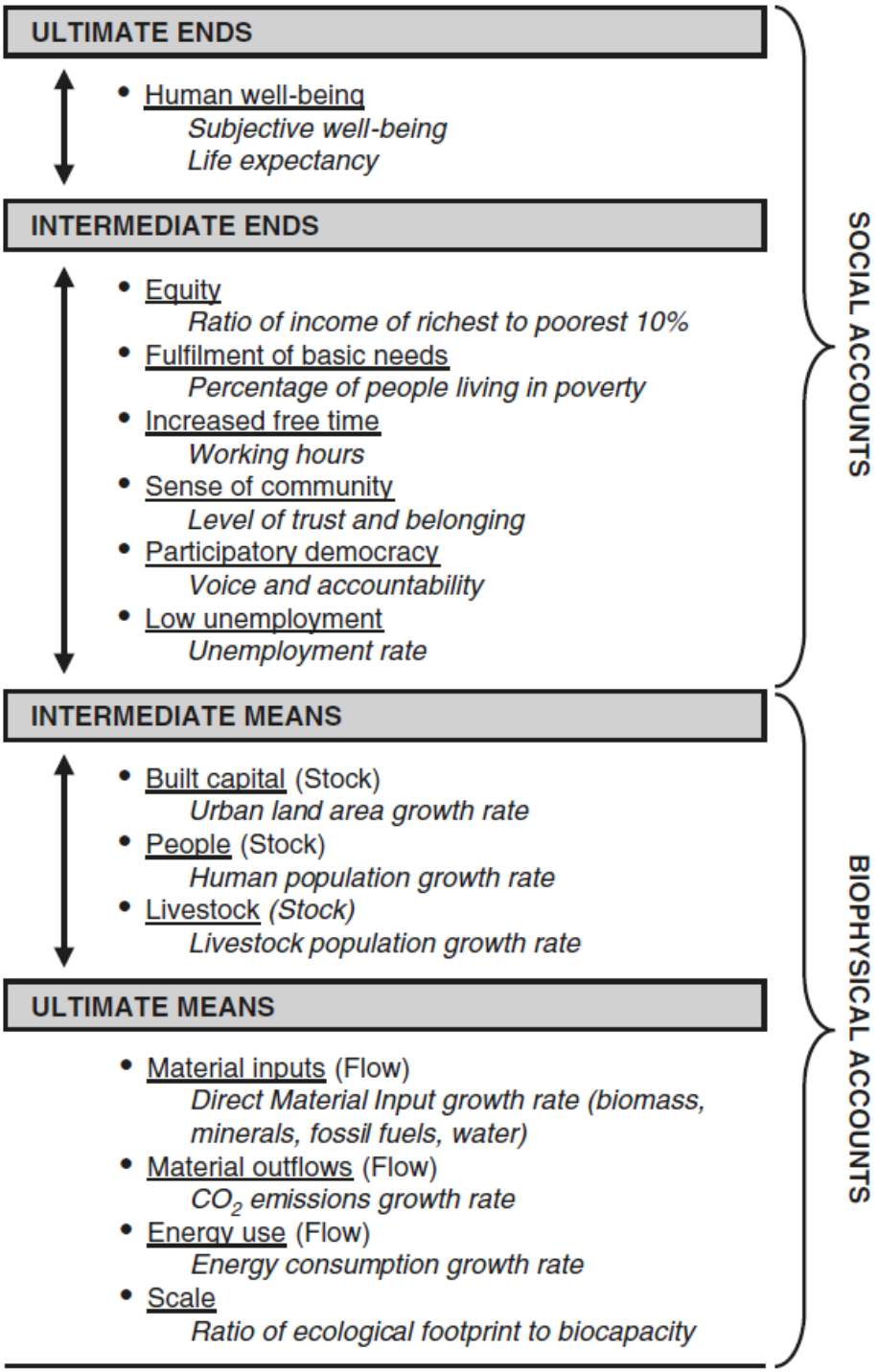


Figure 3 Proposed set of indicators to measure progress in the degrowth transition to a steady state economy. Social and biophysical indicators are classified in order of Daly's End-Mean Continuum. The idealized indicators are underlined and an example of potential proxy is given in *italics*. Adopted from O'Neill (2012).

Methods

Like stated above, the biophysical accounts are based on Daly's definition of a steady state economy and contain three components: stocks, flows and scale (Daly 1977, 2008). O'Neill describes the important stocks to be considered as built capital, people and domesticated animals. Also, three flows are taken into account: input flows from the environment into the economy, output flows from the economy back into the environment and the amount of energy used by the economy itself. Considering scale, two measures are relevant. Firstly, the ratio of material inputs towards the capacity of ecosystem sources to regenerate materials. Secondly, the ratio of material outflows towards the capacity of ecosystem sinks to assimilate wastes. Within this set the indicators of stocks and flows are described by growth rates, the indicator of scale by a ratio.

Indicators in the social accounts are based on ideas of the degrowth movement and represent a mixture of objective and social ones, including measures of social and personal well-being. Overall, O'Neill classifies six goals—participatory democracy, sense of community, increased free time, fulfillment of basic needs, equity, and human well-being—the latter one representing the 'ultimate end' and the others supporting 'intermediate ends'. Understandably, not only the proposed goals invite for debates, also the listed indicators used for measuring are clearly arguable (Figure 3).

As it can be seen, there is no additional group containing typical economic indicators. The rate of unemployment is part of the social accounts. The author states that his "framework takes a very broad view of the economy, seeing it as the system that translates ultimate means (e.g. natural resources) into ultimate ends (i.e. human well-being). Within this conceptual framework, all of the indicators are effectively economic indicators." Furthermore, GDP is not included due to the already mentioned arguments against it. It is replaced with more important information (O'Neill 2012).

2.2 Adaption of the Given Framework

The main methodological challenge throughout this work will be to research for solid, reliable and consistent data concerning the proposed indicators for the given time series. O'Neill states, that "the figure [his framework] does provide an example of an existing indicator that could be used as a proxy for each idealized indicator". In other words, the listed proxies (e.g. *percentage of people living in poverty*) are just one possibility and can be reasonably exchanged. Therefore, some of them will be—due to the lack of available data—substituted for equally suited ones. Additionally, a couple of indicators will be replaced by better fitted ones—conclusively justified.

The following ones will be exchanged due to different reasons, explained separately in detail below.

Methods

(1) Ratio of income of richest to poorest 10%
(2) Percentage of people living in poverty
(3) Level of trust and belonging
(4) Voice and accountability
(5) Urban land area growth rate
(6) Livestock population growth rate
(7) CO_2 emissions growth rate

The indicator, which will be used instead of (1) is the *S80/S20 income quintile share ratio* describing the inequality of income distribution, defined as "The ratio of total income received by the 20 % of the population with the highest income (top quintile) to that received by the 20 % of the population with the lowest income (lowest quintile). Income must be understood as equalized disposable income" (EU-SILC 2014). The exchange is solely due to the lack of data for the proposed one. The alternative indicator will be sufficient in describing the trends concerning equality within a given society.

The decision against (2) is based on the fact, that the progress towards as SSE in G&A will be elaborated. Absolute poverty, as defined by the World Bank and other institutions, as an income level below $1.25 per day (PPP), is only useful for non-industrial countries—which are facing real poverty. In developed countries, the value for absolute poverty is close to zero and often not even measured on a regular basis. As an alternative indicator the level of relative poverty looks like an option, but it is actually an indicator for inequality and not poverty itself. Therefore, the relative number of *severely materially deprived persons* (SMDP) as indicator for the evaluation of poverty was chosen. "Severely materially deprived persons have living conditions severely constrained by a lack of resources, they experience at least four out of nine following deprivations items: cannot afford i) to pay rent or utility bills, ii) keep home adequately warm, iii) face unexpected expenses, iv) eat meat, fish or a protein equivalent every second day, v) a week holiday away from home, vi) a car, vii) a washing machine, viii) a color TV, or ix) a telephone" (Eurostat 2014).

Concerning the social indicators (3) and (4), which are described quite generally and vaguely. For the intermediate end 'sense of community', the decision was made in favor of the proxy *Level of trust towards other people* compiled by the European Social Survey (ESS) in large-scale interviews over the last decade (ESS 2014). Regarding 'participatory democracy', another survey-based one, namely the *Level of satisfaction concerning national democracy* elaborated by the European Commission through face-to-face interviews (ECSE 2014) will be evaluated.

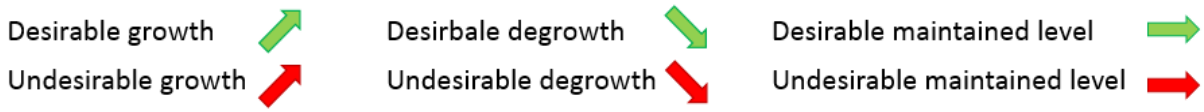
Coming to (5), plenty of data can be found, all of it slightly differing in terms of its definition. For elaborating the process of occupation of land area in Germany the *Area for settlement and traffic* (AST) will be applied (Statistisches Bundesamt). Unfortunately, the Austrian authorities do not provide a dataset equally defined as the German ones. The Austrian Environmental Department alone calculates data for around a dozen different categories, e.g. area of

construction, recreation area, area of settlement and so forth. In the end the decision was made in favor of the *Area for construction and traffic* (ACT) as most suitable indicator concerning the urbanized land area (Umweltbundesamt). But without discussion, there is more than one proxy similar—maybe even better—suited in this case.

Indicator (6) will be changed slightly towards the *Livestock Production Index* (LPI), including "meat and milk from all sources, dairy products such as cheese, and eggs, honey, raw silk, wool, and hides and skins" (World Bank 2014). Other indicators—as *total meat production* for instance—might be suitable as well.

Concerning (7), it will be exchanged towards *Greenhouse gas emissions per capita* as indicator representing material outflows. This indicator also includes other greenhouse gases than CO_2, namely methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (OECD 2014). All of them contributing partially to global warming. Therefore, it is better suited than solely CO_2 emissions.

Additionally, O'Neill developed five categories to evaluate the current state of the investigated national economy (desirable growth, undesirable growth, undesirable degrowth, desirable growth, and a steady state economy). Throughout this work, the proposed categories will be used to evaluate the trends of each indicator separately. Unfortunately, some of the indicators will not show a significant trend concerning the last decade—in these cases it will be necessary to distinguish between a desirable and undesirable maintained level. If an economy operates at constant throughputs, which exceed the capacities of the ecosystem, it is—by definition—not a steady state economy and will be treated as undesirable. This unavoidable extension will result in the following six possible evaluation categories considering a final national steady state scorecard:



Therefore, a perfectly established steady state economy would show a 'desirable maintained level' for all of the investigated indicators.

The decision whether the maintained level of a social indicator, which is not showing significant increase or decrease over the last ten years, is evaluated as desirable or undesirable is partly subjective. But a comparison with other countries for example can serve as a more objective criterion in the decision process. For clarification, a society shows the same level of life expectancy of 80.4 years for the last ten years. Is 80.4 years enough to qualify as desirable or do we have to classify it as undesirable, because the threshold is actually 87.3 years? Who is deciding this threshold? Is there even one? In this case, a comparison with better performing societies, in which people live the longest—Japan with 84.5 years in this case (CIA 2014)—could qualify for an more objective reference point. O'Neill (2012) argues that the "targets for

the social indicators, […] should be probably chosen based on a democratic and participatory process". But as long these processes have not been taken place, the best possible objective and educated evaluation approaches will be performed for each indicator. A little bit easier can the optimal size for biophysical indicators be determined. The logically simplest possibility would be to define the "optimal size as the maximum sustainable size" (O'Neill 2012). But by setting the "optimal size somewhere below the maximum sustainable level [we could] provide ecological space for other species" (O'Neill 2012). Obviously, the stated ideas concerning valuation for both social and biophysical indicators will leave room for fruitful discussions towards better solutions.

Throughout this thesis, the optimal size will be defined by comparison towards best performers within similarly developed countries. For example, setting the optimal size for *Total Material Input per Capita* should not be determined in comparison towards underdeveloped countries, which have historically very low rates of material input—but rather within OECD countries. Additionally, for some indicators it will be particularly difficult to find an optimal size. *Population* is one of them. The discussion about how many people the world can sustain varies from zero, as favored by the Voluntary Human Extinction Movement (VHEMT 2014), to an utopian one trillion (Marchetti 1979). But more serious and reliable scientists think that a maximum in the range of several billion people is reasonable. "If everyone agreed to become vegetarian, leaving little or nothing for livestock, the present 1.4 billion hectares of arable land would support about 10 billion people" (Wilson 2003). This educated guess lies in the same range as the modeled forecasts by the United Nations, estimating a world population of 8.3 to 10.9 billion people (low and high variant) for the year 2050 (UN 2012). Accordingly, that the actual sustainable carrying capacity of the earth is not known, a growing population will be classified as unsustainable and a declining one as sustainable—applying the precautionary principle.

In the discussion part the trends of each indicator will be evaluated—according to an educated and justified determination of an optimal size.

2.3 DATA RESEARCH

Considering this study, the development of the proposed indicators for the time period from 2004 to 2013 will be analyzed—optimally adjusted in some cases due to availability of data. This period represents the last decade and includes the time of the start of the financial and economic crisis (2008/09). During the analysis, two things will be evaluated

- The overall trends of the indicators during the time series from 2004 to 2013
- Abnormalities within the trends of the indicator's data regarding the time of the crises

Significant deviations could indicate potential causal relations towards the crisis. The following table will provide an overview concerning the choice of indicators and data sources (Table 1). In general, more than one indicator source was researched and subsequently compared. The most complete and trusted sources were selected for further analysis. The following table contains all indicators which will be used in the following. The *highlighted* indicators are the ones that replace O'Neill's proposals as explained above.

Table 1 Adapted theoretical framework. This table includes all indicators used to describe the corresponding ends and means. The last column shows the source of data for each indicator. Indicators changed prior to O'Neill's framework are *highlighted*. Due to the availability of data, the indicator 'Urban land area' is analyzed by two different sources, respectively for GER and AT.

	ENDS/MEANS	INDICATOR	SOURCE
ULTIMATE ENDS	Human well-being	Subjective well-being	ECSE
		Life expectancy	Eurostat
INTERMEDIATE ENDS	Equity	*S80/S20 income quintile share ratio*	Eurostat/EU-SILC
	Fulfillment of basic needs	*Severely materially deprived persons*	Eurostat
	Increased free time	Working hours	OECD
	Sense of community	*Level of trust towards other people*	ESS
	Participatory democracy	*Satisfaction concerning national democracy*	ECSE
	Low unemployment	Unemployment rate	Eurostat
INTERMEDIATE MEANS	Built capital (Stock)	*Area for settlement and traffic* (GER): *Area for construction and traffic* (AT)	Stat. Bundesamt (GER); Umweltbundesamt (AT)
	People (Stock)	Population	Stat. Bundesamt (GER); Statistik Austria (AT)
	Livestock (Stock)	*Livestock Production Index*	World Bank
ULTIMANTE MEANS	Material inputs	Direct material input per capita	Eurostat
	Material outflows	*GHG emissions per capita*	OECD
	Energy use	Primary energy consumption per capita	Eurostat
	Scale	Ecological Footprint vs. Biocapacity	Global Footprint Network

3 RESULTS

3.1 PRESENTATION OF THE DATA

In this section, the consolidated data is presented. At this point, it should be emphasized that due to the variety of potentially suited data sources, choosing an adequate set of data was in most cases not a straight forward decision. Factors, which determined the process of decision making, were mainly (1) reliability of source and (2) completeness of data. Further analyzing, interpretation and debate about the results will be carried out in the upcoming 'Discussion' section.

The presentation of the data in diagrams will be done by grouping of single indicators into their corresponding categories (ultimate/intermediate ends/means) to avoid data abundance and unnecessary confusion. Therefore, the data will be standardized and relativized for better comparison and trend analyses. Nevertheless, raw data will be used supportively to evaluate the trends if looking at absolute numbers is required.

All of the raw data used throughout this work can be found in the corresponding tables attached in the appendix—including the sources of research.

This section will start out with the ultimate means. The indicators belonging towards this category represent the environmental resources, which sustain life and all economic transactions. Therefore, they build up the basis for all other categories and should be presented primarily, followed by the intermediate means and ends. The ultimate end, namely 'Human well-being', will complete the 'Results' part.

3.1.1 ULTIMATE MEANS

As defined by O'Neill (Figure 3) the ultimate means contain the three flows 'Material inputs', 'Material outflows', and 'Energy use'. Additionally, a ratio—placing the scale of the total economy into perspective—is also part of this category. Respectively, the three indicators *Direct material input* (Eurostat), *GHG emissions* (OECD) and *Energy consumption* (Eurostat) will be used as proxies for the flows and the *Ratio of ecological footprint to biocapacity* (Global Footprint Network) as 'Scale'.

Looking at the three flow indicators for Germany (Figure 4), general declining trends in both *Energy consumption* and *GHG emissions* since 2004 can be seen. Overall, a reduction by 3.3 % (-0.36 %/y), respectively 7.3 % (-0.91 %/y) took place—including partially high fluctuations. The same trend can be observed for Austria (Figure 5). More precisely, a total reduction by 2.0 % (-0.23 %/y) and 15.3 % (-1.91 %/y) regarding *Energy consumption*, respectively *GHG*

emissions. Additionally, a significantly larger decline than the average one per year can be observed in the datasets for both countries in 2009—the first year after the beginning of the financial and economic crises.

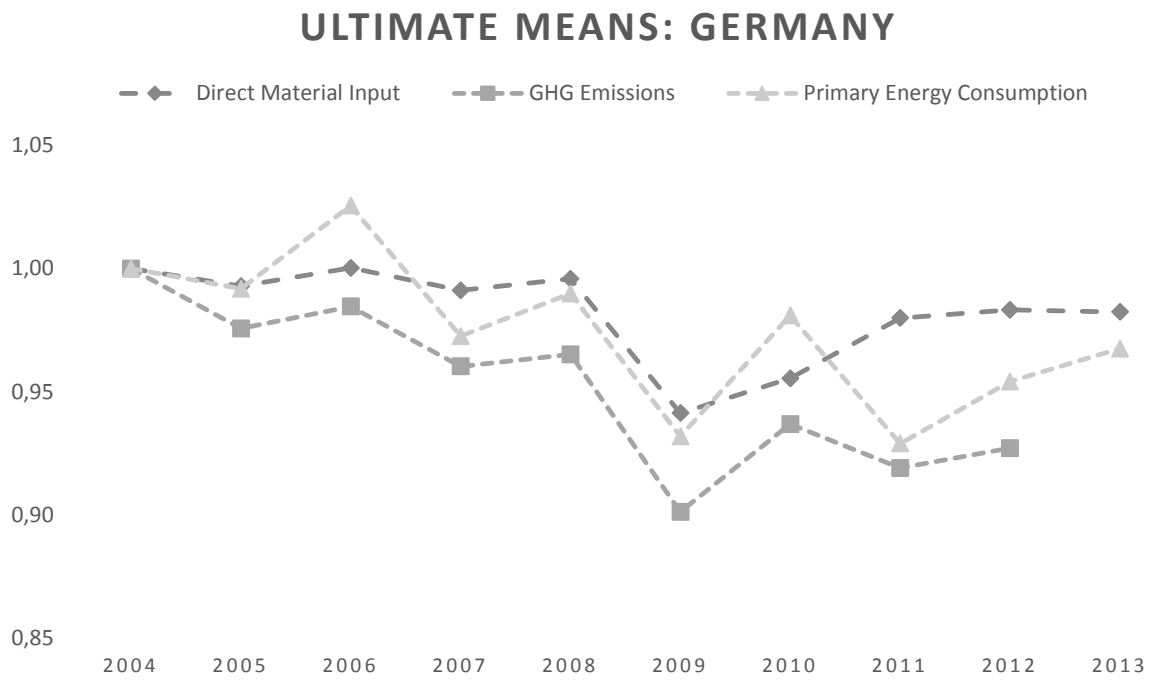


Figure 4 Ultimate Means: Germany. The figure describes the trends of the three indicators, for the time series 2004-2012 concerning *GHG Emissions* (OECD), and *Energy Consumption* (Eurostat)—respectively 2004-2013 concerning *Direct Material Input* (Eurostat). All of them standardized per capita, and relativized for sound comparison. Raw data can be found in the appendix (**Table 3**).

Simultaneously, a slight decrease can be observed regarding the *Direct material input* for Germany and small increase for Austria comparing the 2004's numbers with the 2013's ones. In general, a quite stable rate of DMI can be observed—including a significant drop in 2009 and a steady recovery rate in the following years. For the sake of completeness, a decrease of 1.8 % (-0.20 %/y) for Germany and increase of 3.3 % (+0.37 %/y) concerning Austria can be calculated.

Unfortunately, the Global Footprint Network was not supportive in making their annual raw data accessible, concerning the *Ratio of ecological footprint to biocapacity*. Data, which is publicly available (Global Footprint Network 2014), contain values for the year 2010 (Table 2) and diagrams (Figure 6) representing the trend of the ecological footprint (EF) to biocapacity (BC) during the years 1961 and 2010. Additional data might be available under license.

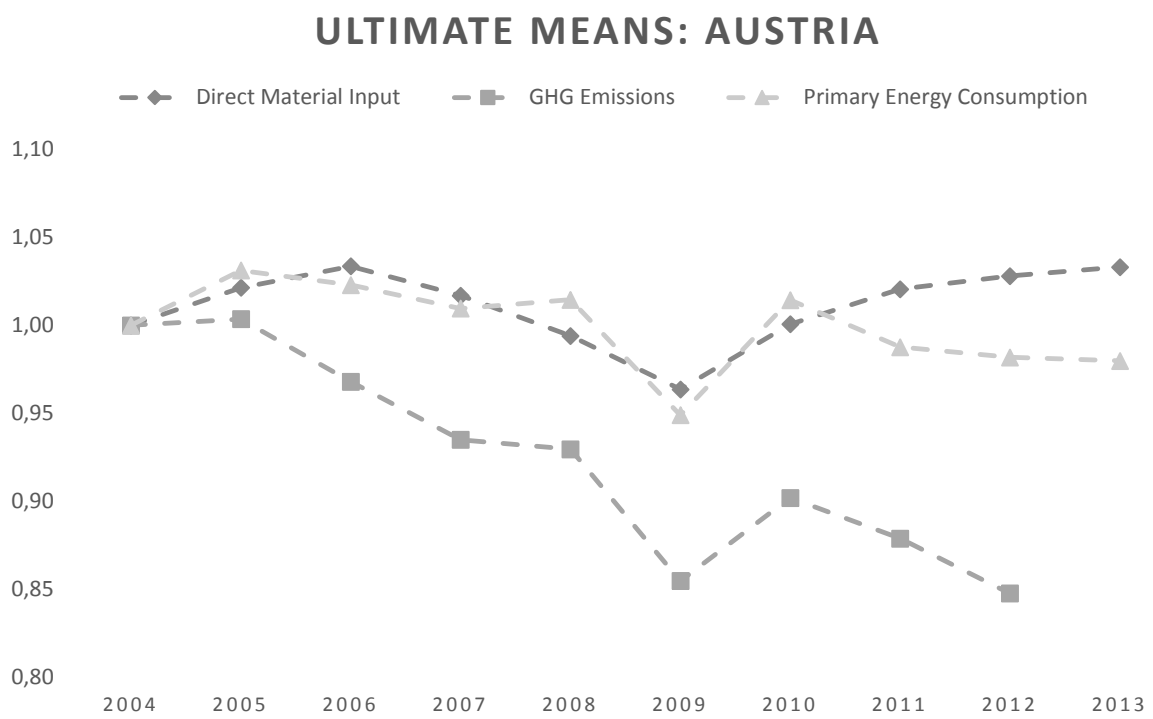


Figure 5 Ultimate Means: Austria. The figure describes the trends of the three indicators, for the time series 2004-2012 concerning *GHG Emissions* (OECD), and *Energy Consumption* (Eurostat)—respectively 2004-2013 concerning *Direct Material Input* (Eurostat). All of them standardized per capita, and relativized for sound comparison. Raw data can be found in the appendix (**Table 3**).

As can be seen, both Germany and Austria are showing an ecological deficit of 3.2, respectively 2.0 global hectares per capita (gha). Comparison of the EF:BC ratios reveal, that both countries are exceeding their environmental capacities by 2.7 fold, respectively 1.6 fold. In other words, in 2010 the economic activities and lifestyles of Germans would have required nearly three times more available hectare land to be sustainable.

Table 2 Ratio of ecological footprint to biocapacity 2010. The table includes data for the ecological footprint of consumption, total biocapacity, and ecological deficit/reserve as well as a calculated ratio of the ecological footprint (EF) to biocapacity (BC) for G&A. The values are in global hectares per capita (gha). For the ratio, BC was set 1 to emphasize the calculated overshoot of ecological consumption.

	ECOLOGICAL FOOTPRINT OF CONSUMPTION [gha]	TOTAL BIOCAPCITY [gha]	ECOLOGICAL (DEFICIT) OR RESERVE [gha]	RATIO EF:BC
GERMANY	5.1	1.9	(-3.2)	2.7 : 1
AUSTRIA	5.3	3.3	(-2.0)	1.6 : 1

The ecological overshoot of G&A is also represented in the diagrams (Figure 6), featuring the evolution of EF and BC since 1961. The EF:BC ratio is fairly stable—including a temporary elevation in the 70s and 80s—for Germany during the past four decades and steadily increasing in Austria. Roughly since 1968, the ecological footprint in Austria is exceeding

country's biocapacity due to an increase of the EF, whereas the BC remains nearly constant. Due to the lack of adequate raw data regarding the investigated decade, no sound statement can be given concerning a potential correlation of EF:BC ratio and crisis.

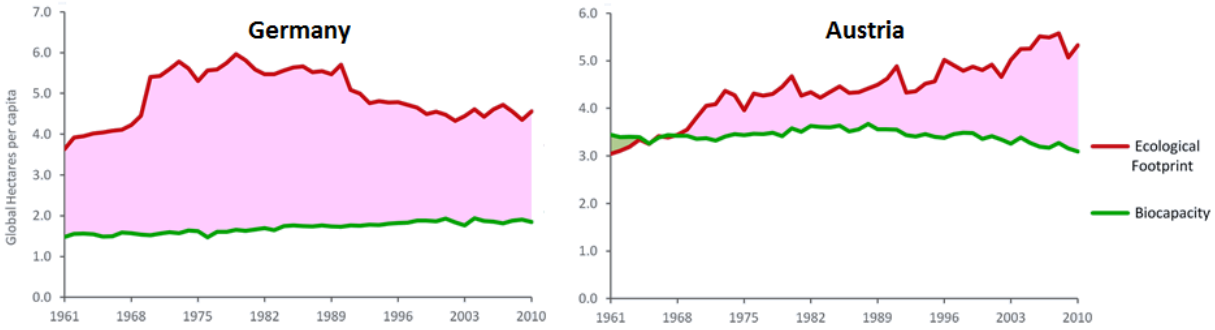


Figure 6 Ecological footprint vs. Biocapacity. The diagrams describe the trend of ecological footprint and biocapacity from 1961 until 2010 for Germany (left) and Austria (right). The unit of both parameters is global hectares per capita. Both countries clearly show an ecological footprint exceeding the corresponding biocapacity during the recent decades.

3.1.2 Intermediate Means

The intermediate means include all the remaining indicators of biophysical accounts, namely the stocks of 'Built capital', 'People', and 'Livestock'. For these the proxies *Area for settlement/construction and traffic* (Statistisches Bundesamt/Bundesumweltamt), *Population* (Statistisches Bundesamt/Statistik Austria), and *Livestock Production Index* (World Bank) were chosen (Table 4).

Starting out with the data for Germany (Figure 7), it can be seen that the *Area for settlement and traffic* is steadily increasing—even though less and less every year on a percentage basis. From 2004 until 2013 the obstructed area grew by 6.2 % (+0.69 %/y). The same trend can be observed for Austria (Figure 8)—a steady increase of the *Area for construction and traffic* by 7.7 % (+0.86 %/y).

Similar, a general increase can be observed for the *Livestock Production Index* for both Germany and Austria—noting high fluctuations for the latter one. From 2004 the Index rose by 9.5 % (+1.19 %/y) for Germany, respectively 6.7 % (+0.83 %/y) for Austria.

Concerning the development of total population, contrary trends can be observed for G&A. During the last decade Austria's population rose by 3.8 % (+0.42 %/y), whereas Germany's declined by 2.4 % (-0.27 %/y). The offset in 2012 towards the previous year is due to a correction based on the national census, by which Germany's population was reduced by around 1.5 million at a blow (Statistisches Bundesamt 2013). But also by taking this offset into account, Germany's population is steadily decreasing.

For none of the three proxies any kind of abnormality within their trends might be identifiable regarding the years of the crises.

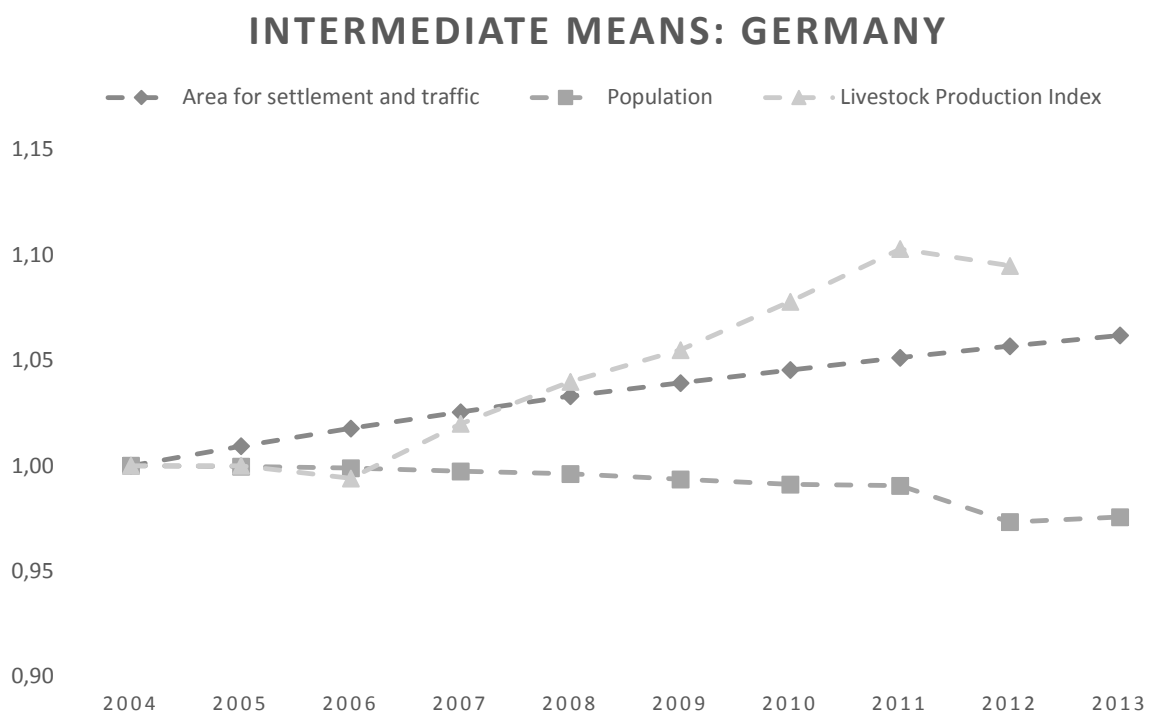


Figure 7 Intermediate Means: Germany. The figure describes the trends of the three indicators, for the time series 2004-2012 concerning *Livestock Production Index* (World Bank)—respectively 2004-2013 concerning *Population* (Statistisches Bundesamt) and *Area for settlement and traffic* (Statistisches Bundesamt). All of them are relativized for sound comparison. Raw data can be found in the appendix (**Table 4**).

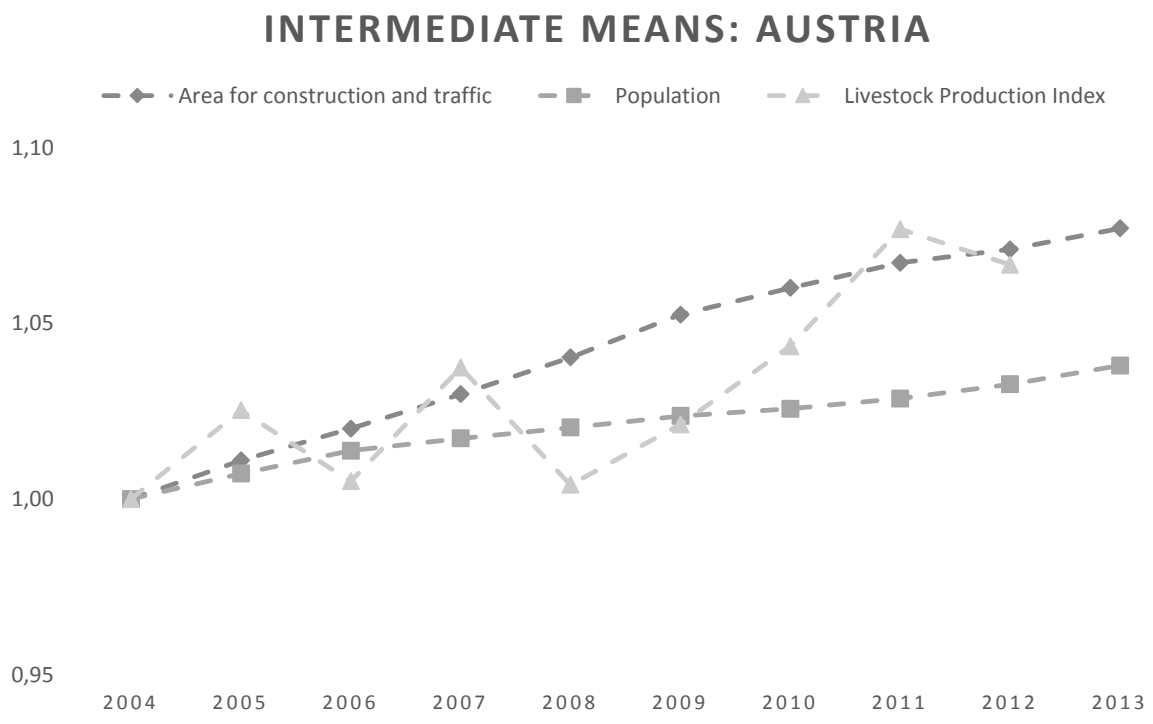


Figure 8 Intermediate Means: Austria. The figure describes the trends of the three indicators, for the time series 2004-2012 concerning *Livestock Production Index* (World Bank)—respectively 2004-2013 concerning *Population* (Statistik Austria) and *Area for construction and traffic* (Umweltbundesamt). All of them are relativized for sound comparison. Raw data can be found in the appendix (**Table 4**).

3.1.3 INTERMEDIATE ENDS

Coming to the social accounts, it will be started out with the six intermediate ends. To recap, these include 'Equity', 'Fulfillment of basic needs', 'Increased free time', 'Sense of community', 'Participatory democracy', and 'Low unemployment'—represented by the chosen proxies *S80/S20 income quintile share ratio* (Eurostat/EU-SILC), *Severely materially deprived persons* (Eurostat), *Working hours* (OECD), *Level of trust towards other people* (ESS), *Democracy perception at national level* (ECSE) and *Unemployment rate* (Eurostat).

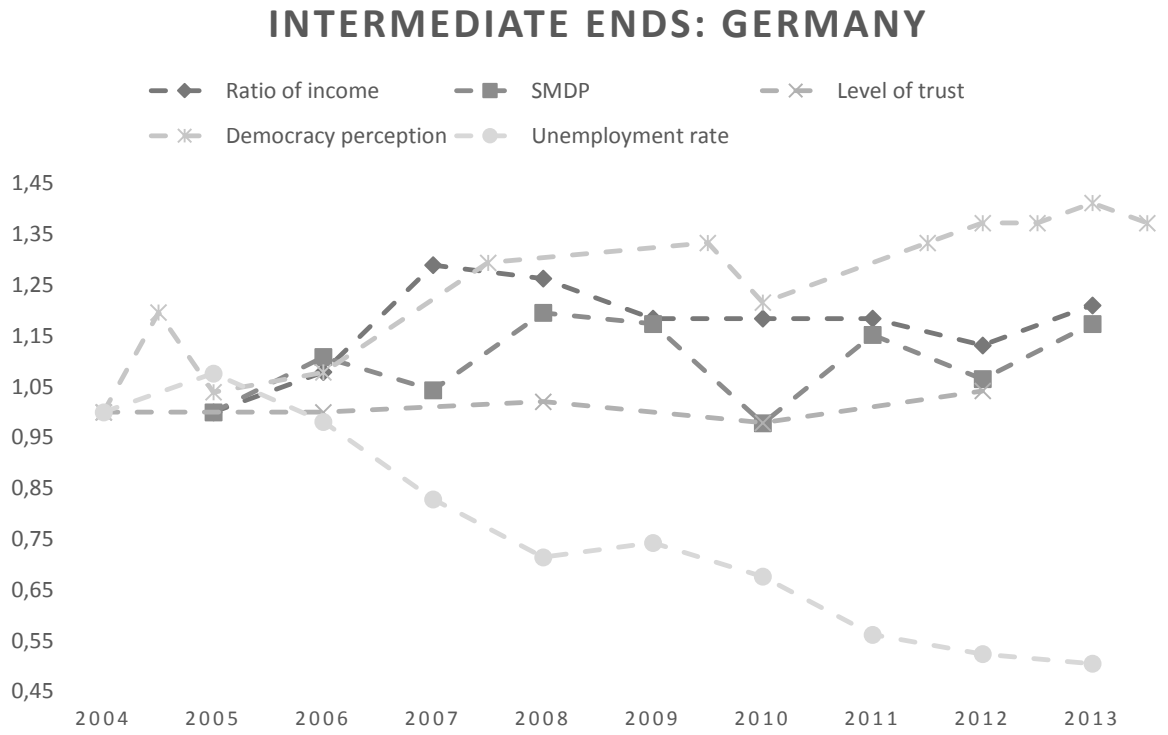


Figure 9 Intermediate Ends: Germany. The figure describes the trends of the five indicators, for the time series 2004/05-2012/13 concerning the *Ratio of income* (Eurostat/EU-SILC), *Severely materially deprived persons* (SMDP) (Eurostat), *Level of trust towards other people* (ESS), *Democracy perception* (ECSE), and *Unemployment rate* (Eurostat. All of them are relativized for sound comparison. Raw data can be found in the appendix (**Table 5**, **Table 6**).

Firstly, the official *Unemployment rate* of Germany (Figure 9) declined significantly from 2004 to 2013 by 49.5 % (-5.50 %/y), compared to Austria's (Figure 10) fairly stable rate of unemployed people over the years. But looking at raw numbers (Table 6), Austria had still less people without work (4.9 %) compared to Germany (5.3 %) in 2013. For the year 2009, we can see a minor rise in numbers for both countries.

Secondly, the *Ratio of income* as measure for equity rose in both countries notably. For Germany an increase of 21.0 % (+2.63 %/y) and for Austria 7.9 % (+0.88 %/y) can be calculated. By looking closer at the data, no abnormalities within the overall trends during the years of crises appear.

The amount of *Severely materially deprived persons* fluctuated quite a bit in Germany and was in 2013 around 17.4 % higher than in 2005 (+2.17 %/y). Similar, an upward trend can be observed for Austria. In 2013 around 23.5 % more people experienced severely materially deprivation than in 2004 (+2.61 %/y). Looking closer into the data for the year 2008, we see an enormous increase of SMDP for Austria. The amount of affected people nearly doubled from 3.3 % in 2007 to 6.4 % in the following year (Table 5). For Germany no clear change within the general trend could be observed.

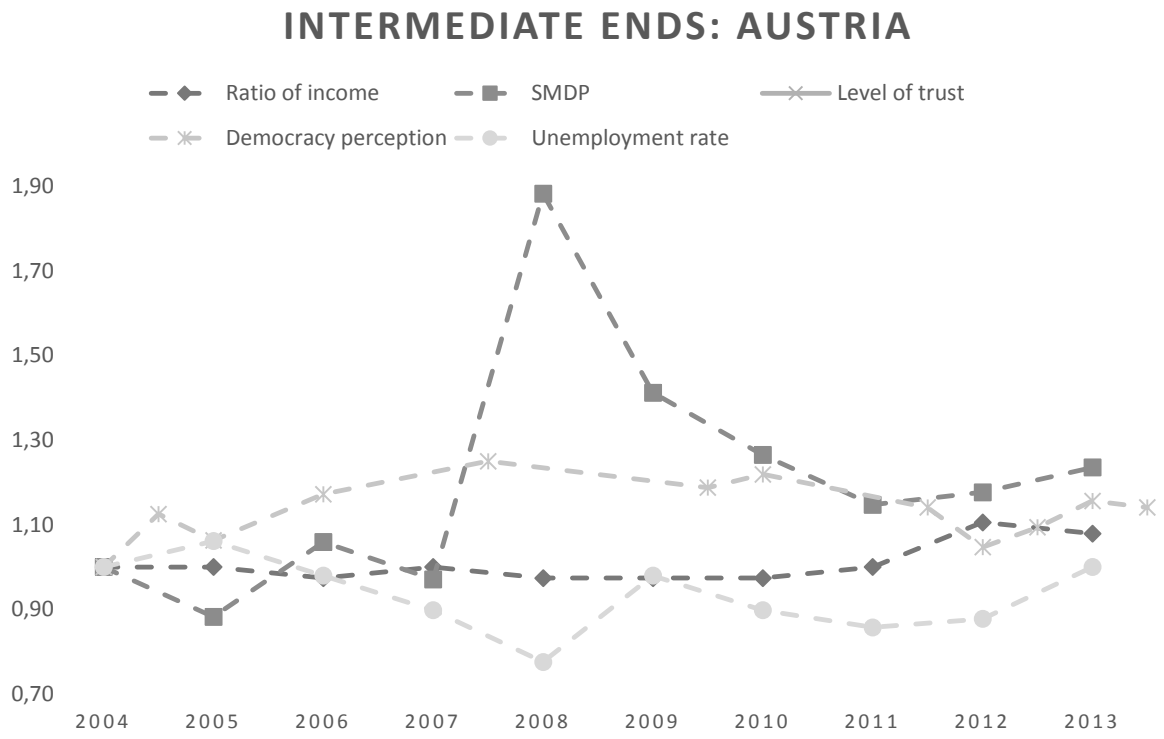


Figure 10 Intermediate Ends: Austria. The figure describes the trends of the five indicators, for the time series 2004/05-2012/13 concerning the *Ratio of income* (Eurostat/EU-SILC), *Severely materially deprived persons* (SMDP) (Eurostat), *Level of trust towards other people* (ESS), *Democracy perception* (ECSE), and *Unemployment rate* (Eurostat. All of them are relativized for sound comparison. Raw data can be found in the appendix (**Table 5**, **Table 6**).

Assessing *Democracy perception*, a clear upward trend can be observed for Germany. The number of people who are satisfied with the functionality of democracy at national level (Table 6) rose by 37.3 % (+4.14 %/y). Also for Austria an increase by 14.0 % (+1.56 %/y) can be observed, whereas most people were actually satisfied with their national democracy system in late 2007.

The data featuring *Level of trust* (Table 6) is quite sparse for Germany. A slight upward trend by 4.1 % (+0.52 %/y) from 2004 to 2012 can be observed. Out of only three data points for Austria, no reasonable trend can be interpreted.

The sixth indicator of this group, namely *Working hours* (OECD), will be presented separately to better illustrate its distinct declining trend and significant drop in 2009—the first year after the beginning of crisis (Figure 10). For both G&A a decline by 3.3 % (-0.37 %/y), respectively

9.1 % (-1.01 %/y) in terms of average annual working hours per person can be observed. The decrease in Austria was nearly 3 times higher than in Germany. But looking at absolute numbers (Table 5) reveals, that in 2013 the annual working hours in Austria (1623 h/y) are still around 17% higher than in Germany (1388 h/y).

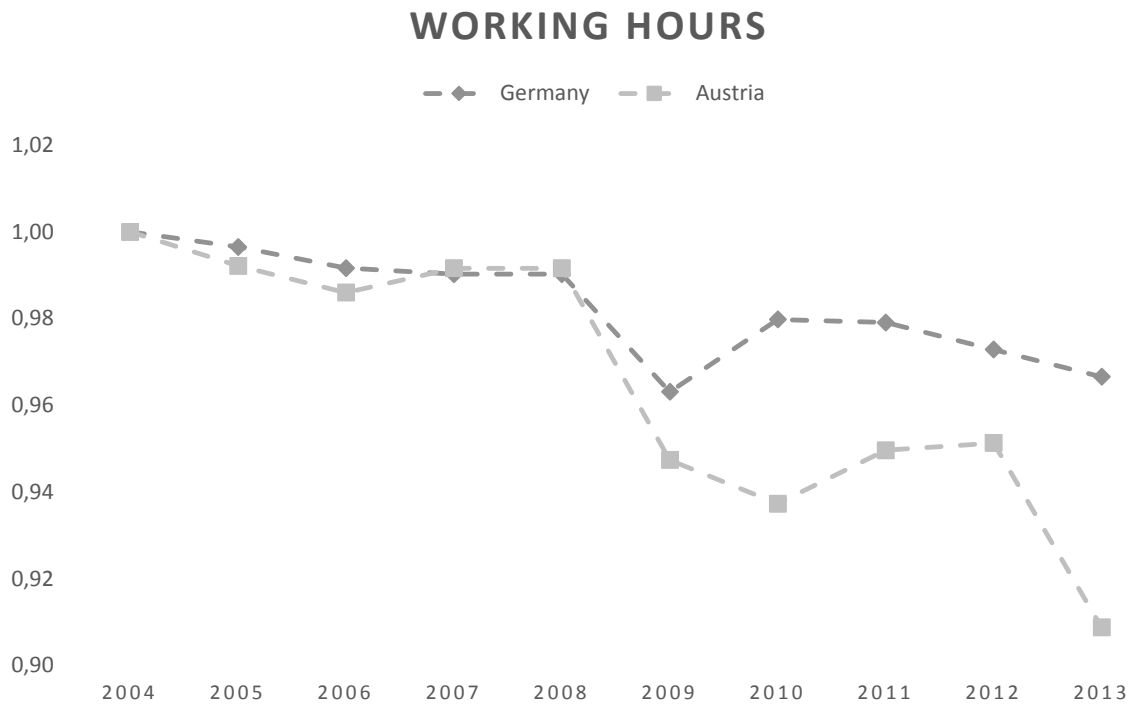


Figure 11 Intermediate End: Increased free time. The figure describes the trends for the time series 2004-2013 concerning the *Working hours* (OECD) for Germany and Austria. All of them are relativized for sound comparison. Raw data can be found in the appendix (**Table 5**).

3.1.4 Ultimate Ends

Finally, coming to the data covering the ultimate end of the framework—'Human well-being'. Contrary to all previous indicators this one is described by two proxies, namely *Subjective well-being* and the purely objective *Life expectancy*. Some could argue to summarize both proxies into one, like the 'Happy life-expectancy' approach by Veenhoven (1996). A strategy like that would allow compensation between both proxies. In other words, an extended life time could compensate for a reduction of subjective well-being. This is not a desirable goal in terms of a steady state economy, wherefore both proxies will be treated individually.

As can be seen, *Life expectancy* is increasing in both Germany and Austria (Figure 12) steadily year by year. Austrians and Germans who were born in 2012 will live on average 1.7 years longer than the ones born in 2004 (Table 7). Both societies show the same increase of 2.0 % (+0.25 %/y) regarding their life expectancy.

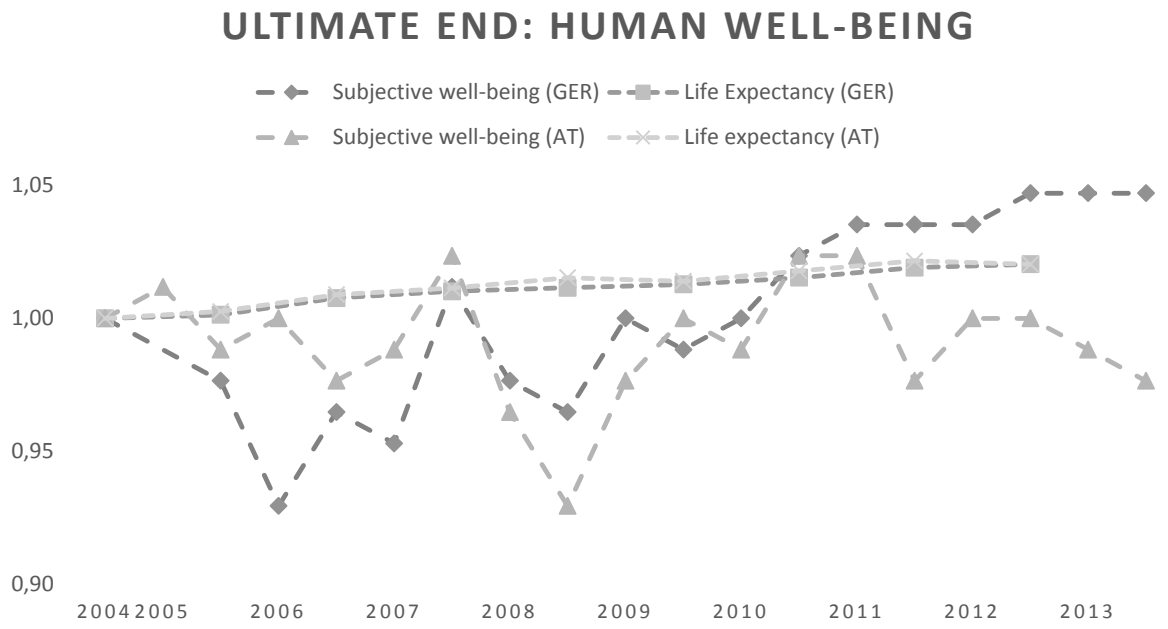


Figure 12 Ultimate End: Human well-being. The figure describes the trends of the two indicators *Life expectancy* (Eurostat) and *Subjective well-being* (ECSE), for the time series 2004-2012, respectively 2004-2013 for Germany and Austria. All of them are relativized for sound comparison. Raw data can be found in the appendix (**Table 7**).

Having a look on the raw data (Table 7) reveals that both Germany and Austria startet out in 2004 with about 85 % of their citizens considering themselves as satisfied (fairly satisfied or very satisfied) with their lives. But over the following years two different trends can be observed. On the one hand, a slight decline of *Subjective well-being* by 1.1 % (-0.13 %) throughout society can be recognized in Austria, with noticable high fluctuations. On the other hand, a significant upward trend for Germany with a rise of about 4.7 % (+0.52 %).

Eye-catching appears the drop in self-reported well-being during the crisis year 2008 in Austria. A similar clear observation cannot be made Germany. Admittely, there is a small noticable decline towards the previous year but it is still in the range of yearly fluctuation.

3.2 INTERVENTIONS

Throughout the second part of the 'Results' section, the measures that were discussed and partly put into action during the recent years in Germany and Austria facing the financial and economic crisis in order to solve emerged problems and maintenance of a functional economic system will be elaborated. The ideas and interventions can be classified into four categories, which contain the responses by

(1) governments (on national and European level);
(2) the financial sector (e.g. European Central Bank);
(3) the private sector; and

(4) the society

Politicians and other decisions-makers decided nearly unanimously to take a variety of steps in order to strengthen the current economic growth model and pursue the *business as usual* (BAU) approach. In order to do so, several ideas came up and were partly transformed into national and European laws. In the following, an overview about the actions which have been taken will be given.

Starting out with the governmental interventions made on national and European level, the following ideas and measures were experienced during the recent years:

(1.1) Incentives and measurements to stimulate economic growth
(1.2) Salvation and nationalization of banks
(1.3) Reformation and stronger surveillance of financial institutions
(1.4) Guarantees for private savings deposits
(1.5) Minimum wage
(1.6) Incentives to promote child births
(1.7) Alternative for GDP

Actions concerning incentives and measurements to stimulate economic growth, like several economic stimulus packages were adopted on national and European level (PdRÖ 2008b; BMWi 2008). Most of the additionally provided money was directed towards highly affected industries, like the automobile one. Concerning employees, short-term working was supported by tax breaks (PdRÖ 2009; SGB III). Furthermore, other tax incentives to stimulate consumption patterns were created, like scrappage programs to promote the exchange of old vehicles with modern ones—supporting the automobile industry. These programs were called *Abwrackprämie* in Germany (BAFA 2009) and *Ökoprämie* in Austria (BMF 2009). To further promote economic activity, debates about consumption coupons for citizens were carried out (Orth 2008). Moreover, the support of self-employment was strengthened by micro credits (European Commission 2010c). On European level, a heated discussion about additional free trade agreements, like the *Transatlantic Trade and Investment Partnership* (TTIP), emerged over the post-crisis years (European Commission 2015). Also, the G-20 states announced throughout the past their efforts towards economic development and call for a “collective action for inclusive and robust growth” as solution towards the recession in 2008/09 in regard of their upcoming meeting (G-20 2015).

In order to prevent a collapse of the economy, salvation and nationalization of banks were necessary. In other words, national governments helped out and saved banks to stabilize the current financial system (BRD 2008; PdRÖ 2008a), like the German *Hypo Real Estate* (HRE 2008). To increase the resilience of financial institutions in the future, reformations and stronger surveillance were set into place. These include for example, regular *stress tests* for banks or stricter rules concerning the stock market (BGH 2010).

The European ministers of finance decided in favor of increasing guarantees for private saving deposits to prevent further damage for private savers and small businesses (Mussler 2008). The long-term discussion about a minimum wage for Germany was finally decided and since 2015 it is national law (BRD 2014). Since 2009, industry-specific wage agreements exists in Austria (WKO 2009).

A long-term strategy towards stabilization of national population and indirectly boosting economic growth was set by financial and social incentives to promote child births (BMFJ 2014; BMFSFJ 2014).

The development of an alternative for the GDP as an indicator to measure wealth and quality of life can be seen as an exceptional alternative towards the BAU approach. The commission of the inquiry "Growth, Prosperity, and Quality of Life" created a set of indicators which should replace the GDP as sole desirable goal in the future (Deutscher Bundestag 2013).

Also the financial sector reacted towards the crises with several measures:

(2.1) Lowering of the base rates
(2.2) Prohibition of naked sales
(2.3) Acquisition of government bonds to support economy

Lowering of the base rate by the European Central Bank was the measurement of choice by the financial institutions to mitigate a further increase of saving rates and to encourage consumption and investment (ECB 2015a). Additionally, short selling was temporarily forbidden concerning some of the major German stocks to prevent potential bankruptcies of these businesses (BaFin 2008). The latest approach by the ECB is the acquisition of government bonds for more than 1,100 billion Euros to stop deflation, support growth and increase exports out of the EU. This strategy is called *quantitative easing* and is supposed to supply banks with additional money to invest in Europe's economy—as stated by Mario Draghi, President of the European Central Bank (ECB 2015b).

Especially hard hit industries had to implement some changes due to the crises:

(3.1) Short-time working & partly redundancies
(3.2) Adaption of supply to changed purchasing power
(3.3) Reduction of production volume

In the private sector, the first steps of adaption in case of reduced demand are shortening of working hours to avoid mass redundancies, as could have been observed for many well-known German businesses (Astheimer 2009).

Further adaptions, which took place in the following years included reorientation of sales strategies towards changed demands of people. Examples for this can be found especially in countries, which were hit even harder by the crisis than G&A. Several manufacturers started to produce smaller packages in concern of the reduced purchasing power (Tagesschau 2012).

Results

The drastic decrease of demand for oil, resulted in significantly falling prices. Therefore, the OPEC decided to reduce its daily production volume to mitigate the price collapse—moderately successful (Tagesschau 2008).

Furthermore, also some social movements among the people and changes on individual level could be recognized:

(4.1) Occupy Movements
(4.2) Voluntary reduction of demands

Grassroots movements emerged after the outbreak of the crisis, like *Occupy Wall Street*. Members of this initiative strongly criticize the growth approach by stating that "we can no longer trust our elected officials to represent anyone other than their wealthiest donors, we need real people to create real change from the bottom up" (Occupy Movement). But also on a smaller level, changes could be observed—challenging the current economic growth model. Voluntary movements to reduce the anthropogenic impact on the environment and to live and act more sustainable are evolving in different areas. These include among others *Transition Towns* and *sharing economies* (Hopkins 2013) or alternative approaches to life, like *Voluntary Simplicity* (Alexander 2013)—as opposed to consumerism.

In the adjoining 'Discussion' part, reasonableness of the taken policies and measurements will be evaluated in accordance with the idea of a steady state economy. Some of the actions taken might be desirable for a SSE, also if they were introduced for a different reason or as an act of necessity.

4 DISCUSSION

4.1 EVALUATION OF THE DATA & INTERVENTIONS

In the 'Results' part, the trends of the chosen set of indicators were presented. In this section, the data will be evaluated towards its meaning in accordance with degrowth and a steady state economy. Therefore, the current trends and raw values of the indicators will be compared towards a defined intended goal. As previously mentioned in the 'Method' section, the decision of the target value for each indicator will be carried out by either comparison towards best performing societies or under the premises of educated reasoning and application of the precautionary principle. Obviously, while this strategy does not entirely exclude subjectivity—it is the best possible approach available for now.

Additionally, measurements taken by the government, financial and private sector will be elaborated besides. What were the purposes of these interventions? How effective were they? And were they (partly) consonant with the idea of a SSE? Several scientists have developed copious frameworks how a SSE might look like and which steps will be essential achieving such one. Therefore, various alternative intervention measures will be presented and discussed regarding their purposes and feasibility considering a socially acceptable transition towards a SSE. Proposed ideas of leading scientists in the field will be used as guiding principles of needed policies and transition strategies. This section will also include chosen examples verifying that substantial changes are possible and no Utopia.

Following this purpose, indicators will be grouped neatly in the same way as done in the 'Results' section and discussed in detail—starting out with the *ultimate means*.

4.2 ULTIMATE MEANS

4.2.1 SCALE: ECOLOGICAL FOOTPRINT VS BIOCAPACITY

Starting out with the ratio *Ecological footprint vs. Biocapacity*, its long-term trend is clearly unfavorable for both countries. The German economy exceeded the natural capacities nearly threefold in 2010 and the Austrian one is continuously increasing since the beginning of measurement (Figure 6, Table 2). In regard of evaluating indicator trends, the EF:BC ratio can function as an objective measurement to determine an acceptable level of anthropogenic impact on the environment. As long as the ecological footprint exceeds the biocapacity for a specific area, it can be assumed that the size of the economy itself is too large and overshoots planetary boundaries.

Efforts should be made to reduce the causes of local and global ecological overshooting. Namely, the quantity of resources consumed, magnitude of global trade and impacts of an ongoing technologization, like unforeseen pollution or a further increase in energy usage. The flow indicators—*Direct material input*, *GHG emissions*, and *Primary energy consumption*—are closely related to these factors and approaches to decrease their values should be supported immediately.

Having a closer look towards these indicators, the drops within their trends appear eye-catching (Figure 4, Figure 5). All of them show an offset within their general trend during the decade of interest. This observation is not unexpected, considering the fact that these three indicators describe means, which are closely connected towards a variety of industrial processes. In other words, they are reflecting the extend of national economic activities quite precisely without any considerable time delay.

4.2.2 Material Outflows: GHG emissions per capita

In accordance with the idea of a steady state economy and its necessary transition phase via degrowth, the trends featuring *GHG emissions per capita* progress promisingly. For both Germany and Austria, a continuous downward trend can be observed—accelerated by impacts of the crisis (Figure 4, Figure 5). Assuming that there is no scientific proof for a sustainable level of GHG emissions yet, precautionary only declining values are evaluated as desirable.

The reduction of emissions can be partly contributed towards the EU's initiative *Europe 2020*. Among other targets, it claims for a reduction of greenhouse gas emissions by 20 % prior to 1990's values, respectively up to 30 % if the conditions are right (European Commission 2010b). In order to avoid global warming by more than 2 °C and associated catastrophic climate change, the extent of this cut-back might not be sufficient. Kevin Anderson, the Deputy Director of the UK Tyndall Centre and expert on greenhouse-gas emissions, claims that "we need a 10 % absolute reduction per annum, and there is no analysis out there that suggests that is in any way compatible with economic growth" and in order to achieve the internationally agreed goal, the wealthy part of the world has to "cut back very significantly on consumption" (Transition Culture 2012). Further institutional initiatives like caps on emissions and resources are needed to achieve an ongoing process of reduction (Jackson 2009).

At this point, it has to be mentioned that a huge part of manufacturing in western countries has been transferred towards lower income countries over the recent years (Jackson 2009; Hopkins 2013). Therefore, many GHG emissions are not captured by national statistics anymore. Consequently, the trend of declining emissions looks—to some extend—more satisfying than it would be if taking these outsourced emissions into account. A different

indicator might be discussed to somehow include these hardly measureable additional emissions.

4.2.3 ENERGY USE: PRIMARY ENERGY CONSUMPTION PER CAPITA

A similar desirable trend can be observed for the *Primary energy consumption per capita* in Germany, which is also steadily decreasing. For Austria, this observation cannot be made yet (Figure 4, Figure 5). In 2012, the energy consumption in Germany amounted to 3.6 tons of oil equivalent per capita (t.o.e.), respectively 3.8 in Austria (Table 3). This was higher compared to the average of 3.1 t.o.e. throughout the 28 countries of the EU and 3.2 t.o.e. in Denmark (Eurostat 2015)—one of the countries with the highest percentage of people living a satisfied life (ECSE 2015). Taking Denmark as a potential top performer, further reduction of energy consumption in G&A is desirable.

In general, energy efficiency is argued to be the major solution for a reduction of energy consumption. Similar like the reduction of GHG emissions, it is one of the EU's targets concerning its *Europe 2020* initiative. Energy efficiency should be increased by at least 20 % (European Commission 2010b). However, the often promised absolute decoupling of economic growth from energy and material consumption could not have been observed in the past—"even relative decoupling just isn't happening" (Jackson 2009). A comparison of GDP and energy use across 175 countries shows clearly that economic output and energy use are highly correlated (Dietz and O'Neill 2013). Resource savings due to technological progress are often largely compensated due to the *rebound effect* (Grubb 1990). In the past, the rebound effect was often neglected by decision-makers and pro-growth representatives. This general ignorance changed a bit over the last years. The German government started to recognize the rebound effect as "a disturbing phenomenon concerning the improvement of energy efficiency". Furthermore, it was realized that the total reduction of energy consumption is mitigated significantly due to usage increase of now more energy efficient products (direct rebound effect) and an increased consumption rate of additional goods (indirect rebound effect), which require a lot of energy and material input as well (Deutscher Bundestag 2014). The commission of inquiry "Growth, Prosperity, Quality of Life" admits that the rebound effect is more relevant than have been discussed so far (Deutscher Bundestag 2013). In this context, it should be noted, that also a collective of leading German scientists sees a reduction of energy consumption in the first place as prerequisite to cover the energy demand in the future. Just increasing energy efficiency alone will not be sufficient (Pehnet *et al.* 2012).

High energy consumption rates correlate with high GHG emissions and material extraction rates. Therefore, in order to shrink the overall size of the economy to a sustainable level, further reduction of primary energy consumption must be seen as unavoidable. Energy efficiency alone will be a lost approach without sufficiency.

4.2.4 MATERIAL INPUTS: DIRECT MATERIAL INPUT PER CAPITA

The *Direct material input* is still increasing in Austria and maintaining relatively constant in Germany—with noticeable annual fluctuations (Figure 4, Figure 5). DMI includes "all materials which are of economic value and which are available for use in production and consumption activities", as defined by Eurostat. In other words, it is the sum of all domestic extracted materials from the environment for further processing in the economy and imported products. Different from GHG emissions, DMI includes also imports and therefore it can be argued, that it represents the environmental burden more accurately. Despite their comparable status of wealth, Austria's level of DMI was around 40 % lower than Germany's in 2013 (Table 3). This can be partly explained by more industrial production and therefore higher export rates of Germany than Austria (Eurostat 2015).

Overall, the development of DMI cannot be seen as desirable in concern of a sustainable future. It seems like national efforts and initiatives have not been able to reduce DMI in G&A yet. Achieving any significant progress might also be quite difficult respectively towards the widespread German demand to be world export champion.

Similar to energy consumption, no absolute decoupling of material input and economic activity could have been reported so far (Jackson 2009). Today, humanity is using roughly eight times more material resources than a century ago (Krausmann *et al.* 2009).

Dietz and O'Neill (2013) call for "policies that reduce throughput with minimal impingement on personal freedom", which include direct methods like bans, rationing, and a tradable permit system. Additionally, indirect methods like conservation of natural areas and payment schemes for ecosystem services are necessary. Accordingly, others advocate for a green or ecological tax reform "to transform (…) the tax system, from one based principally on work to one based on the use of energy and resources" and termination of subsidies and investments towards activities, which are highly polluting (Kallis and Research & Degrowth 2015). A significant reduction of transportation chains, sharing of goods, and prolongation of operation lives would also facilitate the reduction of material input as well as lower emission rates (Paech 2012). Other strategies to reduce material consumption include a limitation or ban of advertisement to diminish the persuaded demand of unnecessary and environmentally unfriendly goods and services (Jackson 2009).

But long-term sustainable change cannot only be accomplished by introducing several top-down policies. A fundamental change of social demand towards *enough* instead of *more* is even more important.

4.3 Intermediate Means

Contrary to the ultimate means, the indicators representing intermediate means do not show any offsets towards the crisis within their general trends over the last 10 years at all (Figure 7, Figure 8).

4.3.1 Built capital: Area for settlement/construction and traffic

In Germany, the *area for settlement and traffic* shows a steady increase. From 2010 to 2013 it increased by 2.2 %. On average, these are 73 hectares per day—equaling 104 football fields. It should be noted that area for settlement and traffic does not match sealed area. Additionally, it includes areas for recreational purposes, like parks and sport facilities. But due to the fact, that these areas change natural habitats too such a significant degree, they should be included during evaluation of anthropogenic impacts in consequence of built capital. The German government states within their sustainability strategy, a reduction towards less than 30 hectares additional surplus per day until 2020 (Statistisches Bundesamt 2014). Right now, this goal seems far away. Even if it will be reached eventually, its sustainable aspect stays questionable when at the same time not an equal amount of area is reconverted into natural habitats.

Similar, the situation concerning the *area for construction and traffic* is progressing in Austria. From 2010 to 2013 it increased by 20.1 hectares on average per day. This is eight times as much as the Austrian sustainability strategy is aiming for. The increasing demand for more living space, shopping facilities and better infrastructure are major causes (Umweltbundesamt 2015). The general increasing demand for areas is an often irreversible progress and therefore one of the major causes of environmental problems (Statistik Austria 2014).

A steadily increasing trend of this indicator must be clearly seen as undesirable. Concerning the future, more serious reduction approaches must be set into place by responsible institutions to meet at least the stated goals and avoid further environmental damages, like an irreversible loss of biodiversity.

4.3.2 People: Population

The second stock indicator is the human *population*. An increase in populations equals a smaller share of natural resources available to each person. In times of resource scarcities the logical approach is to reduce the amount of people by decreasing birth rates to relieve the environment of anthropogenic impacts.

In contrast, national governments have taken social and financial incentives to promote child birth in the long-term (BMFJ 2014; BMFSFJ 2014). So far, these strategies seem to be unsuccessful. The idea of increasing birth rates to sustain the economic system to ensure a sufficient work force and security of pensions by monetary incentives and reforms is a reoccurring topic in politics. As stated by the Austrian minister for family affairs Karmasin, more domestic children are necessary to fulfill the demand for qualified employees and young entrepreneurs (Bauer and Schwaiger 2014). Needless to add, financial and social support of young families is important and a fundamental characteristic of developed countries with a well-functioning social infrastructure. But experiencing the empowerment of women and other shifts in society might require to look around for alternatives than pursuing the old dogma—more children.

Overall, fertility rates have not changed noticeably since 2004. Germany and Austria have one of the lowest rates worldwide. Over the recent years, it was relatively stable at around 1.4 in G&A—whereas ”a rate of 2.1 is considered to be the replacement level fertility rate” (Eurostat 2015). Due to a significant surplus of migration flows, positive annual growth rates of national populations can be observed in Austria (Table 4). In 2013, more than 151,000 people immigrated into Austria and around 97,000 emigrated (Statistik Austria 2015). Also, Germany is showing an increasing surplus of immigrants (+428,600 in 2013; Statistisches Bundesamt 2015a), lately reinforced by increasing migration rates of refugees. But in relative terms, this surplus is not sufficient enough to compensate low birth rates (Table 4).

For the sake of completeness, it should be mentioned, that currently Germany’s population density is more than twice as high as Austria’s (Eurostat 2015). Consequently, Germany has a comparatively harder task to accomplish—reducing its population density towards a sustainable level.

Due to the fact, that a sustainable level of population is not scientifically proven so far, only declining populations are evaluated as desirable in the context of this work. Whereby, Germany’s demographic development is evaluated as desirable and Austria’s as undesirable at the present time. The Department of Economic and Social Affairs of the United Nations predicts an increase of population to 9.35 million people living in Austria and a decline to 72.6 million people in Germany by their medium variant model (UN 2012). In other words, leading experts see the observed trends most likely to continue over the next 35 years.

The problem of overpopulation can only be solved successfully in the long-run. Next to widespread education about family planning, also ensuring an uncomplicated access to contraceptives is essential. In G&A the fertility rates are already quite low. Therefore, it should be focused on improving immigration policies. An immigration reform, which invests into nations abroad and encourages them to retain their most skilled workers instead of recruiting them is necessary. Additionally, this would help developing countries more than short-term aid programs. The one-child-per-family policy in China has shown, that top-down controls

have many negative effects on a society and are therefore not seen as a sustainable solution (Dietz and O'Neill 2013).

4.3.3 LIVESTOCK: LIVESTOCK PRODUCTION INDEX

Regarding the third indicator of the intermediate means group, the *Livestock Production Index* is steadily increasing in both countries (Figure 7, Figure 8) and will be consequently treated as undesirable. Moreover, Germany's meat production even reached an all-time high last year (Statistisches Bundesamt 2015b).

Generally, around 60 % of all harvested plant biomass is utilized as food for different kinds of livestock (Krausmann *et al.* 2008), whereby the amount of resources required to sustain such a huge industry is substantial and must be taken into account when evaluating resource flows. The livestock industry is a major contributor of greenhouse gas emissions and driver of climate change. Researchers estimate it accounts for 14.5 %, which is "more than direct emissions from the transport sector" (Bailey *et al.* 2014). Therefore, only declining trends concerning the meat and dairy production—represented by the LPI—are evaluated as desirable in regard of the idea of a SSE.

So far, little to no serious attempts have been made by policy-makers to reduce meat and dairy products consumption (Bailey *et al.* 2014). A *meat tax*, as proposed by the Swedish agency for agriculture for the entire EU, has not come to fruition so far (El-Sharif 2013). The same applies to the idea of Jochen Flasbarth, President of the German Environmental Agency, who would like to include mass production farms into the European Union Emission Trading Scheme. Also, he advocates to reduce the application of fertilizers significantly, mitigating the negative effects of additional nitrogen in the atmosphere (Ehrenstein 2013). In general, lack of information about livestock's significant contribution towards global climate change is a major reason for political inactiveness. But, the consumption patterns of educated individuals shows that closing the prevalent awareness gap might be an important first step for a mainstream behavior change (Bailey *et al.* 2014).

Then again, top-down regulations alone, like arbitrary quotas set by policy-makers, would lead towards a price increase for meat and dairy products due to artificially created scarcity. This would hit low-income households especially hard and result in an increase of inequality within a society and enhancement of social problems in the long run. Therefore, a solution towards this problem can only be achieved by change of behavior and consumption patterns on social level. If the demand for meat and other livestock related products will decline, also its overall production volume will be reduced. Hence, a shift towards a less meat-intensive society and more vegetarian lifestyle is inevitable. Nevertheless, this transition process could be supported by soft governmental interventions, like tax incentives for non-meat and non-dairy

products, nudging people into the desired direction. Additionally, the continuation of subventions for the livestock industry is not justifiable anymore.

4.4 INTERMEDIATE ENDS

4.4.1 EQUITY: S80/S20 INCOME QUINTILE SHARE RATIO

The equity representing *S80/S20 income quintile share ratio* shows a slight increase for both countries (Table 5), despite the significant increase of the gross national income (GNI) per capita in parallel.

For G&A a raise of GNI per capita by around 29 % can be calculated over the same time period (World Bank 2015). These findings indicate that the idea of overall growing income levels does not lead to a fairer and more balanced distribution of wealth. Increasing total wealth of a society favors under current conditions already higher income households more than lower ones—widening the income gap. Nevertheless, economic growth is often argued to be the solution towards inequality.

Income equity itself is important because it describes the degree of social stratification, a crucial characteristic of a well-functioning society. A high level of inequity is significantly correlated with health and social problems, like “mental illness, violence, imprisonment, lack of trust, teenage birth, obesity, drug abuse, and poor educational performance of schoolchildren”—concluding that “the vast majority [of the population] benefit from greater equality” (Wilkinson and Pickett 2009). It is further stated that “standards of health and social well-being in rich countries may now depend more on reducing income differences than on economic growth without redistribution”. An underpinning argument in favor of redistribution over pursuing total income growth, is shown by several studies. A simple comparison of GDP and happiness, demonstrates that both correlate upon to a specific point but “beyond an average national income of about $20,000 a year, additional [income] does not appear to buy additional happiness” (Dietz and O'Neill 2013). In other words, until people cannot meet their basic needs, like proper housing and an adequate nutrition, increasing levels of income by economic growth improves their lives. Nevertheless, any further surplus does not increase peoples’ happiness and life satisfaction at all.

Therefore, any sustainable approach to shrink the income differences between the richest and poorest within a society should be an important goal towards mitigation of social dysfunction and establishment of a steady state economy. In comparison towards other countries of Western Europe, G&A have still some room for improvement. Most equally distributed levels of income can be observed in the Nordic countries Norway and Iceland (Eurostat 2015). Unfortunately, the development headed in the wrong direction over the recent years, both in

Austria (Figure 10) and Germany (Figure 9). The progress concerning equity is therefore evaluated as undesirable for both countries.

Recently, the first step encouraging a more equal income distribution has been done by the introduction of a minimum wage by law (WKO 2009; BRD 2014). But further arrangements have to be set into place. These might include an improvement of social programs, ceiling of income, and unconditional basic income for every citizen—also called citizen's income (Dietz and O'Neill 2013; Kallis and Research & Degrowth 2015). A study performed in Spain, states that it is feasible to provide every citizen with an unconditional basic income of 400 to 600 Euros per month with only minor adjustments of the current tax system (Arcarons *et al.* 2014). Therefore, a similar program should be achievable in even wealthier and more economically stable countries, like Germany and Austria. Additionally, Dietz and O'Neill (2013) argue for a democratization of the workplace, which includes a maximum of pay differentials, more employee-owned companies, transformation of enterprises into cooperatives, and improvement of gender balances. Furthermore discussed are a "revised income tax reform, (…), improved access to good quality education, anti-discrimination legislation, anti-crime measures and improving the local environment in deprived areas" (Jackson 2009).

Social protests, like the Occupy Movement, demonstrate a change in social thinking patterns. The number of people with a preference for fairness over selfishness and a more equitable distribution of income is growing. Movements like this, which emerged out of the financial and economic crisis, are an important prerequisite for change and can give the necessary pushes to democratize economic institutions.

4.4.2 Fulfilment of basic needs: Severely materially deprived people

Another unfavorable development can be observed regarding the fulfilment of basic needs, indicated by the percentage of *severely materially deprived people* within a society. In both countries the amount of people who cannot afford an adequate level of living conditions increased over the last decade (Figure 9, Figure 10) and will be clearly evaluated as undesirable.

Especially, the tremendous jump in affected persons during the start of the crisis in Austria should be noted. For Germany, such a significant offset cannot be observed. It could be an evidence that the crisis hit the low income brackets in Austria harder than in Germany. This might be due to a less resilient social safety net in Austria, which is less robust towards external and internal disturbances than Germany's.

The general trend of SMDP underpins the abovementioned statement, that an increase of total wealth within a society alone is not sufficient enough to eradicate poverty. A great part of society does not benefit by a raise of average GNI per person. Redistribution and

improvement of the social infrastructure are inevitable for a successful transition towards a steady state economy.

4.4.3 FREE TIME: WORKING HOURS

More delightful is the progress regarding the amount of free time, indicated by annual *working hours*. For both countries a significant decline of working hours can be observed (Figure 11, Table 5) and the trends are therefore considered as desirable. The international comparison reveals, that in 2013 only the Dutch (1380 hours) worked less than Germans (1388 hours). Austrians worked much more (1623 hours) but still less compared to all OECD countries (1770 hours) on average (OECD 2015).

In regard of a steady state economy it is desirable to reduce the amount of working hours as long as labor productivity is increasing. On the one hand this will allow to share the total amount of work fairer throughout society, resulting in declining unemployment rates—especially in the short-run. On the other hand, it will reward people with more free time, which can either be utilized for personal activities to improve individual well-being or voluntary community work to strengthen social structures and help people in need (Dietz and O'Neill 2013; Kallis and Research & Degrowth 2015). Additionally, people with unsatisfying jobs would have to spend less time doing these and "at least for some decrease also their consumption of higher-end environmentally-harmful goods and services. Redistributing work would also enhance access for more people to essential goods and services" (Kallis *et al.* 2013). Furthermore, it has been shown that "working hours are significantly associated with greater environmental pressures" (Knight *et al.* 2013). The German economist Niko Paech sees a transformation of the 40 hour workweek as most important prerequisite towards post-growth society. This new workweek should consist of 20 hours sustainable commercial work with shorter chains of production and less dependencies as well as 20 hours of non-commercial work, including voluntary projects and subsistence work (Paech 2012).

The financial and economic crisis accelerated the drop in working hours by introducing short time working in many of the affected industries. Of course, these interventions were not mostly voluntary but forced due to the economic circumstances and market pressure. Nevertheless, the responsible governments are supporting short time working nowadays better (PdRÖ 2009; SGB III), although if it is mainly to avoid a collapse of the current system by maintaining the economic growth model.

For a successful transition towards a SSE, the level of acceptance concerning short time working must be increased within society. Often, people who work 20 instead of 40 hours a week are not seen as full-valued members of the society. National institutions must have the duty to support the transition towards a 20- or 30-hour workweek by setting financial and

social incentives—also in non-crisis times—promoting a reduction of individual working time and establishing a *new normal* world of employment.

They also should—despite all the achievements so far—improve opportunities for part-time work, job sharing, options to take career breaks, and better parental leave conditions. All of these actions can potentially lead towards a reduction of working time and an improved work-life balance (Dietz and O'Neill 2013).

4.4.4 Low unemployment: Unemployment rate

The *unemployment rate* is maybe the most important measure of a well-functioning economy. The amount of people without a job is tracked fastidiously on monthly, quarterly and annual basis. How important and essential meaningful work is for an individual as key constituent in prosperity is widely known (Jackson 2009). In other words, a low unemployment rate indicates a healthy society and stable economy.

For both Germany and Austria, the development of the rate of unemployed people is evaluated as desirable since 2004 (Table 6). While the rate was continuously falling in Germany (Figure 9) it stayed considerably low in Austria (Figure 10). The crisis did not have a significant impact when evaluating annual numbers. The international comparison throughout Europe reveals, that in 2013 the unemployment rates of G&A were significantly below EU's average (10.8 %). Only Norway had relatively more of its citizens employed (Eurostat 2015).

It might be argued that in countries with a strong infrastructure of social security benefits, the amount of long-term unemployment—defined as more than 12 months—is even more relevant. A short period of time without work will not hurt the affected ones financially due to a well-established support system and most of the negative psychological and social effects associated with unemployment are way more prevalent in the long-run. Especially Austria shows a very low amount of its people affected by long-term unemployment. In 2013, only 1.1 % of Austrians experienced to be out of work for more than 12 months straight, compared to 2.3 % of Germans. Both rates are way lower than the European Union's average of 5.1 % (Eurostat 2015).

As mentioned above, a further step towards full employment can be achieved by a reduction of individual working hours to share the total amount of work more equally throughout society. Of course the idea of work sharing has its limitations due to shortages of skilled workers for some industries, but in general it might be a good first step towards improvement.

Next to work time reduction, also guaranteed jobs are required. The national governments themselves have to take responsibility and create meaningful jobs for their citizens. Full employment becomes possible this way and furthermore leads to a stable income support, use of cheap labor for public works, and improvement of psychological and social conditions

throughout all levels of society (Dietz and O'Neill 2013). Additionally, a general structural transition to service-based activities and investment in ecological assets is required (Jackson 2009).

But to provide significant change, overcoming excessive consumerism must be achieved—terminating the throw-away society. If the demand for material goods is diminished, less production of goods will be required and consequently less working hours. Social studies indicate the desire to rather work less than earn more money. Around 84 % of Americans stated they would like to trade some or all of their future income for additional free time (Schor 1993). After acquiring the basic needs, what really is valued by most of the people, is more time instead of more consumer goods. This time can be spend on meaningful social interactions or any other kind of activity, which will increase individual and collective happiness as well as life satisfaction.

4.4.5 Sense of community: Level of trust towards other people

The *level of trust towards other people* as social indicator for the sense of community showed a slight improvement over the decade of interest for Germany (Figure 9) and is therefore evaluated as desirable.

In a post-growth society, in which people will spend more of their time at local communities than at work a high level of trust towards others is an important feature of such one. Definitively, it is a partly subjective indicator representing a combination of various factors, like social stratification or crime rates and several unknown personal values.

Due to its non-exclusively object nature, improvements concerning the level of trust are not straightforward. On institutional level governments could support local meetings of its citizens or more financial incentives for community-based clubs might be an idea. Also improvements regarding the income ratio will lead to higher levels of trust by diminishing social and material differences. But real significant change will only emerge by a change of behavior patterns, concerning unproductive status competition and standing out by exaggerated consumption rates (Jackson 2009).

4.4.6 Participatory democracy: Satisfaction concerning national democracy

Finally, the progress of *satisfaction concerning national democracy* indicating participatory democracy rose in Germany (Figure 9) and is therefore evaluated as desirable. The increase in Austria (Figure 10) was significantly lower but overall it is seen as a barely positive development.

Looking at the absolute numbers of people who are satisfied with the work of their government reveals that G&A (70 % & 73 % in 2013) have still a long way to go catching up with the best performing countries in Europe, like Denmark (91 %; ECSE 2015).

National governments could improve the levels of satisfaction by involving their citizens stronger into decision processes and making political processes more transparent. More direct democracy approaches might be an idea.

4.5 Ultimate Ends

The ultimate goal of a society should be to maximize the experienced well-being of its individuals. As already stated before, it is indicated by self-reported *subjective well-being* and *life expectancy* as an objective proxy.

4.5.1 Human well-being: Life expectancy

The interpretation of the objective measure *life expectancy* at birth is easy to conduct. An increase in life expectancy is seen as a desirable development due to the universally valid ambitions of a long life. For both countries a robust increase of years to live can be observed (Figure 12, Table 7).

Reasons for a continuous raise of life expectancy are manifold. Improvements concerning healthcare, hygiene, nutrition, habitation, labor conditions, and higher security standards to prevent accidents are some of them (BPB 2012). So far, there are no signals leading to the assumption, that life expectancy will not continue to grow in the following decades. Compared to other highly developed countries, G&A have some room for improvements. Japanese people reach 84.5 years on average. In Europe, Swiss citizens are on top with around 82.4 years (CIA 2014).

Further improvements within the health and social security sector, continuing peace, and reduction of working time in physically demanding industries will further increase the average life expectancy.

4.5.2 Human well-being: Subjective well-being

Measuring individual *well-being* is more complicated due to its subjective nature. For different people various things and values are important. Therefore, the best and most common approach is to simply ask people to evaluate their life individually on a defined scale. The

survey's results reveal, that in late 2013 around 83 % of Austrians and 89 % of Germans were generally satisfied with their lives (Table 7, Figure 12). Compared to 2004 these are significantly more Germans and the corresponding trend is therefore considered as desirable. The values of subjective well-being in Austria over the last ten years are considered as undesirable due to their consistency at a relatively low level.

Comparisons towards other European countries, like Denmark or Sweden (both 97 %; ECSE 2015), show clearly that there is a lot of room for improvement. Different appreciations on individual level lead towards the presumption that wishes and desires between societies differentiate as well. Hence, developments and interventions which facilitated an improvement of life satisfaction in one country will not necessarily do so in another one.

By stating that a fully functional and well-established steady state economy will not only improve the shape of the environment but also the well-being of society and its individuals, the justified assumption can be made that any improvement concerning each of the presented indicators will facilitate the transition towards increasing human well-being.

4.6 STEADY STATE SCORECARDS

The sound interpretation of the data gives the opportunity to develop national steady state scorecards for both Germany and Austria—wrapping up the results concerning each indicator in an easy-view summary (Figure 13). The trend of each indicator is illustrated by arrows (upward, downward, and constant) and is either evaluated as desirable (green) or undesirable (red) in terms of a steady state economy. The colorless circle indicates that there is no sufficient data available. Additionally, the stars mark an offset (black = significant, grey = slight) within the general trend during 2008/09. These offsets might indicate a potential correlation towards the financial and economic crisis.

There are two basic ideas, which are tried to be achieved by the development of such scorecards. Firstly, they give a profound compilation, based on an educated evaluation, in regard towards the current state of a country concerning the ultimate goal of a steady state society. People in charge, like politicians and other decision makers will be able to use the national scorecard as a purely scientific starting point to identify and attempt the major challenges their country is currently facing. Secondly, they reveal which countries are already making good progress towards a SSE divided into specific fields. This opens up opportunities for currently worse performing countries and encourage them to take a closer look at better performing ones to learn from their experiences.

Of course, the concept of SSS could be also employed on different scales—specific regions or areas within a country. At a later stage, even a global application could be considered to evaluate humanity's progress towards a SSE as a whole.

ENDS & MEANS	INDICATOR	EVALUATION GERMANY	AUSTRIA
Human well-being	Subjective well-being		
	Life expectancy		
Equity	S80/S20 income quintile share ratio		
Fulfilment of basic needs	Severely materially deprived people		
Free time	Working hours		
Sense of community	Level of trust towards other people		
Participatory democracy	Satisfaction concerning national democracy		
Low unemployment	Unemployment rate		
Built capital (Stock)	Area for settlement/construction and traffic		
People (Stock)	Population		
Livestock (Stock)	Livestock Production Index		
Material inputs (Flow)	Direct material input per capita		
Material outflows (Flow)	GHG emissions per capita		
Energy use (Flow)	Primary energy consumption per capita		
Scale	Ecological Footprint vs Biocapacity		

Figure 13 Steady State Scorecards (SSS) for Germany and Austria. Summary of the trends concerning all 15 indicators and their educated evaluation concerning a steady state economy. The arrows indicate the average trend (upwards, downwards, and constant) of the individual indicators during 2004-2013 and their colors if these trends are desired (green) or undesired (red) in regard of a SSE. The colorless circle indicates that there is no sufficient data available. Additionally, the stars mark an offset (black = significant, grey = slight) within the general trend of the specific indicator. These offsets might indicate a potential correlation towards the financial and economic crisis.

5 CONCLUSION

Today, the rate of environmental degradation, exploitation of resources, and impact of climate change is continuously increasing. The *business as usual* approach—fixing economic problems with further debts and economic growth—is no option anymore. It is time for a fundamental change towards a sustainable economic system, which interacts within the ecological limits of the planet. In the end, physical laws are stronger than economic ones and cannot be simply changed or overruled. The economy is a subsystem of the biosphere and should not grow larger than the system it is embedded in. The new goal must not be to increase GDP year by year, but to improve satisfaction and quality of life without further environmental degradation.

Already the great economist Adam Smith realized that economic growth can only be a temporary phase in humanity's history. In the late 18th century, he estimated that the period of growth will continue about two hundred years until resources become extremely scarce and labor effectiveness cannot be increased anymore (Spengler 1976). It turned out his predictions were surprisingly accurate. Also other well-known economists and respected scientists realized the limits to growth ages ago, among them John Stuart Mill (Mill 1900) and John Maynard Keynes (Keynes 1932). During the last decades calls of warning were growing ever louder and more precise (Meadows *et al.* 1972; Daly 1973; Jackson 2009). Despite all knowledge of the underlying problem and potential solutions, politicians and other decision-makers have ignored the signs for the most part until today. To paraphrase, “the knowledge that carbon emissions would sooner or later threaten the survival of civilization was known decades ago, but governments have done very little about it relative to the scale, scope, and longevity of the problem” (Prugh *et al.* 2014). Even though environmental destruction has become more and more visible, the mainstream opinion about pursuing growth to solve economic and social problems has not changed. Alternative approaches that favor degrowth and a steady state economy are still exceptional cases.

The elaborated scorecards reveal, that G&A are on a desirable pathway concerning most of their social accounts (Figure 13). Out of eight indicators, six show a worthwhile development for Germany, respectively four for Austria. The ones with undesirable trends concern equity and fulfillment of basic needs. This leads towards the assumption that despite overall growth of income and wealth, particularly already low income households suffer from the current economic system. Further increasing income differentials will put more people at risk of experiencing severe material deprivation in the future.

In regard of the biophysical accounts, a lot more red arrows can be seen in the diagram (Figure 13). For Austria six out of seven indicators show an undesirable trend—only GHG emissions are declining. In contrasts, for Germany only four of the indicator trends are evaluated as undesirable. Nevertheless, it could be clearly demonstrated that the development regarding

biophysical accounts is obviously not in accordance with the idea of a steady state economy. Further undesirable trends will also find expression in the indicators of the social accounts at some point. Ever increasing environmental burdens will most likely have negative impacts on peoples' mind and health.

Most of the indicators are interconnected towards each other to varying degrees. A further increase in material input will lead to a rise of EF:BC ratio and eventually towards a decline in life expectancy. But, the interconnectedness of indicators will also open up opportunities to achieve improvements towards a SSE, e.g. the reduction of individual working hours will simultaneously decrease the unemployment rate. Likewise, a declining population will facilitate a reduction of the material input as well as GHG emission and energy consumption rates—given that behavioral changes emerge at the same time. Conclusively, improvements in one field will make it truly easier to achieve desirable developments in others. Therefore, national governments should focus on easily realizable initiatives as a first step. Besides others, these include a further support of short-time working, reduction of income inequality by tax reformations and capping of emission rates by law. Other strategies towards a SSE, like education about family planning to reduce total population or changes in consumption patterns towards less energy usage, require predominantly behavior changes—achievable by improved education. Hence, improvements in these categories will need more time to come into the picture. Nevertheless, they are as important as regulatory measures taken by authorities. Considering a positive progress in the mentioned categories, other improvements will follow compulsory. These include the EF:BC ratio, sense of community and overall human well-being.

In general, the progress towards a SSE by just comparing indicator trends looks currently more promising in Germany than Austria. Overall, a desirable development can be observed for nine, respectively five out of all indicators. To relativize these results, it has to be noted that Germany is performing worse in many fields if comparing absolute numbers—including direct material input, GHG emissions, area for settlement and transportation, population (density), income share ratio, and SMDP. In other words, despite the more desirable overall progress in Germany, the way towards a sustainable state is comparatively longer than in Austria and will require more effort to achieve.

The financial and economic crisis was reflected quite well within the flow indicators (ultimate means), as already described in detail in the 'Discussion" part. Furthermore, the crisis accelerated significantly—even though unintenionally—the reduction of average working hours in both countries of interest. In Austria the amount of people who suffered materially skyrocked in 2008 and decreased slowly in the following years. This oberservation could not have been made in Germany, where levels of SMDP stayed constant over time. One speculative explanation for this difference might be a more stable social security net in Germany than in Austria, supporting people with low income and no financial reserves in times of unexpected unemployment or other crises better. The overall goal of a SSE, represented by

subjective well-being and life expectancy, did not show any impact throughout the years of crisis—underpinning the hypothesis that increasing income and material wealth is not a necessarily required to improve human well-being.

The proposed framework proved to serve as a robust first methodical approach in order to evaluate the current state of transition towards a steady state economy through degrowth. It delivers together with the steady state scorecards an elaborated overview of the progress. Nonetheless, it does not represent a profound evaluation framework yet. As already explicitly mentioned in the 'Method' section, some of the proposed indicators had to be changed to alternative ones due to various reasons. Data availability and ineffectual choice of indicators were of major concern, e.g. regarding the sense of community and fulfillment of basic needs, respectively. For further application of the framework, collection of reliable and comparable data covering longer time series must be encouraged as well as an established set of appropriate and justified indicators.

To give an example which demonstrates the need for further improvement of the theoretical framework, a closer look into the current financial system might be helpful. The monetary system proved itself over the last years to be unsustainable and not resilient against internal and external disturbances. A more stable system which meets the requirements of a steady state economy is needed. In other words, the current one must be replaced by a more promising one—including important features like a “Tobin tax on international currency transfers” or “a carbon levy paid by richer nations on imports from developing countries” (Jackson 2009). Some advocate for a system consisting of three kinds of currencies (Cato and Mellor 2010; Dietz and O'Neill 2013). A local currency which is only valid in a specific region—supporting community trust and environmental protection by shortening of transport chains due to preferably local trading. The establishment of such local currencies can already be observed in various countries worldwide, including Germany (e.g. *Chiemgauer*) and Austria (e.g. *Waldviertler Regional*). On superior level a stable national currency is needed with additional restrictions and improved monitoring by corresponding authorities—avoiding the possibility of simply issuing money as debt and multiplying it by long-term holding. Finally, a global currency to improve sustainability and equity of international trade should be created. This one could be issued by an independent organization as fiat money or by linking it to a physical resource. Howsoever this currency might look like, it must not be controlled by a single or coalition either countries or institutions. One idea of a decentralized and open-source technology is the cryptocurrency *Bitcoin*. It is an alternative, instant, and cheap payment network in its early stages of development, which operates without a central bank or authority (Bitcoin Project 2009).

The importance of a reliable financial system should also be taken into account during evaluation of the process towards a steady state economy. Hence, it must be reflected somehow in the framework of means and ends. At a later moment, O’Neill himself added the *rate of inflation* as a proxy to his proposed set of indicators (D'Alisa *et al.* 2014). If this one will

be sufficient enough to represent the reformation of the financial system stays arguable because the inflation rate alone is not adequately representing the long-term functionality of a financial system. This example clearly shows that the set of indicators used throughout this work is obviously not fully developed at current stage to serve as a comprehensive evaluation tool. New ends and means might emerge throughout the upcoming century and therefore the framework must maintain flexible with the ability to add, remove or exchange indicators if necessary.

6 OUTLOOK

The events during the previous seven years showed that our current economic system is under no cirumstances suitable for a sustainable future. A system based on indefinetly growth used for a finite system—our planet with limited resources—is in the first place an utopian dream against physical laws and cannot be maintained any longer as our economic system of choice.

Unfortunately, humanity is trapped in an unfavorable state. From a different angle, the current condition can be seen as some kind of *Nash equilibrium*, a concept emerged in the field of game theory. It states, that concerning each stakeholder a change of his or her strategy will not lead to a higher payoff. To serve as an example, introducing a carbon tax on energy-intensive goods would affect various businesses and countries by declining demands of their goods and services due to higher prices. In other words, countries who decide to deviate from the current system will face economic disadvantages—at least in the short-term. Therefore, it is extremely unlikely to expect any change and establishment of a new equilibrium as long as countries will decide individually about future strategies. Only cooperative approaches, like a worldwide taxation of carbon-intensive goods, might truly open up opportunities towards more sustainable practices. International organizations have to take increasing responsibility to support serious measures regarding global challenges. Nevertheless, it does not mean that national governments are off the hook. Setting good examples will motivate others to follow and accelerate the overall process of transition. It must be emphasized again, that during this period grass-root movements—representing fundamental wishes of citizens—will be most powerful to efficiently eliminate grievances. National governments and institutions should provide reliable framework conditions and impose supportive laws. International agreements, like the Sustainable Development Goals by the United Nations (UN 2015), are additional supportive initiatives but not solely satisfying attempts on their own.

The economist Peter Victor has shown that the idea of a SSE is no Utopia on a theoretical level by modeling of the Canadian economy under different growth scenarios. His work reveals that it is possible to perform a successful transition towards a steady state economy on national level (Victor 2008). In practice, the first step must be to accept the limits of growth. This can only be achieved by education and changing humans' behavior to less competitive and more cooperative patterns of thinking. Additionally, some sufficiency on individual level is required to achieve positive change. Material sufficiency itself does not limit someone's ability to flourish, in contrast it can free him or her from the abundances and dependencies of consumer goods and open up new possibilities of satisfaction (Paech 2012).

As Milton Friedman, American economist and statistician, states "Only a crisis—actual or perceived—produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around. That, I believe, is our basic function: to develop alternatives to existing policies, to keep them alive and available until the politically impossible becomes

the politically inevitable" (Friedman 1982). When the recent crisis emerged in 2008, humanity has not been prepared properly. No worked out strategies or blueprints for a different kind of economy were available. But now, "the economic crisis presents a unique opportunity to address financial and ecological sustainability together" (Jackson 2009). For the next time, better preparation is indispensable to avoid a catastrophic and socially unacceptable collapse of the currently unsustainable system. A smooth transition via degrowth towards a steady state economy is only possible with a concrete set of ideas how such a society should look like and necessary steps for its realization. As an example, declining individual working hours due to the economic crisis were unintentional but in accordance with the idea of a SSE. In other words, the crisis itself opened up the opportunity for substantial change. But, in order to provide a transition which is socially acceptable and sustainable in the long-run, these emerging opportunities in times of crises have to be utilized by sound ideas and actions.

Several economists and scientists worked out solution approaches and partly detailed blueprints—describing which initial steps are required to achieve a steady state economy that strives for an equitable and sustainable well-being as the ultimate goal (Jackson 2009; Paech 2012; Alexander 2013; Dietz and O'Neill 2013; Hopkins 2013; D'Alisa *et al.* 2014). Some of them were mentioned and discussed throughout this work. But further serious research attempts and finalizing of these ideas must be supported, as well as offering pioneers a platform to share their visions with the general public. National governments, international institutions, the media and society itself have to tackle this challenge in a cooperative approach. Now, not later.

7 APPENDIX

7.1 ZUSAMMENFASSUNG

Die vergangenen Jahre waren weltweit gekennzeichnet von ökonomischen und gesellschaftlichen Krisen, sowie einem drastischen Anstieg von Umweltproblemen. Zurückzuführen sind diese Missstände auf die Unfähigkeit des derzeitigen ökonomischen Wachstumsmodells Krisen und Zerstörungen zu vermeiden. Es ist daher an der Zeit, dass dieses durch ein widerstandfähigeres und auf Nachhaltigkeit ausgerichtetes System ersetzt wird, welches zudem Möglichkeiten zur individuellen Entfaltung fördert, gesellschaftliche Bedürfnisse befriedigt und weitere Umweltzerstörung verhindert. Doch trotz der physikalischen Grenzen bezüglich stetigen Wachstums sprechen sich die meisten nationalen Regierungen, internationalen Organisationen und Finanzinstitutionen für ein Festhalten am derzeitigen ökonomischen Modell aus. Sie sehen anhaltendes Wachstum als Notwendigkeit um Wohlstand und Sicherheit der Bürger aufrechtzuerhalten – zu Lasten der Umwelt.

Ungeachtet der wachsenden Erkenntnis, dass das Bruttoinlandsprodukt kein adäquater Indikator ist um den Wohlstand und Entwicklungsstand eines Landes zu beurteilen, ist seine Berechnung und Anwendung noch immer weit verbreitet. Jedoch ist in einer Postwachstumsgesellschaft ohne weiteres Wachstumsbestreben (eng. *steady state economy*) die Zukunft des BIP irrelevant, wodurch die Schaffung einer alternativen Methode notwendig wird um den Fortschritt hin zu solch einer Gesellschaft wissenschaftlich beurteilen zu können. In dieser Arbeit wird der Versuch unternommen das theoretische Konzept des Ökonomen Dan W. O'Neill in die Praxis umzusetzen und auf seine Realisierbarkeit hin zu untersuchen. Des Weiteren wird versucht den derzeitigen Fortschritt hin zu einer Postwachstumsökonomie, welche in den Industrienationen auf einer Verkleinerung der Gesamtwirtschaft (engl. *degrowth*) beruht, zu erfassen. Der Evaluierungsprozess besteht aus der individuellen Analyse und Beurteilung von fünfzehn verschiedenen sozialen und biophysikalischen Indikatoren. Er wird für die beiden größten deutschsprachigen Länder, Deutschland und Österreich durchgeführt.

Die Ergebnisse dieser Arbeit zeigen, dass zwischen 2004 und 2013 beide Länder eine wünschenswerte Entwicklung bezüglich der meisten sozialen Indikatoren erfahren haben. Unter anderen beinhalten diese die Arbeitslosenquote, Arbeitszeit, und Zufriedenheit mit der nationalen Demokratie. Im Gegensatz dazu zeigt der Großteil der biophysikalischen Indikatoren eine nicht erstrebenswerte Entwicklung, wie beispielsweise die Materialverbrauchsraten, das Verhältnis des ökologischen Fußabdrucks zur Biokapazität, sowie der Viehbestandsindex. Der direkte Vergleich zwischen den beiden untersuchten Ländern zeigt, dass in Deutschland die Entwicklung von neun der fünfzehn Indikatoren als erstrebenswert in Bezug auf eine nachhaltige Postwachstumsökonomie beurteilt werden

kann. In Österreich hingegen sind es nur fünf. Beim Blick auf die absoluten Zahlen wird jedoch deutlich, dass Deutschland einen vergleichsweise längeren Weg zu gehen hat, hin zu einem nachhaltigen Wirtschaftssystem der Zukunft, als Österreich.

Zusätzlich zeigt die Arbeit auf, dass es bezüglich der Entwicklung einiger Indikatoren eine mögliche Korrelation zu der Finanz- und Wirtschaftskrise von 2008 gibt. Besonders die Flussindikatoren (Treibhausgasemissionen, Materialverbrauch und Primärenergieverbrauch) zeigen einen deutlichen Einfluss der Krise bei Betrachtung ihrer allgemeinen Trends über die letzte Dekade. Jedoch auch die Entwicklungen einiger Sozialindikatoren, wie beispielsweise die Arbeitszeit, weisen einen potentiellen Zusammenhang zur Krise auf.

In dieser Arbeit wird gezeigt, dass die zwanghafte Aufrechterhaltung des ökonomischen Wachstumsmodells keine ernsthafte Option für eine nachhaltige Zukunft der Menschheit ist. Die Ereignisse der Finanz- und Wirtschaftskrise könnten dabei helfen erste Schritte hin zu einer erfolgreichen Postwachstumsgesellschaft zu gehen. Dazu sind jedoch viele neue und alternative Ideen unabdingbar. Einige von diesen werden im Verlauf der Arbeit aufgegriffen und anhand dieser gezeigt, dass die Idee einer nachhaltigen Postwachstumsökonomie ohne Wirtschaftswachstum keine Utopie ist. Es ist vielmehr ein erreichbares Zukunftsszenario, welches in einem internationalen und kooperativen Ansatz von allen Beteiligten erreicht werden kann.

7.2 RAW DATA

The following tables include the raw data and calculated relative data used throughout this work. Additionally all data sources are added in the description of the corresponding tables.

Table 3 Raw data: Ultimate Means. Data for Austria and Germany concerning *Direct Material Input* in thousand metric tons (Eurostat), *Total GHG Emissions* per capita in metric tons (OECD), and *Primary Energy Consumption* in tons of oil equivalent (Eurostat). For further analysis, data of *Primary Energy Consumption* and *Direct Material Input* was adjusted by population data (**Table 4**) to *per capita* units.

	Direct Material Input [thousand metric tons]		**Total GHG Emissions per capita [metric tons]**		**Primary Energy Consumption [tons of oil equivalent]**	
	Austria	*Germany*	*Austria*	*Germany*	*Austria*	*Germany*
2004	29,863	534,496	11.21	12.36	31.4	320.0
2005	30,722	530,469	11.25	12.06	32.6	317.2
2006	31,290	534,023	10.85	12.17	32.5	327.6
2007	30,891	528,389	10.48	11.87	32.2	310.3
2008	30,286	530,263	10.42	11.93	32.5	315.2
2009	29,456	499,948	9.58	11.14	30.5	296.0
2010	30,649	506,175	10.11	11.58	32.7	311.1
2011	31,347	518,808	9.85	11.36	31.9	294.7
2012	31,700	511,518	9.50	11.46	31.8	297.6
2013	32,025	512,326	-	-	31.9	302.5

Table 4 Raw data: Intermediate Means. Data for Austria and Germany concerning *Area for construction and transportation* (ACT), respectively *Area for settlement and transportation* (AST) in percentage of total area (Umweltbundesamt/Statistisches Bundesamt), *Population* at 1st January (Statistik Austria/Statistisches Bundesamt), and *Livestock Production Index* (LPI) in relative values (World Bank).

	ACT (AT) & AST (GER) [% of total area]		**Population**		**LPI (2004-2006 = 100)**	
	Austria	*Germany*	*Austria*	*Germany*	*Austria*	*Germany*
2004	5,00	12.78	8,142,573	82,531,671	99.0	100.2
2005	5,06	12.90	8,201,359	82,500,849	101.5	100.2
2006	5.10	13.00	8,254,298	82,437,995	99.5	99.6
2007	5.15	13.10	8,282,984	82,314,906	102.7	102.2

2008	5.20	13.20	8,307,989	82,217,837	99.4	104.2
2009	5.26	13.28	8,335,003	82,002,356	101.1	105.7
2010	5.30	13.36	8,351,643	81,802,257	103.3	108.0
2011	5.34	13.43	8,375,164	81,751,602	106.6	110.5
2012	5.36	13.50	8,408,121	80,327,900	105.6	109.7
2013	5.39	13.57	8,451,860	80,523,746	-	-

Table 5 Raw Data: Intermediate Ends - Part I. Data for Austria and Germany concerning the *S80/S20 income quintile share ratio* (Eurostat/EU-SILC), *Severely materially deprived persons* (SMDP) as percentage of total population (Eurostat), and *Working time* in hours per year (OECD).

	S80/S20 income quintile share ratio		**SMDP [% of total population]**		**Working time [hours per year]**	
	Austria	*Germany*	*Austria*	*Germany*	*Austria*	*Germany*
2004	3.8	-	3.4	-	1786	1436
2005	3.8	3.8	3.0	4.6	1772	1431
2006	3.7	4.1	3.6	5.1	1761	1424
2007	3.8	4.9	3.3	4.8	1771	1422
2008	3.7	4.8	6.4	5.5	1771	1422
2009	3.7	4.5	4.8	5.4	1692	1383
2010	3.7	4.5	4.3	4.5	1674	1407
2011	3.8	4.5	3.9	5.3	1696	1406
2012	4.2	4.3	4.0	4.9	1699	1397
2013	4.1	4.6	4.2	5.4	1623	1388

Table 6 Raw Data: Intermediate Ends - Part II. Data for Austria and Germany concerning the *Level of trust* reported as self-assessment on scale of 0 to 10 (ESS), *Satisfaction concerning national democracy* as percentage of satisfied people in relation to total population (ECSE), and *Unemployment rate* as percentage of total population (Eurostat).

	Level of trust [Scale 0-10]		**Satisfaction concerning national democracy [% of satisfied people]**		**Unemployment rate [% of total population]**	
	Austria	*Germany*	*Austria*	*Germany*	*Austria*	*Germany*
2004	5.1	4.8	64/72	51/61	4.9	10.5
2005	-	-	68/---	53/---	5.2	11.3
2006	5.2	4.8	75/---	55/---	4.8	10.3
2007	-	-	---/80	---/66	4.4	8.7
2008	5.1	4.9	---/---	---/---	3.8	7.5
2009	-	-	---/76	---/68	4.8	7.8
2010	-	4.7	78/---	62/---	4.4	7.1
2011	-	-	---/73	---/68	4.2	5.9
2012	-	5.0	67/70	70/70	4.3	5.5
2013	-	-	74/73	72/70	4.9	5.3

Table 7 Raw Data: Ultimate Ends. Data for Austria and Germany concerning the *Satisfaction of life* as percentage of satisfied people in relation to total population biannually (ECSE), and *Life expectancy* in years annually (Eurostat).

	Satisfaction of life [% of satisfied people]		**Life expectancy [years]**	
	Austria	*Germany*	*Austria*	*Germany*
2004	---/85	---/85	78.7	78.6
2005	86/84	83/79	78.9	78.7
2006	85/83	82/81	79.4	79.2
2007	84/87	86/83	79.6	79.4
2008	82/79	82/85	79.9	79.5
2009	83/85	84/85	79.8	79.6
2010	84/87	87/88	80.1	79.8
2011	87/83	88/88	80.4	80.1
2012	85/85	89/89	80.3	80.2
2013	84/83	89/89	-	-

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Curriculum Vitae – Ralph Tigges

Education

2001 – 2008	High school, Gymnasium Athenaeum Stade, Germany
2008 – 2011	University, University of Göttingen, Germany
	Topic of bachelor thesis: "Expression and Purification of protein P1 of *Entamoeba histolytica*", elaborated at the Department of Molecular Structural Biology at the University of Göttingen, overall grade of Bachelor's examination: very good (1.4)
Since 2012	University, University of Vienna, Austria
	Topic of master thesis: "Pathway towards a steady state economy through degrowth in Germany & Austria and how to measure its progress", elaborated at the Department of Anthropology at the University of Vienna

Work experience

02/2012 – 03/2012	Conservation Volunteers New Zealand (CVNZ), Auckland, New Zealand
	Various nature conservation projects
Since 01/2015	Meininger Hotel & Hostel, Vienna, Austria
	Receptionist

Languages

German	Mother tongue
English	Fluent
French	Basic Knowledge

Other Interests

Traveling

Basketball & Swimming

Photography